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Kordofan Region Agricultural Marketing and Transport Study

Submitted to:
United States Agency for
International Development
Khartoum, Sudan

Submitted by:
Louis Berger International, Inc.
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MARCH 1983

K O R D O F A N



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March 31, 1983

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Officer
U.S. Agency for International
Development
American Embassy
Khartoum, Sudan

Dear Mr. Witt:

Re: Kordofan Region Agricultural Marketing
and Transport Study
Project Number PD and S 698-0135
Contract No. 630-AID

We are pleased to submit ten copies of our final report for the above project, in accordance with our Fixed Price Technical Services Contract dated 30 September 1982, and our letter of 20 October 1982.

This study was performed by the following members of our staff:

Agricultural Marketing Economist/
Agri-Business Specialist

Mr. Noel Sanborn

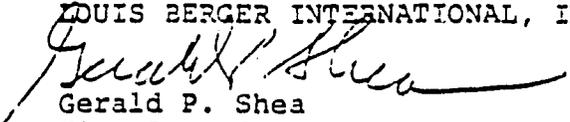
Transport Economist

Mr. Roger Colin

A draft report was submitted by them before they left Khartoum during the latter half of January.

We were pleased to perform this study for your office, and look forward to providing additional services in the future.

Sincerely,
LOUIS BERGER INTERNATIONAL, INC.


Gerald P. Shea
Vice President

GPS:js

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Dr. Edward B. Reeves of the University of Kentucky in Lexington contributed most materially to the final report, writing the chapters on Agricultural Production Systems in Kordofan Region, Rural Agriculture' Marketing in Kordofan Region, and Distribution of Farm Inputs. Dr. Reeves generously shared his extensive knowledge of rural marketing in the El Obeid area with us, providing a well-analyzed basis for comparing markets in other areas of Kordofan.

We also owe a major debt of gratitude to our counterparts from the Ministry of Agriculture, and Elhanan Mohamed Mahmoud, whose insights, guidance, and logistical and moral support both in Khartoum and in the field were invaluable to the completion of our work. Farouk Shomo, also of the Ministry of Agriculture, and Mr. Khalid of the Regional Ministry of Agriculture in El Obeid provided lengthy and timely assistance with our field work in Kordofan. We are also very grateful to Dr. El Tag, Regional Minister of Agriculture, for his valuable input and for the input and logistical support of his staff in El Obeid.

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EXECUTIVE SUMMARY

There are four types of production systems producing major field crops such as groundnuts, sesame, millet, and sorghum, as well as gum arabic and livestock. Traditional farming is the dominant production system in the Kordofan Region producing all of the area's production system in the Kordofan Region producing all of the area's and most of the sorghum. Traditional farming is done by a single family on a small plot of land using minimal inputs. Modernized traditional farming is found in South Kordofan Province in areas where the Nuba Mountains Agricultural Corporation has distributed cotton seed and other inputs to traditional farmers. The family is still the principal production unit, and most families have their lands plowed by tractor and disc, planting their fifteen-feddan plots with cotton and sorghum.

Mechanized farming has been introduced in South Kordofan on tracts of land encompassing several hundred or even a thousand or more feddans. Tractor and disc are used to cultivate primarily sorghum, although small quantities of sesame and occasionally millet are also planted. The fourth production system addressed in this analysis is nomadic herding, which encompasses 17 percent of the region's human population and about 80 percent of the livestock. The nomadic herders generally live in South Kordofan most of the year, coming north during the rainy season where they sell animals and buy consumer goods.

Sesame, groundnuts, gum arabic, and other cash crops are marketed through village crop buyers, agent/transporters, urban crop buyers, rural auction markets, and urban auction markets. These crops are sold in their entirety and eventually are processed in urban centers and/or exported. The village crop buyers, agent/transporters, and urban crop buyers provide informal markets where a farmer or rural intermediary sells his crops. The rural and urban auction markets are government-administered markets for cash crops and serve the additional purpose of being tax collection centers.

There are no official markets for millet and sorghum. Traditional farmers market only a fraction of their sorghum and often none of their millet. They usually sell to village crop buyers or agent transporters although those with larger surpluses sell to urban crop buyers. Scheme owners are themselves merchants and will sell to urban crop buyers throughout the Kordofan and Darfur as well.

Groundnuts are the most important cash crop grown in the Kordofan. About one-third of the crop is exported in seed form and another third is processed into oil, 25 percent of which is eventually exported. Thus, the international price determines prices throughout the marketing chain. The marketing system seems to work fairly efficiently although traditional producers are often forced to sell their crop immediately after harvest when prices are lowest in order to pay off debts.

Sesame prices are also influenced by world prices for seed and oil. Marketing is basically identical to that of groundnut marketing, and farmers have the same difficulty holding on to their crop until prices reach maximum levels. Both groundnut and sesame oil processing suffer from severe over-capacity. The average capacity utilization rate is approximately 20 percent, although during good crop years, much of the excess seed is processed and more capacity is employed.

Gum arabic marketing is initially the same as for groundnuts and oilseed, the primary difference being that 100 percent of the gum is exported through a 37 percent state-owned government monopoly. All prices are set by the monopoly, and the merchants buying at auction markets and selling to the Gum Arabic Company in Port Sudan collude to keep auction market prices very close to the floor price. The government claims 25-50 percent of the gum arabic export price in the form of taxes and dividends from the Gum Arabic Company. This percentage has declined to about 25 percent in recent years. Producers have received 32-40 percent of the export price during the last five years. Reduced government taxation and correspondingly higher floor prices would encourage producers to collect more gum.

Millet is an important food crop in North Kordofan, where it is preferred over sorghum by farmers. Farmers grow millet for their own consumption and will sell it only if they have a surplus or if they have had a poor crop and need to sell millet and purchase lower cost sorghum in order to ensure an adequate food supply for their families. Thus, only 10-15 percent of millet grown is commercialized. Because prices for millet are high, and consumers do not seem to share the farmers' taste preference for it, millet trading is not an active business for urban grain merchants.

Sorghum is grown by most traditional farmers in the Kordofan and by large scheme owners as well. Traditional farmers market only about 25 percent of their sorghum crop through village merchants, visiting merchants, or, occasionally, directly at the urban crop market. The bulk of the marketable surplus of sorghum, generated by the scheme owners at Habila, is sold directly to urban buyers.

Both sorghum and millet experience price increases of 100 percent or more four to six months after harvest. These increases appear to be due more to hoarding and price speculation than to actual shortages, storage costs, or storage losses. Producers get little if any benefit from these price gains as they generally have sold their crop early in order to generate needed cash. This practice appears to be an area where a system of government price supports and a government-managed stockpile could boost farmer incomes, ensure adequate grain supplies, and reduce seasonal price increases.

Livestock marketing in the Kordofan closely follows the seasonal movements of the nomadic herders. The herders come north during the rainy season to escape biting flies and to take advantage of northern pastures. Animals are sold both informally and through government-administered auction markets in the larger towns. Cattle are sold at auction in most of the government markets although sheep, goats, camels, donkeys, and horses are traded by negotiation. The highest quality sheep and cattle move on to Omdurman, and many are eventually exported via Fort Sudan. At present, most of the animals trek the distance, although a World Bank program will soon greatly increase livestock transport by rail. This business appears to be lucrative for livestock merchants although they do incur risks of price fluctuations and animal mortality.

Slaughtering of animals is done under simple conditions at licensed slaughterhouses in major towns. There is a lot of illegal slaughter as well, but most of the rural slaughter is licensed. It is illegal to slaughter goats in El Obeid and some other towns because butchers have been known to sell goat meat as higher-priced mutton. Of course goats are still slaughtered there, albeit illegally. The price of meat is government controlled, but the controls are rarely enforced.

There is a minimal dairy industry in the Kordofan although demand for milk is high. Farmers get milk from their goats and cattle while most urban consumers buy powdered milk. There appears to be potential for expansion of the dairy industry, at least in the El Obeid area.

The leather industry in the Kordofan is underdeveloped. There is no large tannery capable of properly treating cattle hides. Most skins are purchased by a small group of merchants and either sold to government tanneries in Khartoum or exported.

There are three major marketing constraints facing traditional farmers. These constraints are lack of affordable credit; lack of prompt information on market prices; and arduous, expensive transportation. In addition to these three systemic constraints, there are inefficiencies associated with particular crops and marketing systems.

The Agricultural Bank is currently loaning money to small farmer cooperatives in the Umm Ruwaba and El Obeid areas to finance groundnut and sesame crops. This program has been successful at increasing the area of land the farmers can cultivate and raising farm incomes by allowing the farmers to sell their crops months after harvest when prices are higher. Expanding this program to include additional crops and a broader geographical area would inject capital where it is needed most--at the small producer level.

Traditional farmers get market price information by word of mouth. Lack of prompt and reliable price information delays their ability to respond to changes in the market. It is also very difficult for extension services to reach farmers. A daily radio program discussing prices at all the important Kordofan markets and Khartoum, explaining developments in relevant world markets, and giving detailed advice on new cultivation techniques would be of great assistance to the farmer.

Crop-specific marketing constraints also hamper the farmers. Groundnut seed stock is 20 years old, and quality has greatly deteriorated, reducing both the yields and quality of the seed produced. Poor quality reduces revenues from export markets. The setting of prices throughout the gum arabic marketing system is not properly coordinated to maximize foreign exchange earnings, producer incomes, and public benefits from land conservation. An integrated approach is needed for gum arabic pricing.

Sorghum and millet are subject to hoarding and price speculation, with few of the benefits being passed down to the producers. A government floor price and stockpile could be used to regulate prices to more reasonable fluctuations. Agricultural Bank loans to Habila scheme owners are used to finance some of this speculation and should be revised. There is also a shortage of properly pestcontrolled storage space for grains, leading to unnecessary losses.

Most traditional farmers in the Kordofan spend an inordinate amount of time and money procuring water. Increasing water supplies in strategic areas would allow farmers to divert this money and effort to more productive enterprises.

Kordofan is characterized by an almost complete absence of graded or paved roads. There is nevertheless a lot of traffic utilizing a relatively dense network of tracks running on the natural sand or clay soils. Small trucking companies owning from one to four souk lorries will go almost anywhere to transport the crops from the field to the market centers (for which they charge about Ls 0.70 per ton/km) or to get involved in long distance transport from market center to market center (at the cost of Ls. 0.20 per ton/km). The transport operators earn extra revenues by taking passengers, who travel on top of the loads.

These rates may seem high, but computation of the truck operating costs show that the rates reflect the very difficult driving conditions on these rudimentary tracks as well as the high cost of diesel fuel which is available only on the black market.

Rail transport has not displayed the same efficiency, and service levels have gone down during the last 10 years. The single track which crosses Kordofan (with a branch to El Obeid) is in poor condition and the cause of many derailments. The availability of wagons and locomotives is low because of lack of maintenance,

resulting in long waiting periods to obtain empty wagons. As the Sudan Railways Corporation (SRC) gives priority to cash crops over other products and as big merchants involved in exports also get preferential treatment, export traffic has not suffered too much from the deterioration of service.

Evaluation of the existing transport system tends to indicate that truck transport is available, but expensive. Considering the high construction costs of roads and the low tonnages (as production is spread over vast areas), there is limited room for improvement of the infrastructure. It seems, nevertheless, that a maintenance unit equipped with tipper trucks could do an efficient job, at least in Southern Kordofan, at grading the tracks after the rainy season. The unit could also build light feeder roads adapted to 10 to 15 ton vehicles. Such a unit would represent an investment of about \$4 million (including technical assistance and two years of working funds).

As for the railroad, it is appropriate to continue with the existing local currency program which will result in material improvement of the western network -- keeping in mind that only policy changes (lowering labor costs, improving management, setting appropriate rates) could have the necessary long lasting positive impact on nationwide SRC operation.

CHAPTER 1

INTRODUCTION

1.1 Purpose

The purpose of this study is to analyze the structure, conduct, and performance of agricultural marketing and transportation systems in the Kordofan Region. The analysis is intended to identify and define policies and investment opportunities that will improve the efficiency of agricultural marketing and transport and increase the benefits accruing to traditional farmers over both the short and long term.

1.2 Scope of the Study

The study has focused on the marketing of three cash crops (groundnuts, sesame and gum arabic), two food staples (sorghum and millet), and livestock. When appropriate, it has addressed processing and storage issues. The study has also examined in detail the functioning of road and rail transportation systems, particularly in regard to transportation of agricultural commodities. An analysis of the system for distributing agricultural inputs, particularly the pesticide Aldrex-7, has been included as well.

1.3 Structure of the Report

This draft report presents the analysis of the agricultural marketing and input delivery systems. It begins with an overview discussion of crop production and marketing systems. Next it describes and analyzes the marketing systems for oilseeds, gum arabic, sorghum and millet, and livestock. It then addresses input delivery systems. This is followed by three chapters addressing the Kordofan highway network, transport activities, and the railroads respectively. The final chapter is a summary of conclusions and recommendations.

CHAPTER 2

AGRICULTURAL PRODUCTION SYSTEMS IN KORDOFAN REGION

2.1 Introduction

As a preface to the discussion of marketing that follows, this chapter describes the agricultural production systems found in Kordofan Region. There are five types of production systems producing major field crops such as groundnuts, sesame, millet, and sorghum as well as gum arabic. This analysis is not concerned with horticulture or irrigated gardening. One of the five production systems has to do with livestock raising and seasonal migration in search of pasture. Nomadic herding may or may not be associated with cultivation.

2.2 Four Types of Production Systems

2.2.1 Traditional Farming : This production system consists of smallholder agriculture employing hand tools without animal traction. Livestock (particularly donkeys and goats) are most important. Ownership of cattle or sheep usually indicates that the farmer is relatively prosperous. In the El Obeid area, for example, a recent study* reports that 85 percent of the farmers own cattle, 20 percent own sheep, 62 percent own donkeys and 80 percent own goats.

Our investigation turned up several sub-types of traditional farm production. The sub-types can be related to different geographic areas.

In El Obeid District, the average cultivated landholding of a household head is 16 makhammas (1 makhammas = 1.8 feddans). The four most common crops are millet, sorghum, sesame, and groundnuts. The two cereals are primarily subsistence crops with surpluses sold to shopkeepers and at local markets. Millet is the preferred staple of the rural diet, and the stalks of the millet plant are used as building material. While nearly all farmers use one-third to a half of their cultivatable area for millet, sorghum is given much less prominence. A red sorghum variety is popular for beer-making, an important village trade, while a white variety is preferred for making porridges. Sorghum is also an important animal fodder; both the seed and the stover are used for this purpose. In recent years, groundnuts have been gaining importance in the El Obeid area after several years of high prices for the exported crops.

Yields in the El Obeid area are probably typical for farm production across the entire belt of Qoz (sandy) soil. In the 1980-81 season, the following yields were noted:

*Reeves, Edward B. and Timothy Frankenberger; 1982 Farming System Research in North Kordofan, Sudan, Report No. 2, College of Agriculture, University of Kentucky.

<u>Crop</u>	<u>Avg. Yield</u> (kantars)	<u>Range</u> (kantars)
Millet	2.05	0.00 - 5.40
Sesame	1.91	0.07 - 3.78
Sorghum	1.96	0.25 - 5.40
Groundnuts	6.58	1.67 - 15.83

Land pressure is becoming a serious problem in the El Obeid area. The following period is being shortened, and gum arabic is not being harvested due to its low producer price. Many gum arabic trees have been cut down and the wood sold for construction and fuel. The sesame and groundnuts cultivated on the cleared land bring much higher returns.

In En Nahud District, farm production closely resembles that found in the El Obeid District except that groundnuts take leading importance as a market crop. Millet is grown for subsistence, but surpluses are sold locally. Interviews with farmers in a number of villages indicated that those with sufficient financial resources generally liked to plant groundnuts and millet in a ratio of 2 to 1. Average yields for these two crops appear to be about the same as in the El Obeid area. En Nahud is a Qoz soil region where acacia senegal is a native plant. Gum arabic is therefore an important product.

As in El Obeid District, the rural population of En Nahud is not self-sufficient in growing millet and depends for some months of the year on purchases of feterita* sorghum which is hauled from El Obeid or Habila. Unlike El Obeid District, which is rather densely settled, En Nahud District has a population density of 5-6 persons/square kilometer. Villages are clustered around rural marketing centers, and these clusters are typically separated by huge tracks of fallow land. Clearly, increased agricultural production through increasing the area under cultivation is a real prospect in this district, although water availability is a major constraint.

Traditional farming in Kadugli District shows several striking contrasts with the Qoz soil areas. Farming is performed on sandy soils but also on dark, cracking clay soils. The principal crop is sorghum, of which there are three local varieties (kulum, kurge, and aish abyad) in addition to the feterita type. The farmer's basic aim is to produce enough to meet his family's annual requirements for grain. Farmers interviewed by the Consultants said that in general they are able to do this because the fertile clay soil yields about 5 sacks of sorghum per feddan. A family of six requires as much as 20 sacks of feterita to feed itself during one year. Therefore, most families plant at least 4 feddans of this crop annually. Surplus sorghum is sold to shopkeepers or traders at the Kadugli market. Limited amounts of sesame and groundnuts may also be grown for the household to consume or to sell locally.

*Feterita is the most widely available and lowest priced variety of sorghum grown in the Kordofan.

Dried okra is also an important market crop in the area. Large amounts of it are trucked north to markets at Kosti and Khartoum. Gum arabic is not a product in this district. During the four to five months of the rainy season, the heavy clay soil becomes a viscous mud, and truck transportation essentially ceases during this time. Thus the traditional farmers in Kadugli District are more subsistence oriented and less oriented to the market than are farmers in En Nahud and El Obeid Districts.

2.2.2 Modernized Traditional Farming : This production sub-system is found in South Kordofan Province in areas where the Nuba Mountains Agricultural Corporation has distributed cotton seed and other inputs to traditional farmers. The purpose of the program is to promote cotton production by smallholders on the dark clay soils of the area. The Nuba Mountain Agricultural Corporation has received huge tracks of land for this purpose. In the 1982-83 season 20,000 feddans were planted in cotton from which a production of 50,000 small kantars (50 kg.) has been estimated. The program also permits farmers to grow an area of sorghum equal to that of cotton in order to meet their subsistence needs. About 20,000 farmers are currently participating in the program.

The average family of 5-6 persons is allotted 15 feddans:

5 feddans cotton
5 feddans sorghum
5 feddans fallow

The Nuba Mountain Agricultural Corporation offers farmers several subsidies and services. Of particular noteworthiness is the corporation's efforts to introduce the use of mechanized cultivation to smallholders. Nearly three-quarters of the farmers now participating in the program have their land plowed by tractor and disc. The remainder of the farmers, who do not use mechanical cultivation, plant both cotton and sorghum by traditional hand methods. The following is a list of the inputs and subsidies provided to farmers who participate in the program:

Cotton seed	provided in kind
Clearing	2-3 Ls/feddan
Weeding	2 Ls/feddan
Spraying	performed by specialists
Chemicals	provided in kind
Mechanical cultivation	tractor, driver, and disc
Sacks	provided in kind

Farmers not having their land plowed by machine still receive the other subsidies.

The economic status of these modernized smallholder farmers is hard to assess. The cotton crop is ginned at the Corporation mills and stored in its warehouse at Dubeibat after being transported northward on the paved highway from Kadugli to Dubeibat. In recent years, the inadequate government floor price for cotton has discouraged farmers who have decreased their output. Sorghum grown on clay soil is the most important substitute for cotton, and farmers market the surplus sorghum.

2.2.3 Mechanized Farming : This production system refers to producing sorghum (and sometimes millet and sesame) on large tracts of several hundred feddans or more, aided by tractor and disc. Weeding and harvesting operations are performed by hand using migrant labor. Mechanized farming is found in South Kordofan on clay soils around the 600 mm. isohyet. The Mechanized Farming Corporation has created a vast mechanized farming area at Habila in Dilling District. The area contains 28 schemes of 1,000 feddans that are operated as state farms or are leased to private operators. More important than these are the 370 private schemes of 1,000 feddans each and the 130 directed schemes of 1,500 feddans each. The latter participate in a World Bank program which provides financing, inputs, and storage of the crop. In addition to these schemes at Habila, which are overseen by the Mechanized Farming Corporation, 1,000 "undemarcated" schemes of 200-300 feddans each are located in Dilling District. The farmers of these tracts have paid a use fee to the district council and, of course, pay taxes on the production of their schemes.

Mechanized farming in Kordofan does not use fertilizer, and the soil becomes less productive with each successive season of planting. Fallowing is the only method for restoring fertility to exhausted land. On the schemes overseen by the Mechanized Farming Corporation, farmers are encouraged to fallow previously cropped land. On the undemarcated schemes, fallowing seems to be a rare practice. When the land is exhausted, it may be more economical to shift to a new area. Sorghum yields on clay soil in the mechanized schemes may vary greatly from, for instance, two to eight sacks per feddan. Differences in soil fertility at least partially account for this. Four to five sacks per feddan appears to have been an average yield during the 1981-82 season.

2.2.4 Nomadic Herding

About 17 percent of the population of Kordofan Region consists of livestock herders living in scattered encampments. These nomads migrate seasonally with their herds. From the point of view of marketing, the region's most important movement of livestock is the North-South route taken by the Baggara tribes. During the dry season (December to May), they are encamped below the latitude of 11°N (Kadugli). Then, with the onset of the rain, they move northward stopping at market towns to buy or sell livestock as required. Their object is to travel as far as North Kordofan (13°N latitude) in the vicinity of El Obeid. Here they get the best prices for their stock; milk can be sold to cheese factories;

and urban manufactured goods which the nomads wish to buy are cheapest. Promptly, as the rainy season ends in the north (September), the nomads and their herds begin to migrate Southward toward the secure watering points where they make dry-season encampments.

CHAPTER 3

RURAL AGRICULTURAL MARKETING IN KORDOFAN REGION

3.1 Introduction

The present chapter is a discussion of rural agricultural marketing from the standpoint of its overall structure and organization. Subsequent chapters are concerned with specific commodity markets, transportation, and the distribution of agricultural inputs. This analysis is mainly concerned with identifying the marketing channels through which agricultural commodities flow from the farm or nomad camp to markets in a major town, such as En Nahud, El Obeid, or Umm Ruwaba. It is important to note that livestock marketing is undertaken through a different set of channels than are crops and, therefore, will be treated in a separate section.

3.2 Crop Marketing

The farmer interacts with five different types of marketing institutions and marketers in order to sell his crops:

<u>Market</u>	<u>Crop</u>				
	Sesame	Groundnuts	Gum Arabic	Sorghum	Millet
1. Urban crop buyer	x	x	x	x	x
2. Village crop buyer	x	x	x	x	x
3. Agent/transporter	x	x	x	x	x
4. Urban crop auction market	x	x	x		
5. Rural crop market	x	x	x		

Each of these channels is significant to a greater or lesser degree for the cases of sesame, groundnuts, and gum arabic. These crops are taxed at the point of sale, and tax revenues are used to finance district and local government operations. Owing to this, these crops are often sold at government administered markets that are located both in the major urban centers as well as in strategically established village markets where prices are determined by auction. The urban crop auction markets operate six days per week. Rural crop markets usually operate on a periodic schedule of two auctions per week, and the schedules of neighboring markets are coordinated so that they do not conflict. For example, if one market is held on Sunday and Wednesday, its neighbor is scheduled for Friday and Monday.

The situation is quite different for the cereals (sorghum and millet) since official markets do not exist for these crops. In the case of traditional farmers and modernized traditional farmers, cereals are considered to be a subsistence crop and remain untaxed, even though a small percentage of the output, which is surplus, will eventually find its way into the market. In the case of mechanized farming - largely commercial sorghum farming - taxes are assessed not at the point of sale but on the basis of yields estimated while the crops are still standing in the field. Because of this provision, the commercial sorghum crop is marketed entirely through private channels, and there are no government sponsored auction markets. The same thing can be said for millet although this crop has little market importance in Kordofan. The marketing of millet produced in the Qoz area of Kordofan probably does not exceed ten percent of the annual production.

3.2.1 Urban Crop Buyers

Except for gum arabic, which is bought by a parastatal monopsony, crops are ultimately purchased by urban-based merchants generally having capital in excess of Ls 10,000 who are mainly concerned with purchases in large quantities for speculation (storage and shipment), processing, and export. An urban crop buyer may tend to emphasize a certain crop - for example, groundnuts - but it is likely that he buys all crops indiscriminately if the prices are attractive. The urban crop buyers in Kordofan Region constitute a hierarchy that has both geographic and economic dimensions. The merchants with limited working capital usually act as agents for the merchants with more capital. These larger merchants in turn are agents for major exporting firms located at Khartoum and Port Sudan.

The direct sale of crops by smallholder producers to large urban buyers is probably a rarity in El Obeid District, although it may occur somewhat more frequently in En Nahud District for groundnuts. The arrangement of transportation may be a problem: if the urban merchant's warehouse is busy receiving crops, the trucks may have to wait in line. Truck drivers usually refuse to allow their trucks to become tied up in this way. Another problem is that the farmers may not want to sell a quantity large enough to attract the urban merchant's interest. For these reasons, then, the small farmer sells crops to other marketers who in turn sell to the big urban merchant either in a direct sale or through an auction market. The most important buyer of the marketable surpluses of smallholders is the village crop buyer. Usually, this person is a shopkeeper or the owner of some other capital enterprise (e.g., a truck, a flour mill, an irrigated vegetable garden, or a livestock herd).

3.2.2 Village Crop Buyers

Many village shopkeepers in El Obeid District not only sell groceries and dry goods but also buy crops from local farmers. This is equally common in En Nahud District but may not be so in Kadugli District where the traditional sorghum cultivators appear more subsistence-oriented than do farmers in the Qoz area. Also, in Kadugli District the long rainy season interrupts the inflow of consumer goods, which no doubt discourages shopkeeping.

The village shop is the first-line buyer of virtually all crops that are grown by traditional farmers in Kordofan Region - such as sorghum, millet, sesame, groundnuts, roselle, cowpeas, watermelon seeds, and okra. Gum arabic is also an important commodity purchased by shopkeepers. Most crops sold directly to shopkeepers are bartered for consumer goods. The value of the crop is based on a local price which is pegged to the price that the crop would bring at the nearest auction market. It is to the farmer's advantage to sell his crop only in small quantities in order to pay for necessities early in the marketing season while the prices are low. This strategy helps him save his crop until after the prices have risen, which usually takes one or two months. Farmers with poor production will not market by any other means, but will continue to pay their consumption bill with their crops until their supply is exhausted. After that, they begin to sell their labor.

In El Obeid District it is common to find more than one shop in a village, not allowing the shopkeeper the advantage in crop buying of being monopsonist. Farmers were found to be well aware of the importance to them of competition among crop buyers. Thus, if a village has only one shopkeeper/crop buyer, it is likely that an extended family residing in the village will try to put one of its young men into business precisely to create competition.

Needless to say, village crop buyers have no significance at all in the operation of mechanized schemes. The sale of sorghum produced on the schemes is handled through urban merchants almost exclusively. In fact, most scheme operators are also sorghum merchants.

3.2.3 Agent/Transporter

Villages in which there is not a truck usually establish a relationship with a truck owner from a neighboring village. The truck owners buy crops that the village merchants have collected from sales at their shops. Typically, this agent/transporter pays the shopkeeper the current local price for the crop plus a commission. For example, in the El Obeid District the commission for sesame was two piastres per malwa* on a price of Ls 1.05 during December of 1981.

*A malwa is a dry measure equivalent to 4.125 liters.

The agent/transporter does not usually buy directly from farmers in the El Obeid area because he does not want to incur the cost of assembling the crop. In the groundnut producing area around En Nahud, purchases by this type of market may be more common since it is not essential for a farmer to produce a truck-load or more of groundnuts. However, in most instances, the farmer probably prefers to sell in the urban auction market in order to gain the highest price. The direct sale by farmers to an agent/transporter is most likely to occur late in the marketing season (March-May) in El Obeid area. At this time big farmers open their storage pits before the on-set of the rains and sell the remainder of their crops in order to pay for land clearing and planting as well as to buy sorghum while the price is still low.

3.2.4 Urban Crop Auction Market

Major government supervised crop auctions are held at El Obeid, En Nahud, Umm Ruwaba, and Er Rahad. These urban crop markets are concentrated in the Qoz region of Kordofan. They are primarily involved in the sale of groundnuts, sesame, gum arabic, and water-melon seeds. All of these are export commodities except for sesame, which is processed into oil for local consumption. The purpose of the auction market is to assist in the collection of taxes and to maintain floor prices for groundnuts, sesame, and gum arabic. The auction establishes a benchmark for prices of the various agricultural commodities, which is used as the basis for price calculations by farmers and crop buyers alike. Normally a village crop buyer will set his buying price by taking into account the current auction price less transport costs to haul the crop to the urban center plus his profit margin. The village crop buyers tend to use a low margin (e.g., 50 piastres per kantar) because their real profit is from storing the crop for several months. It is conceivable that they may also be evading taxation on some of the crops that they are selling. The option to sell in the urban market is one of the most important constraints that causes crop buyers to operate with small profit margins.

Traditional small farmers are of two opinions about selling at the urban auction market. On the one hand, they prefer it, if transportation is reasonable, because of the comparatively higher price. On the other hand, there are risks involved. During the Consultants' visit to En Nahud, the price of groundnuts plummeted from Ls 17/kantar to Ls 15/kantar. The farmers who were auctioning groundnuts refused the bids and held their crops over several days looking for an increase in the price. Some were unable to wait and had to sell because their families needed the money right away.

3.2.5 Rural Crop Market

Government administered rural crop markets have been established by the rural councils to be a chief source of tax revenues. The typical pattern in El Obeid District is to find a large rural crop market in the same village as the council headquarters while several satellite markets occupy secondary villages. The satellite markets are often set up near the boundaries of administrative districts

reflecting the competition between neighboring rural councils to capture a large tax base. In the majority of cases, the rural crop market establishes a sale price for each commodity by an auction procedure that is virtually the same as the one found in the urban market. Some of the rural markets, however, are better described as tax collection points. The crop is purchased by village shopkeepers and other buyers with no auction and no weighing of the crop. The weight of the crop is estimated from a rough calculation of its volume, and value of the crop is estimated based on the local market price, or, alternatively, on a price set for the season by the District Council. Taxes are assessed on the basis of the estimation. This system of taxation is called shiishna.

Prices at the rural crop market generally parallel those at the urban crop auction. At most rural markets, the prices set in the urban market are known the same day. Because the farmer has the option to take his crop to the urban market, there is a tendency for merchants to keep their profit margin low and to rely more on storing and tax evasion to gain a profit.

The rural crop market offers the farmers the opportunity to sell in quantity without incurring the cost of transporting the crop to the urban center and possibly being held up there if the price should fall suddenly on the day he tries to sell. Generally speaking, the farmer tries to postpone selling as long as he can in order to benefit from price increases as the marketing season progresses.

3.3 Livestock Marketing

Livestock is bought and sold at government administered marketing centers where taxes are assessed on each animal sold, as well as in direct sales between a buyer and a seller, in which case taxes are not assessed. When a transaction occurs at a government market, the buyer receives a certificate guaranteeing that he is the rightful owner. Without this certificate it is possible for someone to bring charges that the livestock are stolen. The certificate is not so important if the transaction occurs between residents of the same village, but its importance grows when the livestock are bought and sold between nomads and farmers, between members of different tribes, and between the residents of distant villages.

Livestock sales - particularly of cattle and sheep - have a marked seasonality owing to the movements of the pastoralists. In El Obeid District, the volume of transactions for these two kinds of animals increases several hundred percent in August and September because of the incursion of the pastoralists into the area. At the Kadugli livestock market, by contrast, the sales of cattle and sheep fall off in the rainy season because the nomads have migrated northward. Instead, the period of highest sales is during the dry season.

It is very difficult to generalize about the organization of livestock marketing in Kordofan because the system appears so fluid. The nomads are the major animal breeders, of course, but they are also at times livestock merchants and middlemen. Farmers also play these same multiple roles.

CHAPTER 4

THE MARKETING OF OILSEEDS

4.1 Introduction

Groundnuts and sesame are the principal oilseeds grown in the Kordofan Region. Both are produced by traditional farmers with groundnut cultivation located primarily in the southern and middle parts of North Kordofan and sesame in both North and South Kordofan.

Because the production and marketing systems for these two cash crops are quite similar, they are discussed together in one chapter. The first section of the chapter describes the marketing of groundnuts in some detail as groundnuts are the dominant cash crop and a more important foreign exchange earner than is sesame. The crops are sold through identical channels, so the second section, dealing with sesame, is confined to a discussion only of those issues peculiar to the sesame marketing system. The third section addresses the subject of groundnut and sesame oil processing, which is significant to groundnut marketing and pervasive in the marketing of sesame. The chapter closes with a summary of issues and recommendations for interventions in the Kordofan oilseed marketing system.

4.2 Groundnut Marketing

4.2.1 Allocation of Groundnuts in the Sudan

As evidenced in the numerical breakdown of Sudanese groundnut production and utilization presented in Table 4-1, groundnuts are either exported, consumed domestically or processed into oil. Exports have historically consumed the bulk of the crop. The five year average in Table 4-1 shows that 47 percent of groundnut production was exported in various forms: 36 percent of production was exported shelled, 8 percent as oil cake, 2 percent as groundnut oil, and 1 percent was exported unshelled.

Domestic users consumed the other 53 percent with ten percent reserved for seed. Another 10 percent went to direct domestic consumption; 12 percent was considered to be wasted; groundnut oil users consumed 12 percent, 7 percent became seedcake for domestic users (primarily animal seed); and 2 percent was lost during oil processing.

Table 4-1

Groundnut Production and Utilization
in the Sudan 1973/74 - 77/78
 (quantities are in thousands of metric tons except
 where otherwise indicated)

	<u>5 Year Average</u>	<u>Percent*</u>
Production (in shell)	809	100
Export (in shell)	11	1
Domestic Supply (in shell)	798	99
Shelling (% yield)	60	
Domestic Supply (shelled)	479	99
Exports (shelled)	175	36
Net Supply (shelled)	303	63
Domestic Utilization:		
Direct Food	47	10
Seed	47	10
Waste	57	12
Processed	153	32
Oil Yield (%)	45	
Production of Oil	69	14
Exports of Oil	10	2
Domestic Use of Oil	59	12
Industries	3	1
Food	56	12
Groundnut Cake Production	76	16
Exports	40	8
Domestic Utilization	36	7

*Percentages based on total production in shelled form.

Source: Ministry of Agriculture, Food and Natural Resources

4.2.2 Export

Groundnuts are an important export for the Sudan. Of the 424,000 metric tons of shelled groundnuts produced during the 1980/81 season, the equivalent of 143,000 tons were exported, either as nuts or as oil. The 94,000 tons of raw nuts exported were primarily of hand picked selected (HPS) quality. The 22,000 tons of oil exported was processed from 49,000 tons of raw nuts with much of the by-product oil cake exported to livestock feedlots in Europe.

Export earnings from groundnuts fluctuate from year to year as the international groundnut market is characterized by large variations in supply and prices. Not only does the price fluctuate but the quantity of Sudanese exports varies from year to year. In 1980, for example, Sudan exported only 22,000 tons of seed and processed 81,000 tons into 40,800 tons of oil for export. This contrasts sharply with 1976, when 283,000 tons of nuts were exported to a world market in short supply and 5,000 tons of oil were exported. Indeed, the export figures for 1976 would have been even higher but

for bottlenecks in the transport system (especially the railroad) that was unable to handle the sudden increase in traffic. The vicissitudes of the international groundnut market reverberate throughout the marketing system in the Sudan and are reflected at least to a partial extent in farm-gate prices.

When the Sudan Oilseeds Company monopoly was terminated in 1981, five large merchants began to export groundnuts. They were Sheikh El Emin Co., El Nefiedi Co., Abdu Kerim Co., Bastawi Co., and Omar Osman Co.

International prices for Sudanese groundnuts were good in 1980/81, ranging between US\$800 and US\$1,050 per ton. In 1982, however, the price dropped to US\$400 per ton. Sheikh El Emin Co. withdrew from groundnut exports to emphasize its more lucrative groundnut oil export business. All the remaining companies, including the Sudan Oilseeds Co., lost money. Although in October of 1982 the export price briefly reached US\$800 per ton, the December price was only \$650-700 due to an excellent crop in the United States. The low international prices and low export volume projected for the 1982/83 season have encouraged all the private exporters to leave the business for the time being, with only the Sudan Oilseeds Company planning to export the crop. Sheikh El Emin Co. will buy large quantities again this year to be processed and exported as oil and oilcake and, at present, has the largest investment in oil processing capacity including a plant in Port Sudan that can process 150,000 tons of groundnuts annually utilizing a modern chemical extraction process.

In 1974, the Sudanese Government, seeking to divert a larger share of profits from oilseed production into government tax revenue, established the Sudan Oilseeds Co. and granted it a monopoly on oilseed exports. The company set a Port Sudan purchasing price as well as a floor price to be paid to producers. This policy meant that in order to maximize profits, the merchants' ability to keep producer prices as close as possible to the floor price increased in importance relative to the merchants' ability to buy large quantities of groundnuts. Many merchants left the market, and those who remained tended to collude to keep auction prices as close as possible to the floor price. When, in 1980, the Sudan Oilseeds Company monopoly was terminated under intense pressure by merchants, new exporters entered the market, as did a host of buyers at the regional level. The increased competition for the available groundnuts has tended to raise auction prices above the minimum floor price thereby increasing producer prices.

The large exporters have backwards integrated and now have company buyers and agents at all the major auction markets and many of the minor ones as well. The buyers of the Sudan Oilseeds Company and Sheikh El Emin Co. are especially prominent in the major Kordofan markets at En Nahud and El Obeid and thus exercise a considerable degree of market power, as described later in this chapter.

4.2.3 The Significance of the Kordofan Region in Sudanese Groundnut Production

The Kordofan Region produced 182,000 metric tons of groundnuts during the 1981/82 season, comprising 23 percent of the Sudanese crop. As can be seen in Table 4-2, the area planted with groundnuts has fluctuated between 800,000 and 1,000,000 feddans in the Kordofan since 1971/72, while the area under groundnut cultivation in the entire Sudan varied from 1,512,000 to 2,376,000 feddans during the same period. Groundnut yields in the Kordofan were exceptionally low during the early 1970s and in more recent years have remained below the 370 kilograms per feddan country average.

4.2.4 Groundnut Production Areas in the Kordofan Region

Groundnuts grow well in the sandy Qoz soil that extends across the south and middle of North Kordofan. The hard clay soils of South Kordofan support little groundnut cultivation nor is the crop grown in the harsh, dry northern reaches of North Kordofan. By far the most important growing area is En Nahud District, as indicated in Table 4-2.

Table 4-2

Groundnut Growing Areas and Projected Production 1982-83

<u>District</u> <u>(North Kordofan)</u>	<u>Area</u> <u>(feddan)</u>	<u>Production*</u> <u>Kantars**</u>	<u>MT</u>
El Obeid	16,743	61,949	2,788
En Nahud	530,351	1,962,299	88,303
Umm Ruwaba	15,179	56,162	2,527
Bara	-	-	-
Total: North Kordofan	562,270	2,080,410	93,618
South Kordofan	20,000	74,000	3,330
Total: Kordofan	582,273	2,154,410	96,948

* Production assumes average yield of 3.7 kantars per feddan.

** 1 kantar = 45 kgs. or 99 lbs.

Source: Regional Ministry of Agriculture, El Obeid.

There are three major groundnut auction markets in Kordofan, two of them in En Nahud District. During the 1981/82 season, the En Nahud auction market handled 722,549 kantars (32,515 MT) between November 15 and June 31. The Ghibbeish market, also in En Nahud District, auctioned 247,405 kantars, and 175,933 kantars were sold in El Obeid. Sales at El Obeid greatly exceed production in the district

because the city is a center for "hand-picked selected" (HPS) groundnuts and oil processing and is a major railway terminus for groundnuts to be exported via Port Sudan. These advantages draw groundnuts producers from the Umm Ruwaba District, from eastern En Nahud and from South Kordofan.

4.2.5 En Nahud Market

Given the significance of En Nahud District and the town of En Nahud in the Kordofan groundnut marketing system, it is important to examine the area's marketing structure. En Nahud is the largest district in the Sudan encompassing an area of 53,512 square miles on the western border of North Kordofan.

There are 15-25 village markets, six council markets (located at Ghibbeish, Abu Zabad, Wad Banda, El Khowei, El Gamal, and El Odeiya), and the district market located in the town of En Nahud itself. There are an estimated 4,000 villages in the district.

The railroad passes within 60 kilometers to the southeast of the city of En Nahud; however, the vast preponderance of agricultural produce moving east from the town, as well as consumer goods flowing into En Nahud, do so by truck from El Obeid, a 215-kilometer, twelve hour journey over a torturously rutted track. This is the preferred route for groundnuts because it is faster, requires less handling, and therefore is cheaper than by railroad. During the rainy season the road becomes a quagmire, and a determined lorry driver may make the trip in 3-7 days if at all. During the height of the rains, the city may be out of contact with the outside world for days at a time.

4.2.5.1 The Buyers

There were eighteen merchants registered to trade on the Auction Market in November of 1982, a number typical in recent years. In order to participate in the market a merchant must either have a trading license from another district or obtain one from the En Nahud Town Council. The Council will grant a trading license to anyone who has a shop in the town. The office investigates past business dealings and tax records and assesses whether the merchant has the Ls 40,000 deemed a necessary minimum in order to do business on the Market. Though regulations require a deposit, this requirement is waived in almost all cases as the traders are well known and adequately capitalized. In 1982 seven merchants requesting permission were rejected all on the basis of inadequate capital.

There are three classifications of groundnut buyers operating in En Nahud. The smallest buyers are the dubbai* who operate outside the

*Dubbai are merchants with sufficient capital to purchase small quantities of each crops, buying usually a fraction of a sack each from many farmers, and then selling the crop on the auction market once they have accumulated 5-15 sacks.

auction market. The dubbai will purchase groundnuts in small quantities accumulating up to 10 kantars a day which they then sell directly to larger local merchants or on the auction market. They do not have adequate capital to store crops in anticipation of higher prices but, instead, set their buying price based on the current auction price so they will earn about Ls 2 per kantar. The dubbai provide an important service to local farmers who wish to trade a small amount for cash but don't want to take the time to sell at auction.

The second tier is medium-sized merchants having capital of Ls 104,000 or more. These number about twenty in En Nahud, only eleven being big enough to buy on the auction market itself. These merchants buy from dubbai, local village merchants, farmers, and lorry drivers. They have adequate capital and storage facilities to accumulate a few truckloads that they may sell to local processors, or to an exporter, auction at market, or transport to El Obeid if they believe they can obtain a better price there. In practice, most sell in En Nahud.

The final group of buyers are representatives of major groundnut exporters. Of this group, the Sudan Oilseed Company bought 255,000 kantars and Sheikh Mustafa Emin purchased 250,000 kantars in 1981/82.

4.2.5.2 Buying Strategies

There are basically three kinds of buyers on the auction market, each with his own strategy. There is a small group of oil processors who must enter the market constantly to buy raw materials for their plants. There are speculators who buy on their own account and store the groundnuts or ship them to another market in pursuit of future higher prices. Finally, there are the representatives of the large groundnut exporters and processors whose goal is to buy large quantities of the groundnuts without driving prices upward too much. Some buyers may fall into two or even all three of these categories.

The strategy of the oil processor is to buy at a price equal to or lower than his competition. He rarely has enough working capital to maintain large inventories, and therefore he is buying constantly. To some extent he is at the mercy of the market because if prices rise sharply and he is low on groundnuts, he has no choice but to buy as the alternative of idling his plant is far too costly. The local processors will also buy directly from farmers and merchants at the factory gate.

The speculators usually buy at the beginning of the season when prices are relatively low, and then sell later to an exporter or an oil processor, hopefully at a profit. Some of these speculators are also agents for exporters. Before the exporter places orders to buy, the representative is free to purchase on his own account and to resell as he wishes. Once the parent company begins to buy, however, he can no longer buy on his own account but is still free to dispose of his inventory as prudent.

The representatives of the major exporters, especially the Sudan Oilseeds Company and Sheikh El Emin, heavily influence the market. They buy only on order from headquarters but attend the market daily, feeding price and quantity information back to decision makers in Khartoum after every auction. The large buyers usually commence their purchases during the beginning of December. This gives the company time to approximate the probable international production of groundnuts and to estimate the export price. As these buyers prefer to buy in bulk, waiting until December offers the additional advantages of well-stocked speculator storage houses and an increasing quantity of groundnuts coming to market. Because they know that the size of their buying needs will bid prices upward once they start buying, they strive to lower prices before entering the market.

The power of the large buyers was dramatically illustrated during the Consultants' visit to En Nahud. When the Sudanese Pound was devalued 44 percent on November 15, 1982, the floor price for groundnuts was raised from Ls 10 to Ls 12 per kantar (an increase of only 20 percent). By November 26, when the consultants arrived in En Nahud, the auction market price had risen to Ls 17.50. The major buyers still had not entered the market by this time, and the rumor began to spread that the prices were too high. On November 27th the average bid was Ls 16.52. Of the 49 farmers and merchants offering lots, only one sold his lot at the offered price. Over the next two days prices continued to decline as the major buyers stayed out of the market, and speculators, realizing that prices would fall further, also did not buy. The major buyers, the Sudan Oilseeds Company and Sheikh El Emin Co., commenced their buying at the En Nahud market and the other markets in the Kordofan on December 18, by which time the price of groundnuts had fallen to Ls 14.50 in En Nahud. Prices readjusted to 15.50 within two weeks, but this type of increase occurs every year when the exporters start because of the immense quantities involved.

The motives of the exporters in refraining from entering the market was more than just a desire to reduce prices. At the time, there was a major uncertainty as to whether the recent 44 percent devaluation would be rescinded and the previous exchange rate restored. This controversy was not resolved until the middle of December. The exporters interviewed by the Consultants, however, further maintained that they could not earn a profit exporting groundnuts costing Ls 17.50 per kantar (see Tables 4-6 and 4-7 for the comparative profit margins).

The export buyers have a number of sources of leverage with which to influence prices. They realize that if they compete too vigorously with each other, their profits will be lower so they maintain "gentlemen's agreements" on buying policies and prices. They can also make similar agreements with smaller buyers, as the specu-

lators realize that they cannot make a profit by buying when the exporters want lower prices, and it is to the advantage of oil processors as well to keep prices low. If another buyer should create difficulties for an exporter, it is easy for the latter to bid up the price every time the smaller merchant wishes to buy.

The exporters have tremendous amounts of capital which allow them some flexibility in timing their purchases. They cannot delay purchases too long, however, as they have contracts to fill and must move large quantities through the marketing and transport system. They generally begin buying in late November and complete their purchases in early March.

4.2.5.3 The Sellers

Officials of the En Nahud auction market estimate that about 20 percent of the groundnuts there are sold by farmers; the remainder having been assembled by village merchants, lorry drivers, and small buyers from En Nahud. This is probably the most efficient system as few farmers have enough crops to make the trip to En Nahud worthwhile. The villagers generally have up-to-date information on auction market prices that they get from the trucks that pass by so they can negotiate effectively with buyers who come to the village. If they feel that the offering price is too low, they will go to En Nahud themselves. The more remote villages probably are subject to lower prices as there are fewer trucks passing by and therefore less timely information on prices and less opportunity to visit En Nahud.

The farmers selling on the En Nahud market generally have little capital and are incurring both out-of-pocket expenses and opportunity costs by coming to En Nahud. If the price is not to their liking, they can wait only a few days before they must sell. Only a few can take their produce and return home to wait for higher prices or sell at another market. The latter course is rarely taken as the investment in time and money is too large and the difference in prices between auction markets is usually directly related to transportation costs, providing only rare opportunities for arbitrage. One such opportunity did occur in December when the En Nahud price was Ls 14.50 and the El Obeid price, reflecting the poor local crop and large number of oil processors, was more than Ls 13/kantar. This situation was corrected within a week as producers from En Nahud went to El Obeid, and merchants from El Obeid went to En Nahud.

A further disadvantage to removing crops from the market is that one must pay the 15 percent ushur tax* and the 50 piastre per kantar

*Ushur tax is a 15 percent ad valorem tax assessed on cash crops by the rural town council.

Gibana.* Few farmers have extra cash for such outlays even though they will be able to sell the crop at a commensurately higher price having already paid the taxes.

Approximately 50 percent of groundnuts produced in En Nahud District are not traded on the auction markets. Rather, the farmer or village merchant sells directly to agents of exporters or to assemblers who then sell to such agents. Prices, however, are based on auction market prices. The purchasers do pay taxes, as tax certificates are necessary in order for crops to move by railroad, and all groundnuts exported eventually move by rail to Port Sudan. Tax evasion is estimated at about 10 percent, primarily in sales to oil processors.

4.2.6 Timing of Groundnut Sales

The groundnut harvest begins in early November and continues into December. Farmers in need of cash will sell their copra immediately despite the lower prices offered. This is especially true among the large contingent of sharecroppers who want to return to their homes in Bahr El Ghazal after harvest. Some farmers must sell to particular merchants from whom they have borrowed money. If prices are exceptionally high at the beginning of the season, a farmer may even harvest a little early to ensure that he will get the good price (despite the fact that the price usually rises later on). The practice of early harvesting can create problems as the immature nut has a high water content and may not dry out quickly or completely, thereby providing a fertile medium for aflatoxin mold. Exporters must be wary of those nuts as the mold will not develop until the nuts reach Port Sudan where the shipment could be rejected by the importing country.

Sales on the major auction markets are concentrated in December and January, tapering off in February and March as the exporters fill their buying needs and the supply begins to dwindle. From April to June, the remaining buyers are primarily oil processors. Table 4-3 demonstrates this pattern for the 1981/82 season.

*Gibana tax is a Ls 15/kantar tax assessed on cash crops.

Table 4-3

Groundnut Quantities 1981-82
(kantars)*

Market	Nov	Dec	Jan	Feb	Mar	Apr	May	June
En Nahud	21,483	243,321	202,807	124,909	61,557	33,116	25,153	10,203
Ghibbeish	11,508	65,098	61,428	33,567	17,566	30,487	27,501	25,000
El Obeid	27,770	53,470	48,710	14,610	14,390	8,293	3,583	5,107
Total	60,761	353,459	312,945	173,086	93,513	71,896	56,237	40,310

* 1 Kantar = 45 Kgs or 99 lbs.

Source: Market records.

The price movements during this time period are more difficult to document for each of the auction markets due to incomplete and poorly compiled price records. Prices obtained from El Obeid auction market are thought to be reliable and, as merchants interviewed consistently maintained, price differences between markets are a function of the costs of transportation and handling of crops, so the El Obeid prices, as indicated in Table 4-4, should be an accurate indicator.

Table 4-4

Monthly Groundnut Prices at El Obeid
1981-82

(Ls per Kantar)

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Price	7.50	8.60	8.90	9.90	10.00	10.30	9.50	9.10

Source: El Obeid Auction Market

Prices start low as the new harvest arrives, increase as exporters begin to buy, continue to climb as most of the harvest crop is sold, and then fall as the exporters leave the market.

4.2.7 Movement of Groundnuts

The three largest groundnut auction markets are in En Nahud, Ghibbeish (120 km. SW of En Nahud), and El Obeid. Together these markets handle 75 percent of the groundnuts traded on formal auction markets. The En Nahud auction market traded 722,500 kantars of groundnuts during the 1981/82 season, about half the groundnuts sold through auction markets in the Kordofan. Of this total about 70,000-100,000 kantars were processed locally into oil. The remaining nuts were decorticated in En Nahud and trucked to El Obeid where HPS selection was done. These HPS quality nuts were sent to Port Sudan by rail. In order to better assess the potential margins in the marketing chain, the consultants analysed the direct costs of moving a ton of decorticated HPS groundnuts to Port Sudan. The costs were developed in interviews primarily with the Sudan Oilseeds Company and are contained in Table 4-5.

The figures in Table 4-6 indicate that at the December 28, 1982 En Nahud auction price of Ls 15.50/kantar, a ton of HPS groundnuts delivered in Port Sudan will require about Ls 716 in direct costs. At an auction price of Ls 17.50/kantar, the Port Sudan delivered price becomes Ls 791. These direct costs do not include overhead and administration, marketing costs, depreciation, costs of capital, and marketing expenses.

The export price at this time was about US\$650/MT F.O.B. Port Sudan. According to government regulations, half of this revenue must be converted into Sudanese pounds at the official rate of Ls 1.30 per US\$1. The other half can be retained by the exporting enterprise; however, in practice, 10-20 percent of the remainder is sold to the bank at the official rate as incentive to the bank to give good service. The remaining dollars can be used as the holder desires-- in most cases to purchase imports. In December of 1982, the open market value of these dollars was Ls 1.80 per US\$1.

Thus the total value in Sudanese Pounds of the \$650 would be Ls 983 as described below in Table 4-5

Table 4-5

Conversion for Exporters Revenue into Sudanese Pounds

	<u>Dollars</u>	<u>Sudanese Pounds</u>
Revenue from Sale of Groundnuts	650	-
Mandatory Official Conversion of 50% at 1.32	325	429
Voluntary Conversion of 10% for Bank at 1.32	65	86
Value of remaining dollars at 1.80	260	<u>468</u>
Value of Sudanese Pounds of 1 Ton exported groundnuts.		983

Table 4-6

Groundnuts
Cost Per Kantar

	(December 28, 1982 Price)	(November 28, 1982 Price)
Auction Price per kantar	15.50	17.50
Ushur tax (15%)	2.33	2.63
Gibana tax	.15	.15
Weighing	.15	.15
Sacks	.10	.10
Loading and transport to Decorticator	<u>.50</u>	<u>.50</u>
 Cost per Kantar inputed to Decorticator	 18.73	 21.03

Decortication

(31 kantars Unshelled Groundnuts Yield 1 Ton Decorticated Nuts)

Cost of Groundnuts (31 x 18.73)	580.63	651.93
Decortication (residual shells have no value)	10.00	10.00
Packing and Weighing	2.30	2.30
Loading on Truck	1.25	1.25
Transport to El Obeid (12.5 sacks x Ls 2.50 per sack)	31.50	31.50
Unloading	<u>1.25</u>	<u>1.25</u>
 Cost per ton delivered to El Obeid	 626.93	 698.23

Selection

(2 tons Groundnuts Yield one ton of Hand Picked Selected Groundnuts)

Cost of Groundnuts (2 x 626.93)	1253.86	1396.46
Cost of Picking (25 sacks x 50 piastres per sack)	12.50	12.50
Losses from waste (2%)	24.27	27.93
Less Revenue from sale of Broken Peanuts	-627.00	-698.00
Packing and Weighing	4.00	4.00
Loading and Transport to Railway	2.50	2.50
Transport by Rail to Port Sudan	42.00	42.00
Unloading and storage	<u>4.00</u>	<u>4.00</u>
 Total Direct Costs Delivered to Port Sudan	 716.13	 791.39

Source: Interviews with Merchants and the Sudan Oilseeds Company.

Another vantage point from which to view the profits in the system is to look at the share of the price that each party earns.

Table 4-7

Share of Revenues from Groundnut Exports

	<u>Ls 15.50/Kantar</u>		<u>Ls 17.50/Kantar</u>	
	<u>Share</u>	<u>%</u>	<u>Share</u>	<u>%</u>
Producer	480.50	49	542.50	55
Government (Taxes)	76.88	8	86.18	9
Transport	91.50	9	91.50	9
Processing & Handling	67.32	7	67.32	7
Merchant Gross Margin	<u>267.00</u>	<u>27</u>	<u>195.70</u>	<u>20</u>
Export Price	983.20	100	983.20	100

Source: Calculations using Table 4-5

The chart above compares the price at which groundnuts were actively trading in En Nahud and the price at which merchants refused to buy, stating they could not earn a profit. At the Ls 15.50 per kantar price, the producer (here "producer" refers to the party selling at the market, only 20 percent of whom are actually producers) earns 49 percent to cover all his expenses, labor, and profit while the merchant gets 27 percent after paying direct expenses and before paying overhead, marketing, and financial costs. Under the \$17.50/kantar scenario, the producer's share moves to 55 percent, the government gets an extra 1 percent in taxes, and the merchant's share declines by 7 percent.

One can plainly see from Tables 4-5 and 4-6 the significance of the 40 percent of the groundnut revenue that has a free market value of Ls 1.80 per US\$1. If the entire revenue were to be changed at the official rate, the price equivalent in Sudanese pounds would decline from Ls 983 to Ls 358. At an auction market price of Ls 15.50/kantar, the merchant's gross margin would shrink to Ls 142 or 16.5% share, and under the Ls 17.50/kantar scenario, the gross margin falls to Ls 70.50 or only 8 percent.

As the total overhead, operating, and opportunity costs of the merchants are well concealed and exceedingly difficult to estimate, the best indication of whether there are excess profits in the system is to measure the interest of merchants in exporting groundnuts. Judging from reports that the major oilseed exporters lost money last year and that only the Sudan Oilseeds Company plans to export this year, the merchants do not appear to be earning an adequate return.

4.3 Sesame

4.3.1 Introduction

The Kordofan region produces about one third of Sudan's sesame. Kordofan production has held fairly constant over the last ten years ranging between 72,000 and 92,000 tons per year, as can be seen in Table 4-13 at the end of the chapter. Most of the sesame is a red variety which is valued domestically for its high oil content (44 percent) although there is some white sesame being produced by the Habila Scheme. Red sesame is rarely exported, while white sesame is primarily for export. Total Sudanese exports were 59,000 tons in 1981, only a small fraction of which originated in the Kordofan region.

As evidenced in the numerical breakdown of Sudanese sesame production and utilization presented in Table 4-8, just over half of Sudan's sesame crop is processed into oil while the rest is either consumed domestically or exported. Total exports in all forms required 52 percent of the crop over the period studied: 39 percent of the crop was exported as seed, 3 percent as oil, and 10 percent as oilcake. Twelve percent was eaten domestically in seed form, 15 percent was consumed by animals (oilcake), 5 percent was reserved for seed, and 7 percent was wasted.

Table 4-8

Sesame Production and Utilization in the Sudan
1973-74 - 77/78
(quantities are in Thousands of Metric tons except
where otherwise indicated)

	5 Year Average	Percent
Production	236	100
Exports	91	39
Domestic Utilization	145	61
Direct Food	12	5
Seed	5	2
Waste	7	3
Processed	120	51
Recovery Rate (%)	48	
Oil Production	58	25
Oil Export	6	3
Domestic Oil Use	52	22
Sesame Cake Production	60	25
Exports	24	10
Domestic Utilization	36	15

4.3.2 Production

All of the sesame grown in North Kordofan and 80 percent of the seed grown in South Kordofan is grown on traditional farms. As can be seen in Tables 4-9 and 4-10, 85 percent of production is in North Kordofan, concentrated in Umm Ruwaba District. South Kordofan production is not demarcated by district. Tables 4-10 shows 50 percent higher yields of the mechanized sesame growers over traditional growers. These superior yields are the result of superior cultivation techniques and less intercropping.

Table 4-9

Sesame Growing Areas and Projected Production in North
Kordofan 1982-83

District	Area (feddan)	Projected* Production (kantars)
El Obeid	96,346	173,423
Umm Ruwaba	280,243	504,437
Bara	181,201	326,162
En Nahud	116,667	210,000
Total	562,273	1,214,022

* Average yield is 1.8 kantars per feddan

Source: Regional Ministry of Agriculture, El Obeid.

Table 4-10

Projected Yields and Production of Sesame in South Kordofan
1982-83

Technology	Area (feddans)	Projected Yield	Projected Production (kantars)
Traditional	150,000	1.8	270,000
Mechanized	14,700	2.6	38,220
Total	164,700	-	308,220

4.3.3 Marketing

The structure of the sesame marketing system is identical to that for groundnuts. Farmers sell to village merchants, at nearby rural markets or at major auction markets. The purchasers on the auction markets are a mix of oil processors, exporters, and speculators, most of whom also purchase groundnuts.

The most important distinction between the sesame and groundnuts marketing is that sesame marketing is dominated by oil processors, whereas the exporters drive prices on the groundnuts market. This means that prices move on the basis of diminishing supply, as farmers sell their harvest, and constant demand as oil processors continue to crush the seed until April or May. Table 4-11 shows the effects of this supply and demand situation on the Umm Ruwaba and El Obeid markets.

Table 4-11
Average Monthly Prices Per Kantar
for Sesame 1981-82

Market	Nov	Dec	Jan	Feb	Mar	Apr	May
Umm Ruwaba	17.45	17.50	19.15	21.25	19.62	20.00	19.00
El Obeid	17.45	17.30	20.20	20.80	21.70	21.75	21.80

Source: El Obeid and Umm Ruwaba Auction Markets

Of the 88,000 tons of sesame harvested in the Kordofan in 1981/82, 4,400 tons (96,000 kantars) were sold on the El Obeid auction market, and 1600 tons (35,200 kantars) were auctioned in Umm Ruwaba. Though Umm Ruwaba district has a larger production than does El Obeid, the latter also serves as the principal market for eastern En Nahud district and much of Bara. In addition to these two district markets, there are about 20 village auction markets in each district that trade sesame as well. Much of the crop, however, is sold directly to oil processors, especially in Umm Ruwaba. It is unknown what the tax collection rate is on these direct sales.

During the 1981/82 season, an estimated 20 percent of the red sesame traded on the El Obeid auction market was exported. This year, red sesame exports should consume 40 percent of the crop traded, and 100 percent of the Habila white sesame is expected to be sold outside of Sudan compared to 20 percent of red sesame and 90 percent of white sesame in previous years. As with groundnut exports, there are a few large companies handling sesame exports. The Sudan Oilseeds Company still holds the majority of the market, having had a monopoly seeds exports from 1974 to 1980.

Sesame prices have risen dramatically due to a combined push from increased export prices and a poor crop. In contrast to 1981/82 prices of Ls 17.45-21.80 per kantar, prices in November 1982 exceeded Ls 37.00. This sharp rise in prices has made sesame oil increasingly non-competitive with groundnut oil, forcing processors to cut back production and to sell more energetically to the less price sensitive Khartoum marketplace.

As the vast preponderance of sesame grown in the Kordofan Region is eventually crushed, its marketing is primarily a function of the edible oil market described in the following section.

4.4 Oilseed Processing

The processing of groundnuts and sesame into oil entails identical technologies and frequently is done under one roof using the same equipment. Processors in the El Obeid area, for example, have access to both oil seeds and determine what to process based on the relative prices of sesame and groundnuts. They may switch from one oil to the other almost overnight. Because of the similarities of raw material, processing, and marketing, the two will be discussed together in this section.

4.4.1 Exports

The export of groundnut oil has become an important industry in the Sudan during the past ten years. Exports have been highly variable because of fluctuation in world production as well as government regulations imposed when a small domestic groundnut crop combined with good international prices for oil threatened to draw all the oil out of the country. Exports reached 40,800 tons in 1980 and were 22,000 tons in 1981.

Groundnut cake is also exported, primarily to Europe where it is processed again and used as animal feed. Exports of sesame oil have rarely surpassed 1,000 tons in a year. Some small quantities of sesame cake are exported.

4.4.2 Sudan's Oilseed Processing Industry

The Oilseed processing industry is characterized by overcapacity throughout the country. During the years of mounting groundnut surpluses in the early 1970's, the Sudanese government viewed oil processing as a logical way of increasing total exports as well as supplying the nation with vegetable oil. By 1975, however, it became evident that too much capacity was being built, and the Ministry of Commerce, Cooperation, and Supply stopped granting licenses for new construction. The Ministry took the further, though unsuccessful, step of trying to cancel licenses for plants not yet under construction. Thus, in 1981 there was the capacity to process an estimated 1.3 million tons of oilseeds per year with an additional 400,000 tons of capacity under construction. As can be seen below in Table 4-12, the capacity is concentrated in Khartoum Province and Red Sea Province (Port Sudan) with major capacity also located in the oilseed growing areas.

Table 4-12

Oilseed Processing Capacity
Existing in 1981

<u>Province</u>	<u>Capacity</u>		<u>Under Construction</u>	
	<u>Plants</u>	<u>(tons of input)</u>	<u>Plants</u>	<u>(tons of input)</u>
Khartoum	23	642,300	4	24,000
Red Sea	7	292,950	4	45,600
Kordofan	23	111,820	15	69,900
White Nile	12	70,000	8	37,800
Blue Nile	8	42,960	7	34,800
Gezira	8	88,470	25	125,080
Kassala	2	3,660	5	22,200
Darfur	12	44,100	8	31,400
Bahr Egezal	-	-	1	6,000
Upper Nile	-	-	2	4,000
East Equatoria	-	-	1	1,080
Total	95	1,296,260	80	401,510

Source: Ministry of Commerce, Cooperation, and Supply.

If the projected capacity is completed, Sudan will be able to process its entire crop of groundnuts and sesame one and a half times. Although it is likely that some plants will not be constructed and that some existing capacity will be scrapped, there is obviously an overcapacity problem.

The largest and most efficient processors are in Port Sudan and Khartoum. There are two plants in Port Sudan with a combined capacity of approximately 200,000 tons that utilize a modern chemical extraction process capable of removing 5 percent more oil than the heat and pressure method used in the rest of the country. In fact, much of groundnut cake that is exported through Port Sudan is processed a second time at one of these two factories. The groundnut processing factories in Khartoum, although using conventional processing techniques, are more efficient than those in the Kordofan, and it is only in times of nationwide shortage or extended power failures in Khartoum that El Obeid merchants can probably sell groundnut oil in Khartoum. Sesame oil from Umm Ruwaba, however, is generally cost competitive in the Khartoum market.

4.4.3 Oilseed Processing in Kordofan

The oilseed processing industry in the Kordofan is characterized by overcapacity just as is the rest of the country. The plants are clustered in the groundnut marketing centers of El Obeid and En Nahud and at the sesame growing center, Umm Ruwaba, as can be seen in Table 4-13 below. Most of the processing plants are in operation despite the fact that all of the half dozen processors interviewed were operating at 10-40 percent of capacity due to low demand.

Table 4-13

Oilseed Processing Capacity in Kordofan Existing in 1981

<u>City</u>	<u>Capacity</u>		<u>Under Construction</u>	
	<u>Plants</u>	<u>(tons of input)</u>	<u>Plants</u>	<u>(tons of input)</u>
El Obeid	9	46,780	7	36,600
En Nahud	4	21,120	2	12,000
Umm Ruwaba	8	39,420	1	4,500
Er Rahad	1	1,800	-	-
Er Zeneeba	1	2,700	-	-
Babanousa	2	-	2	6,600
Ghibbeish	-	-	1	3,600
Dubeibat	-	-	1	3,000
Other (unidentified)	-	-	1	3,600
Total	23	111,820	15	69,900

Source: Ministry of Commerce, Cooperation and Supply.

4.4.4 Marketing

Groundnut processors throughout the Kordofan sell almost exclusively to their local areas. Five years ago processors in El Obeid and Umm Ruwaba could sell groundnut oil in Khartoum, but processors in the capital city are now plentiful and are more efficient than those in the Kordofan. Umm Ruwaba processors, however, have now almost entirely switched to processing sesame, which is more plentiful in the area and can be sold at a profit in Khartoum.

There is a taste preference for groundnut oil in North Kordofan, and the price is generally lower than that of sesame oil. When the premium for sesame is too large, retailers stop buying it from processors. During the consultants' stay in El Obeid during December 1982, the small sesame crop caused auction market prices to rise to Ls 37 per kantar. The price of sesame oil rose to Ls 36.50 per 16 kg., while the groundnut oil price stayed at Ls 30.00 per tin. Retail merchants refused to buy the sesame oil, insisting on a price of Ls 35.50. The response of the processors was to switch to processing groundnuts. The consumers apparently switched to groundnut oil in sufficient quantities so that there was no shortage of sesame oil.

The vegetable oil market is largest in the winter and tapers off sharply during the summer months as consumers reduce their oil usage. This seasonality corresponds well to the production season which begins in October and usually ends by June. In part because of the match of supply and demand, prices usually fluctuate by only one pound per tin of oil.

4.4.5 Oilseed Cakes

The processing of oilseed yields 40-50 percent oil and 50-58 percent seed cake. The groundnut cake is considered to be too hard for cattle to chew and is sent to Port Sudan for export. As previously mentioned, much of this cake is processed a second time using a chemical process that produces about 5 percent oil. According to El Obeid's largest farmers, another reason why groundnut cake is not used for cattle feed is that the cattle all try to stand in the shade (which is practically non-existent) when they have eaten groundnut cake. The December 1982 price of groundnut cake in El Obeid was about Ls 100 per ton and Ls 150-160 per ton in Port Sudan.

Some sesame cake is exported, but most is purchased by dairy farmers in Dueim, and additional quantities are used for livestock feed in El Obeid, Kost, and parts of the Nile Provinces. The December 1982 El Obeid price of Ls 200-250 per ton represents a large, but not uncommon, premium over groundnut cake. It is unlikely that sales to feedlots in the El Obeid area will show any significant growth in the near term due to the adverse economics of these operations.

4.5 Alternatives to Reduce Inefficiencies in the Marketing of Groundnuts and Sesame

There were two inefficiencies uncovered in the analysis of the oilseed marketing system which adversely impact producer incomes. The first inefficiency is the lack of protection from fluctuations in international prices. These fluctuations make it difficult for farmers to plan their production and increases their exposure to risk. The second inefficiency is caused by the farmers' lack of adequate capital, which forces them to sell their crop immediately upon harvest rather than waiting until prices have risen 3-5 months later.

In addition to these two inefficiencies, groundnut growers are hampered by a lack of high quality seed. Improved seed varieties would not only increase production, but would facilitate marketing as the groundnuts would be larger and of better quality, enhancing their competitiveness in international markets.

4.5.1 Realistic Exchange Rate

In the past, the Sudanese pound has been maintained at artificially high levels. This has meant that the value of exports denominated in pounds has been too low. The recent 44 percent devaluation increased the Ls value of every dollar of exports by 44 percent. Much of this benefit is being passed along to farmers in higher prices. Because farmers use essentially no imported inputs and purchase only limited imported consumer goods, their cost of production and cost of living have not risen significantly since the devaluation. Therefore, the less the Sudanese pound is over-valued, the higher the income of the cash crop farmer. The Government of the Sudan should strive to maintain a realistic exchange rate in order to provide farmers with adequate prices and to keep Sudanese crop prices competitive in world markets.

4.5.2 Floor Price

Ideally, an international floor price for groundnuts would protect all developing countries from the downside risk of low prices. Such a floor price program would have to be funded by consuming nations in the developed world and would require expensive storage facilities.

The government should continue to set floor prices to cover costs of production profit. It is also important that floor prices be announced before the planting season so that farmers can rationally develop production plans. Floor prices were announced before planting for the first time in 1982, but not in sufficient time to increase production.

4.5.3 Small Farmer Credit

There are currently small farmer cooperative credit programs operating in the areas surrounding Umm Ruwaba and El Obeid. The programs are both production loans--in that they finance costs of production--and marketing loans, as they finance the farmer's inventory until prices rise. These programs, managed by the Agricultural Bank, assist interested villages in the formation of cooperatives. Once the cooperative is formed and has elected officers, the Agricultural Bank loans money to each member based on the area of sesame and groundnuts to be cultivated. The money is paid in three installments: the first is intended to coincide with planting; the second with weeding, and a final installment at harvest.

At harvest time, the cooperative stores the produce in space provided by the Agricultural Bank. All the crop is sold at one time selected by the officers of the cooperative. The Agricultural Bank deducts the amount of the loan, plus 12 percent interest and the cost of storage, from the revenues received by each individual member. Any surplus is given to the member. If there is a shortfall, the member is ineligible to receive further loans until the balance is paid off.

The program has enabled farmers to plant larger areas and also to sell their crops in March or April when prices are high rather than at low harvest time prices. Farmer income has increased because of both of these factors. Farmers have also been spared the costs of sheil system interest rates and the costs of selling and later buying back animals in order to finance their crops. As yet, the number of farmers involved has been insufficient to have a discernable impact on the market.

Judging from the initial achievements of the cooperative loan program, it appears worthy of expansion. Loan repayment has been variable depending primarily on how good the season was. Loans not repaid in the first year usually are paid in the following year as farmers are generally anxious to be able to borrow more money. Umm Ruwaba Agricultural Bank officials put their loan loss rate at 10-20 percent, but claim that up to 80 percent of the balance outstanding is repaid in the following season. The El Obeid program has been in existence only since 1980/81 (Umm Ruwaba's program was established in 1977/78) and, thus far, loan losses have been about 20 percent.

The cooperative loan program may not be able to charge an interest rate adequate to cover cost of capital, loan administration, and defaults. It must be regarded as a financial institution, a market organizer, and a program that increases the capital accumulation of farmers in order to make them more productive, increase marketable supplies, and increase export earnings.

There is much room for careful expansion and improvement. Total loans in 1982/83 were only Ls 200,000 each for Umm Ruwaba and El Obeid. Other villages are eager to form cooperatives, but there is not enough capital available. There is also limited staff, vehicles, and fuel. Such cooperatives offer an excellent opportunity for extension services, including marketing information, to be provided. The Agricultural Bank could provide certified seeds, and additional crops could be financed besides just sesame and groundnuts. Not only can the present programs in Umm Ruwaba and El Obeid be expanded, but branches of the Agricultural Bank could be established in En Nahud, Abu Zabad, Babanousa, and other cities.

Although there appears to be good potential for this program, it should be expanded with caution. Cooperatives are very fragile entities entirely based on trust. The most successful cooperatives have always been those that formed at the initiative of the members, and this process of formation cannot be accelerated. It is also important not to expand the size and responsibilities of the Agricultural Bank faster than it is able to attract and train qualified personnel and establish sound operating procedures. Thus far, the reputation of the program has excited and encouraged farmers to form additional cooperatives. Any major failures would quickly become public and would discourage farmers from joining.

The loan repayment rates and interest charges will have to be carefully monitored if the program is to expand. It is much better to run a limited program at a small but sustainable loss than to expand an expensive program to the point where finances run out and it collapses.

There is the potential for a donor to work closely with the Agricultural Bank to expand and enhance the cooperative loan program. It would require a relatively simple study to evaluate the current program, clearly delineate areas of possible improvement and expansion, and roughly estimate costs for various options. Important options include: geographic expansion; increasing the density of service in areas currently served, including additional cash crops and commercialized food crops into the program; marketing inputs through the Agricultural Bank; and providing extension services.

The small farmers credit program injects capital where it is needed most--at the point of production. This capital allows farmers to increase their plantings, marketable surplus, and earnings and releases them from the usurious interest rates of local creditors. Thus, the extension of this program could be of great benefit to the Kordofan.

A lower cost alternative to providing production and inventory loans to farmers would be to finance only the inventory after the crop is harvested. This limited program would assist farmers by allowing them to hold on to their crops until prices have risen. The risk incurred by the Agricultural Bank would be greatly reduced as the loans would be fully secured by the crop which the Agricultural Bank would hold in storage. The farmers, however, would lose the benefit of the production loans which enable them to expand their plantings and increase yields by providing funds to hire labor for weeding.

4.5.4 Improving Quality

Sudanese groundnuts are of below average size and thus regarded as being of inferior quality by international buyers. This perception reduces prices and also means that in years of international surpluses, Sudanese groundnuts quickly lose market share to other countries.

There is little use of certified seeds in the Kordofan. Much of the groundnut seed stock is 20 years old and should be replaced with new, higher yielding varieties. Current extension programs are hamstrung due to lack of fuel and vehicles and shortages of staff. Because resources are so limited, they must be used as efficiently as possible.

A program is needed to inject a fresh supply of seed stock into the groundnut and sesame production systems. The first step in this program would be for the Ministry of Agriculture, through the Western Sudan Agricultural Research Project or through its own Seed Propagation Unit, to develop high yielding varieties that will pro-

duce quality seeds. It will also be important that varieties be developed that can thrive under each of the different soil and climatic conditions found in the Kordofan. Once appropriate varieties are developed, they must be produced in large quantities, a role likely to fall to the aforementioned Seed Propagation Unit.

The distribution of the seeds can be done by the private sector or by the government. In either case, prices must be kept low so that farmers can afford the purchase price, which may require a one-time government or donor subsidy.

The private sector has the infrastructure in place to distribute the seed and, given a price structure within which they can earn a profit, they also have the incentive to do the job. The critical factor would be setting a price for supplies at which the merchants could earn a good return without encouraging them to divert the seed to other uses, such as export. Given the poverty in which most farmers live, it may not be possible for the seed producer to price the product at a level which allows the merchants to cover expenses and take a profit while selling at a price affordable to farmers. The spread between the retail price of ordinary seed and the retail price of the improved seed may be so slim that the seed producer would have to wholesale to merchants at a price below that of ordinary seed to give the retailers even a modest profit. Under such conditions, the merchant might better maximize his profits by exporting the seed or selling it to oil processors rather than incurring the costs of trying to market to small farmers.

A government seed distribution program would cost more than merely subsidizing the merchants, although it might prevent misuse of the new seed. The program would require large investments in vehicles if it were to be rapidly implemented. If a slower implementation schedule were allowed, and farmers came to government distribution centers at auction markets rather than the government trying to visit every village, costs could be reduced. In order to alleviate the cash burden on farmers, it is recommended that they be able to exchange old seed stock for new stock at some suitable ratio.

Table 4-14

Groundnuts: Area, Production and Yield, Sudan and Kordofan Province

<u>Years</u>	<u>Area</u>		<u>Production</u>		<u>Yield</u>	
	<u>Sudan</u> (1,000s of Feddans)	<u>Kordofan</u> of Feddans)	<u>Sudan</u> (1,000s of Metric Tons)	<u>Kordofan</u> of Metric Tons)	<u>Sudan</u> (Kgs./Feddan)	<u>Kordofan</u> (Kgs./Feddan)
1961-62	471	211	148	64	314	303
62-63	695	232	229	82	329	358
63-64	845	246	290	79	342	321
64-65	778	243	279	81	359	333
65-66	935	313	304	70	325	224
66-67	926	250	313	59	338	236
67-68	846	228	298	65	352	285
68-69	720	214	163	46	226	215
69-70	1,074	366	384	90	358	245
70-71	910	290	338	50	370	172
71-72	1,512	897	388	93	257	104
72-73	1,643	858	567	87	345	101
73-74	1,748	985	553	135	317	137
74-75	1,792	706	928	231	518	327
75-76	2,321	985	796	143	342	145
76-77	1,880	556	748	166	398	299
77-78	2,661	975	1,027	249	386	255
78-79	2,328	842	810	236	348	280
79-80	2,352	807	852	182	362	226
80-81	2,129	800	707	240	334	300
81-82	2,376	830	808	182	340	219

Source: Ministry of Agriculture.

Table 4-15

Sesame: Area, Production and Yield, Sudan and Kordofan Province

<u>Years</u>	<u>Area</u>		<u>Production</u>		<u>Yield</u>	
	<u>Sudan</u> (1,000s of Feddans)	<u>Kordofan</u> (1,000s of Feddans)	<u>Sudan</u> (1,000s of Metric Tons)	<u>Kordofan</u> (1,000s of Metric Tons)	<u>Sudan</u> (Kgs., Feddan)	<u>Kordofan</u> (Kgs., Feddan)
1961-62	982	291	234	57	238	196
62-63	776	279	142	42	183	151
63-64	1,183	430	173	58	146	135
64-65	1,117	227	183	37	164	153
65-66	947	404	151	52	170	129
66-67	925	449	133	42	144	94
67-68	1,236	554	187	59	151	106
68-69	1,321	454	154	33	117	71
69-70	1,361	557	174	60	128	108
70-71	1,857	1,180	297	175	160	148
71-72	1,922	1,117	296	99	154	89
72-73	2,846	1,891	340	180	119	95
73-74	2,265	1,064	244	77	108	72
74-75	2,178	1,091	234	92	107	83
75-76	2,216	1,099	218	90	98	82
76-77	2,288	1,012	247	78	108	77
77-78	2,349	1,023	245	79	104	77
78-79	2,057	1,020	210	85	102	83
79-80	1,989	813	209	72	105	89
80-81	2,011	849	221	75	110	88
81-82	1,971	849	242	88	123	104

Source: Ministry of Agriculture.

CHAPTER 5

GUM ARABIC MARKETING

5.1 Introduction

The export of gum arabic, which provided 10 percent of the country's foreign exchange in 1981, is vital to the economy of the Sudan. Eighty percent of the world's supply of gum arabic is produced in the Sudan, with the Kordofan Region contributing 52 percent of the country's production in 1981, generating for Kordofan farmers an income of more than Ls 7 million. All gum is exported in unprocessed form. Although the Sudan has a virtual monopoly on world production of this commodity, it must compete on the basis of price and reliability of supply with modified seed-based gums and synthetic gums in the international market for water soluble gums. The Sudan uses insignificant quantities of gum arabic domestically.

5.2 Export Markets

Gum arabic has been recognized for centuries as the most soluble of the naturally occurring water soluble gums. It is possible, with gum arabic, to prepare solutions of up to 50 percent gum, compared to a maximum of 5 percent from other natural gums. When dissolved, the gum is tasteless, odorless, colorless, non-toxic, and has superior stabilizing and emulsifying properties.

In 1977, 40 percent of the world's gum arabic was used in confectionery. In candies it prevents sugar from crystalizing; for diet foods it provides emulsifier bulk; in glazes it is fixative and adhesive; and in ice cream it is an emulsifier. Twenty five percent was consumed in beverages, 10 percent by the flavor industry, 8 percent by pharmaceuticals, and 17 percent went into producing miscellaneous food products, pastes and glues, lithography paper, cosmetics, and other products.*

Gum arabic, for all of its excellent properties, currently commands only a 20 percent share of the world market for water soluble gum. The competition comes from natural gums, modified natural gums, and synthetic gums. The natural gums included plant seed gums such as guar gum (which is being rapidly developed in India), seaweed extracts, citrus fruit pectins, natural starches, milk casein, and gums derived from animal parts. Modified gums are produced from starch derivatives and cellulose compounds. Synthetic gums are created from petroleum bases and other chemicals.

*"The Market for Gum Arabic," International Trade Centre, Geneva, 1978.

These competing gums have a range of characteristics that permit them to compete in most of the markets served by gum arabic. In fact, all but a few of the food and drug applications of gum arabic could be replaced by other compounds. The deciding factors in these markets are generally price, reliability of supply, and historic industry usage. Gum arabic is more costly than some of the synthetics which are used in paints. Users place a premium on having a reliable supply. During the world shortage and subsequent high price of 1972-75, many changed over to substitute gums and have yet to be lured back to gum arabic. Because an adjustment in the product process must be made when one gum is substituted for another, users are reluctant to make changes, and when they do, they prefer not to switch back again.

5.3 The Gum Arabic Company

The Gum Arabic Company was created in 1969 as a 37 percent government owned corporation with a monopoly on the export of gum arabic from the Sudan. The company buys the gum in Port Sudan at a price determined at the beginning of the season. Since the Sudan has a virtual monopoly on the international market for gum arabic, the Gum Arabic Company also sets the export price, and most other producing nations peg their prices at or very close to the Sudanese price. As previously mentioned, however, there are many competing substitutes for gum arabic, and because there has been no comprehensive study of the interchangeability and cost competitiveness of substitute gums for the major gum users, The Gum Arabic Company may not be maximizing either revenues or profits with its price setting policies.

5.4 Production

Gum arabic, the most common variety being acacia senegal, grows naturally in the Sahelian Zone extending in a 400 kilometer wide belt, 1,500 kilometers across Africa (see map in Table 5-1). In the Sudan the tree grows both in clay and sandy soils and can survive in the dry, harsh climates of the Kordofan. Gum output, however, is highly dependent on the weather, as was evidenced during the disastrous 1972/73 drought when the Kordofan output declined 41 percent.

Although some gum arabic is actively cultivated in the Gezira scheme and the tree is used as a fallowing crop or for intercropping in the Kordofan region, most of the gum is collected from self-propagating trees, often growing on communally or government owned land. Each of the villagers collecting the gum has a time-honored claim on certain trees in certain areas. Growing areas have declined in recent years as the land has been cleared for more profitable cash crops and for locally needed firewood, charcoal, and building materials. This decline not only depresses the productive capacity of the Kordofan, but it also aggravates an already severe desertification problem as gum arabic trees provide a vital barrier against the encroaching desert.

GUM ARABIC BELT IN THE SUDAN

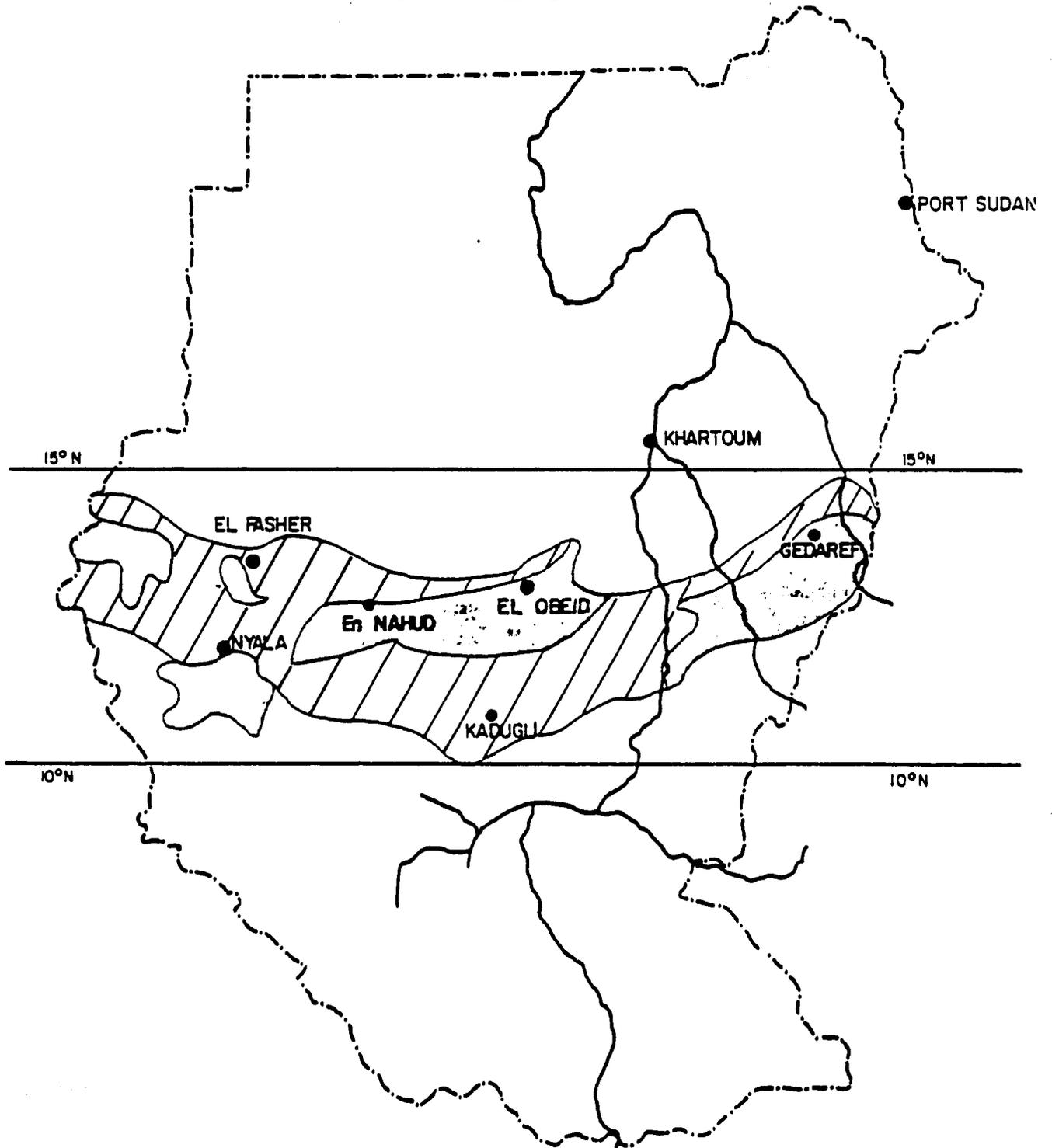


Table 5-1

Source: Gum Arabic Company



The gum harvest normally begins in early October at which time the bark of the tree is slashed and a collecting receptacle may be placed at the bottom of the incision. The gatherer returns a month later to gather the gum that has oozed out and solidified. Subsequent collections can be made every two weeks for a total of 3-4 collections on clay soil and up to eight collections in sandy areas. Annual yields average 250 grams per tree, with a range of 50 grams for a six-year old tree up to 300 grams for trees ten years and older.*

Gum arabic tapping and collecting is hot, arduous work. The tapper/collector must go to a number of trees covering a wide area in order to gather enough gum to be worthwhile. Water must be purchased and carried and, thus, can become a major expense as the high demand for water drives the price from 20 to 50 piastres per tin.

5.5 Marketing

The gum arabic marketing system is, at its lower levels, identical to that of groundnuts and sesame. Villagers sell gum to village markets, visiting merchants, lorry drivers, and at the auction market. A 1980 study reported that 30 percent of gum arabic is sold through the "sheil" credit system, 40 percent is sold directly to village merchants, and 30 percent is sold by farmers at the auction market.* Although the consultant team could not verify that 30 percent of gum sales are handled through any kind of credit system, it is believed that only 20-30 percent of the gum sold on the auction market is sold by producers.

The marketing of gum arabic differs from the marketing of oilseed in that the Gum Arabic Company has a monopoly on exports. Before the monopoly, there were five large merchants competing to buy gum for export, and the gum usually sold at about 20 percent over the government established floor price. Now, just as when the Sudan Oilseed Company had a monopoly on oilseed export, gum arabic trades within a pound or so of the floor price: for example, the floor price at Umm Ruwaba was Ls 19 during the 1981/82 season. The gum actually sold at Ls 19.14 all season long. Because the merchants who buy the gum and transport it to Port Sudan are constrained by the Port Sudan price, they collude to keep auction prices low. It has been widely suggested that should the Gum Arabic Company monopoly be eliminated, the competition for gum arabic would increase producer prices substantially, just as prices rose for oilseeds when the Sudan Oilseed Company lost its monopoly.

*"Gum Arabic Development" GITEC Consult GmbH for the Ministry of National Planning, 1980.

Before the Gum Arabic Company was established, quality was an important factor affecting auction price. Now, quality is not a factor. The only exception is that gum from the previous year's crop can be traded at a lower price because as it has probably dried out and deteriorated. Quality becomes a factor after the gum is sold. Then, the merchants clean it, sort it, and send it by train to Port Sudan. All the gum from El Obeid moves by train because the continuous jostling of a truck ride would reduce the gum to chips and dust.

5.6 Taxes

The Sudanese government has claimed an average of 37 percent of the export revenues of gum arabic for the last twelve years. As can be seen in Table 5-2, the government has used eight different taxes plus dividends from the Gum Arabic Company itself to draw revenue from gum arabic trade. In 1981, for example, export duties alone took 28 percent of the export price of the gum and another 24 percent went to the government in the form of other taxes and dividends. Obviously, the government is more interested in the revenue it receives than in producer prices.

A further example of government indifference to the producers occurred after the November 1982 devaluation of the Sudanese pound. When the pound devalued 44 percent from .90 to 1.30 pounds to the dollar, the floor price for gum arabic was increased only 21 percent from Ls 19 to Ls 23 per kantar, despite the fact that all of the gum is exported and is priced in dollars.

5.7 Producer Share of Export Price

Before the November devaluation, the El Obeid floor price for gum arabic was Ls 19 per kantar, the price delivered in Port Sudan was Ls 26.46 per kantar, and the export price was US \$1,450 per ton or Ls 58 per kantar using the official exchange rate. This means that the producer was getting 33 percent of the export price for doing the labor of tapping the trees, collecting the gum, and taking it to market. Merchants were earning 13 percent of the export price for buying the gum at the auction markets, paying 15 percent ushur tax, cleaning and grading it, and transporting it to Port Sudan. The Gum Arabic Company and the government received the remaining 54 percent.

5.8 Producer Price Response

There is tremendous capacity to expand gum arabic production in the Kordofan as many trees are not tapped. Farmers will only tap the tree if the price is adequate to cover their costs and labor. This was evidenced when floor prices were nearly tripled from Ls 6.50 per kantar at the beginning of the 1973-74 season to Ls 18.25 per kantar at the start of the 1974-75 collection period. Production increased 68 percent in the Kordofan Region. The response was so good that it outstripped export demand.

5.9 Intervention to Improve the Gum Arabic Marketing System

5.9.1 Integrated Pricing Strategy

There is a need to develop an integrated pricing strategy for gum arabic. This strategy would set export prices and floor prices at a sufficient level to maximize foreign exchange revenues and producer profits, encourage adequate production levels, and promote range and crop land preservation. A study, as outlined below, would be required to establish a proper and integrated strategy.

The first phase of the study would be to conduct a thorough analysis of the international market for water soluble gums. The purpose of this phase would be to determine the relative price elasticities of demand and scope for adjustments of export offering price. This would be done by examining the industrial uses for which gum arabic has a comparative advantage over competing natural or synthetic gums. Once these uses have been determined, the study would establish the price at which producers would substitute gum arabic for the gum currently used. This information could be used to project the potential sales volume of gum arabic at different prices in different markets. The study would further seek to discern the likelihood and cost of each user switching to gum arabic or increasing the use of gum arabic. Finally, the study would determine how important security of supply is to each importer and what costs would be incurred by the importer if supply were curtailed.

The second phase of the study would examine the effects of floor prices on supply, deriving short-term and long-term production scenarios assuming different price levels. Variations on these scenarios include possible investments the Gum Arabic Company could make to speed the growth in production and to stabilize the source of supply. One such investment would be a buffer stock to ensure supply during dry years. Another possible investment would be improving water availability.

A third phase of the study would be to determine the environmental impact of expanded production. Gum arabic trees are a natural barrier against the encroaching desert. In recent years many have been cut down, having a higher economic value as firewood or building material. Gum trees are also important to the fallowing cycle for crop land. The increase in the value of cash crops relative to gum arabic has disrupted this cycle and reduced fallowing periods, speeding erosion and depleting the land. Improved gum prices would encourage farmers to preserve trees and pursue proper fallowing practices. The study should, therefore, evaluate the impact of different price levels on desertification and land deterioration and attempt to quantify the value of these benefits.

The final phase of the study would utilize the data compiled in the first three phases to devise an optimal pricing strategy to yield maximum long-term benefits to the Sudan. Export prices would be set so as to maximize foreign exchange revenue. Floor prices would be set to maintain production at a level conducive to supplying the needs of the market, maintaining an adequate buffer stock, and pro-

moting land preservation practices in a cost effective manner. Taxes would be reduced to boost producer incentives. In order to achieve the goal of cost effective land conservation, it may be best to set prices at a level that causes over-production. If so, the study should determine how these excess quantities of gum should be disposed of: by storage, by lowering the export price and selling, or by other means.

5.9.2 Eliminate Monopoly of Gum Arabic Company

The Gum Arabic Company is reaping excess profits from its position as the monopolistic purchaser and exporter of gum arabic. Table 5-2 shows that the company's profit taxes rose from Ls 2.8 million in 1979 to Ls 6.1 million in 1981 indicating, before tax, profits in excess of Ls 5 million and Ls 10 million respectively. The profit margin (not gross margin) is 20-25 percent of sales. Table 5-3 shows that the gross margin (the difference between the Port Sudan delivery price and the export price) has risen from 41 percent to 55 percent over the same period and that the producer floor price declined from 42 to 32 percent of the export price. The Gum Arabic Company's investment is very small as it performs only minimal storage functions and has little need for fixed investment. Thus, it is earning an excessive profit for the small investment and minimal value added of its services.

Eliminating the monopoly of the Gum Arabic Company would encourage competition between merchants purchasing gum at auction markets, bidding up prices paid to producers. The increased prices would raise the incomes of the farmers gathering the gum and would encourage them to increase output.

The Gum Arabic Company would still maintain a role in the marketing system. It would set export prices based on the results of the aforementioned study; continue to export gum; and remain responsible for building and maintaining an adequate buffer stock. Finally, the company would still be responsible for maintaining floor prices in the event of surplus production.

5.9.3 Credit

Collectors could increase their output if they had credit available to buy water and to hire assistants during the tapping and collecting season. There is currently a commitment to provide credit through the cooperatives established by the Agricultural Bank at El Obeid and Umm Ruwaba. The Agricultural Bank, however, has not yet instituted such a loan program. These loans should be made available and the program expanded to include other gum producing areas, notably En Nahud. Because there is no significant price variation, as there is with groundnuts and sesame, the loan program will not provide quite as much benefit as do the oilseed loans. However, the money would increase production and likewise producer incomes.

Table S-2
Government Revenues From Gum Arabic
(in Sudanese pounds)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Export duties	998,976	1,674,790	1,837,767	1,414,081	1,241,447	1,455,000	2,651,752	2,233,873	2,243,128	4,790,767	6,567,627	11,237,316
Profit tax	166,000	509,699	743,864	768,335	3,974,270	0	1,214,060	730,482	945,045	2,823,071	3,468,822	6,068,947
Defense tax	3,479	17,178	20,152	-	-	-	-	-	73,207	discontinued	discontinued	discontinued
Development funds	22,650	65,712	97,368	81,330	81,330	-	81,330	71,330	103,820	106,330	376,030	599,190
Special development funds	-	-	-	112,656	2,253,946	-	413,806	46,918	-	1,001,546	709,205	1,488,457
Stabilization funds	-	-	-	-	574,518	1,054,156	867,587	675,470	718,806	570,661	172,827	558,454
Bshur	50,897	193,918	205,919	165,244	145,485	255,476	181,975	136,602	128,850	115,675	95,727	112,451
Local government tax	n.a.	n.a.	n.a.	n.a.	n.a.	632,631	443,842	333,177	314,267	282,136	233,488	274,271
Dividends	19,500	37,500	45,000	60,000	37,500	37,500	81,000	81,000	81,000	135,000	216,000	216,000
Total government revenues	1,261,502	2,508,797	2,950,070	2,601,646	8,308,496	3,434,771	5,935,353	4,308,852	4,608,123	4,825,192	12,138,926	20,555,286
Total export revenues	5,033,182	8,769,118	9,743,519	8,117,830	15,382,180	8,113,948	12,926,627	16,122,022	16,953,384	25,855,742	26,388,970	39,579,396
Total government revenues as a percent of total export revenues	25	29	30	32	54	42	46	28	27	38	46	52

Source: Gum Arabic Company

Table 5-3

Gum Arabic Production, Prices and Export

Year	Production (tons)			Price Per Kantar* (Ls)		
	Sudan	Kordofan	Exports	El Obeid Floor Price	Port Sudan Delivery Price	Export Price
1971-72	27,310	11,496	45,128	4.50	6.10	9.77
1972-73	20,310	6,710	36,214	4.61	6.40	10.20
1973-74	29,723	15,647	20,804	6.50	8.88	33.60 (avg.)
February '74				10.00	12.80	
1974-75	52,400	26,328	15,845	18.25	22.88	23.28 (avg.)
February '75				12.30	15.81	
1975-76	41,200	18,576	26,200	9.00	12.89	22.43
1976-77	34,810	17,750	34,373	9.00	12.89	21.32
1977-78	34,800	19,239	35,180	9.00	12.89	21.90
1978-79	28,500	17,385	42,666	11.25	16.00	26.90
1979-80	38,000	14,509	33,301	11.25	17.92	36.09
1980-81	39,500	20,355	35,553	16.00	22.50	50.45
1981-82	40,000	n.a.	n.a.	19.00	26.46	58.00

*1 kantar = 45 kg

Source: Gum Arabic Company

5.9.4 Water

The high cost and lack of availability of water constricts gum arabic collection, as the water is needed to sustain the people doing the gathering. Providing hafirs and wells in water-short areas would both increase gum arabic production and ease a major drain on farmer incomes.

5.9.5 Buffer Stock

The Gum Arabic Company currently has plans to establish a buffer stock in order to supply customers in years of low production. It will be important to achieve this goal if Sudan is going to rebuild its reputation as a reliable supplier. The country lost many customers and much good will following the poor gum arabic output in 1972-73.

CHAPTER 6

SORGHUM AND MILLET MARKETING

6.1 Introduction

Sorghum and millet are the principal food crops grown in the Kordofan Region. Sorghum is grown throughout the area while millet is grown only in the sandy Qoz soil in a belt extending from Umm Ruwaba to west of En Nahud, reaching as far south as Dubeibat. The consumption of sorghum and millet closely corresponds to their production areas with sorghum consumed universally and millet consumed primarily in rural North Kordofan. The Sudan exports some sorghum from the eastern areas although the only exports originating in the Kordofan are illegal exports to Chad and the Central African Republic.

During the 1981-82 season, 1,081,000 feddans of sorghum and 945,000 feddans of millet (almost entirely in North Kordofan) were planted, yielding 300,000 metric tons of sorghum and 209,000 metric tons of millet.

6.2 Millet Production

Millet is grown primarily for home consumption by traditional farmers across the bottom half of North Kordofan. It is a high risk crop which is very susceptible to damage from insects and birds. In a bad year a farmer can lose his entire crop. Farmers in the area continue to grow the crop, however, because they have developed a strong taste preference for it. Unlike sorghum, which is so bland that it must be flavored with a sauce or side dishes, millet can be eaten alone. Furthermore, the local farmers believe it to be a higher quality food source than sorghum.

6.3 Millet Commercialization

Because farmers seek to grow only enough millet for themselves, very little enters the marketing system. Farmers sell an occasional surplus or, if they are low on cash, they sometimes sell their millet stores and purchase lower cost sorghum to feed their families. In the El Obeid area, only an estimated 15 percent of millet harvested enters the marketing system, while the figure for the Kordofan Region is believed to be closer to 10 percent.

There appears to be a relatively low demand for millet at grain markets, corresponding to the small supply and a price that is often close to double that of feterita, the prevalent variety of sorghum. The wealthy village farmer is usually capable of growing enough millet for himself so he will rarely enter the market. The poor urban consumer buys lower-priced sorghum, and middle and upper class urbanites, perhaps influenced by the influx of elites from Khartoum and other areas where sorghum is preferred, will usually buy the

higher quality varieties of sorghum which may sell at a 30 to 40 percent premium over the price of feterita, but are still well below the price of millet. Urban consumers also tend to have a more varied diet so the advantage of millet being a meal in itself is not at all appealing.

Merchants interviewed at grain markets in El Obeid, En Nahud, Abu Zabad, Kadugli, and Umm Ruwaba all de-emphasized millet. At El Obeid and En Nahud, merchants estimated that only 5 percent of their trade was in millet versus 95 percent for sorghum. Some of the grain merchants in Abu Zabad said that they have millet in stock "occasionally." Kadugli has no local millet production, and the area taste preference is for sorghum so no millet is traded on that grain market. The small quantities of millet traded in Umm Ruwaba come from White Nile Province or from the Bara area.

Though millet is not heavily traded in the El Obeid area, officials at the Regional Ministry of Agriculture estimate that perhaps half of the millet that enters the market goes west to Darfur. Another 25 percent is estimated to go to South Kordofan, which has essentially no local production and likewise little demand.

6.4 Sorghum Production

Sorghum is grown throughout North and South Kordofan by both traditional farmers and in large schemes located in South Kordofan. The traditional farmers will grow sorghum, millet, and a variety of cash crops such as groundnuts, sesame, watermelon seed, and karkadee on 15-35 feddans. Scheme owners in the Habila area near Dilling grow sorghum exclusively on areas of 300-1,500 feddans utilizing tractors. In addition to these licensed schemes, there are an additional 1,000 undemarcated schemes of 200-300 feddans near Habila growing primarily sorghum, as well as major areas authorized by the Nuba Mountain Corporation around Kadugli.

Traditional farmers grow only feterita while scheme owners produce feterita, safra, and duber. Safra and duber are lighter in color and produce a more viscous dough than does feterita and, as can be seen in Table 6-1, can command a premium of 32-50 percent. Even within varieties there are substantial differences in quality. The safra and duber coming from Gedaref have a larger grain size and are lighter in color than the same varieties from Kosti, and even more so than those from Habila. The October 1982 prices in Table 6-1 demonstrate a 13 percent premium for Gedaref safra over safra from Habila, and the premium for duber from Gedaref is 17 percent.

Table 6-1

October 1982 Buying Prices at El Obeid Grain Market

Variety Area	<u>Feterita</u>	<u>Safra</u>		<u>Duber</u>			<u>Millet</u>
	All Areas	Gedaref	Habila	Gedaref	Kosti	Habila	All Areas
Buying Price+ (Ls)	35.85	54.83	48.00	50.50	46.50	40.00	71.00

+Price is per ardeb, with one ardeb equalling two 85-kg. sacks.

Source: Regional Ministry of Agriculture, Market Observer Records, El Obeid.

The 528 schemes in Habila alone produced a total of 99,000 tons or 30 percent of the Kordofan's sorghum in 1981-82. It is the surpluses generated by these schemes that has allowed farmers to gradually shift from subsistence farming to growing cash crops.

6.5 Sorghum Commercialization

The majority of commercialized sorghum in the Kordofan comes from large schemes although there is still a very significant portion coming from the traditional sector. The market observers' estimate is that 70 percent of the sorghum at the El Obeid market comes from schemes while 30 percent is from traditional farmers. As most, if not all, of the scheme owners at Habila are also merchants, and if at least 20 percent have their own trucks, they can send their crops directly to the major crops markets. Unless there is a major grain shortage in their area, which has resulted in government restrictions on crop movements, the scheme owners will select the market where prices are highest. At the time of the study, one scheme owner estimated that 60 percent was being sold in El Obeid with the remainder going primarily west to Babanusa, Nyala, and El Muglad. Reports from Habila truck drivers, however, indicate that large quantities go illegally to Chad. Well-capitalized scheme owners can further enhance their profits by timing the sale of their sorghum with the summertime peak in prices, while those with less money meet their cash flow needs by selling crops throughout the year.

The traditional farmer has neither the capital nor the economies of scale to maximize the price he receives for his sorghum. If his other crops are poor, he may be compelled to sell early in the season at low prices.

Whether or not he can select the timing of his sales, he will rarely have enough crop to make it worthwhile to visit an urban crop market, and thus will sell to a village merchant, lorry driver, or visiting merchant. As most farmers keep abreast of crop prices in urban markets (by talking to people on passing trucks), they can usually negotiate a price that roughly represents the urban price less transport costs and a small profit margin. There has been no study of farmers in very remote areas, so it is unknown whether they are successful at negotiating reasonable prices for their crops.

The one area in which the traditional farmer has an advantage over the merchant/scheme owner is storage. The farmers' underground storage pits offer such complete protection from pests and rot that losses are virtually nil. The merchants, however, must store their crops in large warehouses. None of these warehouses are adequately protected or fumigated and over time have become havens for a host of pests. A merchant storing sorghum or millet from a January harvest time until May or June is likely to lose 10-15 percent of the crop to pests. This loss must be compensated by an equal increase in price or the merchant will not have maximized his profit.

6.6 Millet and Sorghum Marketing

As previously described, traditional farmers will generally sell their excess crops to a village merchant, lorry driver, visiting merchant, or at an urban market. The scheme owners are most likely to store their crop and sell at urban markets when the prices are highest, 4-6 months after harvest.

A farmer may sell to a village merchant in small quantities as he needs money for provisions. It is not uncommon in a village shop to see a villager bring a small quantity of produce and actually barter for goods at a price based on the cash value of the crop and the goods.

The small urban merchants buy and sell grain on a daily basis, working six and a half days per week. They operate a private grain market with no government controls and no formal recordkeeping. The merchants pay taxes based on their own estimates of sales volume and profit. For this reason, it is difficult to get much accurate information from them. The Ministry of Agriculture sporadically monitors activities and prices on the El Obeid market, providing the primary source of price information.

The thirty merchants at the El Obeid grain market sell an estimated average of 10-15 sacks per day primarily to retailers who come from the El Obeid souk. As can be seen in Table 6-2, they maintain about a Ls 2 spread between their buying and selling prices. All of the merchants have been selling there for 20 years or so, and although others have applied to enter the market, the physical size is too small, and they have been denied entrance. It is possible that this may limit competition as only an established clique can sell to the retailers in the area.

With the exception of one merchant who has a scheme at Habila, all of the merchants interviewed denied having any grain stored outside the small market area. Given their strong interest in the problems of storage, especially their interest in an underground storage system called matamura used at Gezira, it is thought that they all have grain stores in the El Obeid area, some of them totaling in the thousands of sacks. It is believed that they earn much of their profit from the 100 percent rise in prices that normally occurs between the January harvest and May or June.

Table 6-2

Buying and Selling Prices at the El Obeid Grain Market
October 1982

Variety	Feterita	Safra		Duber			Millet
	All areas	Gedaref	Habila	Gedaref	Kosti	Habila	All Areas
Buying Price* (Ls)	35.85	54.83	48.00	50.50	46.50	40.00	71.00
Selling Price* (Ls)	37.70	56.50	49.88	52.13	48.75	44.50	73.80
Spread	1.85	1.07	1.88	1.63	2.25	4.50	2.80
Markup	5%	3%	4%	3%	5%	11%	4%

* Price is per ardeb, with one ardeb equalling two 85-kg. sacks.

Source: Regional Ministry of Agriculture, Market Observer Records, El Obeid.

The major factor affecting the grain marketing system in the Kordofan Region is the large merchants. These are men capable of storing thousands of sacks of grain, buying them at the low harvest price, and selling the inventory during the summer months when prices are typically double.

During 1982 the price of feterita on the El Obeid grain market rose 120 percent from Ls 25 per ardeb (2 sacks) in January to Ls 55 per ardeb (170 kg.) in May according to the Regional Ministry of Agriculture's market observer. Over the last three years, the prices of grains have at least doubled in El Obeid between harvest and June. It is highly likely that much of this price movement is due to manipulation. There are always supplies of grain from the previous

year that are sold along with the current year's harvest. Even at Ls 55 per ardeb, feterita is the lowest cost nutritional source available, and thus demand must be fairly price-elastic. Although precise data is not available, it appears that this enormous price escalation occurs regardless of whether the crop is good or bad, the only difference being that in good years average prices are lower.

A portion, but certainly not all, of the price increase is justifiable on the basis of storage losses and costs of capital. As can be seen in Table 6-3 below, however, storage losses rise precipitously after six months, and unless a merchant were expecting a very significant price increase, he would seek to sell his inventory.

Table 6-3

Rate of Loss as a Function of Time
Storage for Sorghum and Millet

<u>Time Period</u>	<u>1-3 months</u>	<u>3-6 months</u>	<u>6-9 months</u>	<u>12 months or more</u>
Sorghum	5.5%	12.5%	21.5%	45.9%
Millet	n.a.	n.a.	19.4%	n.a.

Source: Plant Protection Department, Regional Ministry of Agriculture, El Obeid.

The trade offer between higher price and inventory losses is illustrated in Table 6-4, which shows the net rate of return to a merchant resulting from a series of different scenarios under which varied storage loss rates and price increases are applied. One can see from the chart that if a 10 percent storage loss is likely during the four months between January and May, merely a 20 percent increase in price will yield an 8 percent profit for the four month period or 26 percent on an annual basis. If inventory was held for one year and a 40 percent loss occurred, an 80 percent price increase would be necessary to yield an 8 percent return.

Table 6-4

Percent Profit (Loss) From Storing Grain

<u>Storage Loss</u>	<u>Price Increase</u>					
	<u>20%</u>	<u>40%</u>	<u>60%</u>	<u>80%</u>	<u>100%</u>	<u>120%</u>
10%	8%	26%	44%	62%	80%	98%
20%	(4%)	12%	28%	44%	60%	76%
30%	(16%)	(2%)	12%	26%	40%	54%
40%	(28%)	(16%)	(4%)	8%	20%	32%
50%	(40%)	(30%)	(20%)	(10%)	0%	10%

Although the above chart is a good way to begin thinking about what prices should be under varying levels of storage losses, it omits another important factor, the time value of money. Rather than going through a complex series of assumptions and calculations to derive a hypothetical cost of capital appropriate for the Sudanese private sector, the analysis will be kept simple by applying an approximation of the inflation rate of about 40 percent. Furthermore, a holding period of six months will be assumed. Based on these assumptions, Table 6-5 shows annualized real (inflation adjusted) rates of return to the merchant that can be achieved under scenarios of storage loss rates and price increases identical to those in Table 6-4 above.

Table 6-5

Annualized Inflation Adjusted⁺ Rates of Return
From Storing Crops Over a Six-Month Period

<u>% Storage Loss</u>	<u>% Price Increase</u>					
	<u>20%</u>	<u>40%</u>	<u>60%</u>	<u>80%</u>	<u>100%</u>	<u>120%</u>
10%	(17%)	13%	48%	87%	131%	180%
20%	(34%)	(10%)	17%	48%	83%	121%
30%	(50%)	(13%)	(10%)	13%	40%	69%
40%	(63%)	(50%)	(34%)	(17%)	30%	24%
50%	(74%)	(65%)	(54%)	(42%)	(29%)	(14%)

⁺Inflation is assumed to be 40 percent annually.

The table above indicates that a merchant who can store crops for six months, experiencing the maximum 20 percent storage loss projected by the Ministry of Agriculture and reaping benefits of at least a 100 percent price increase in a climate of 40 percent annual inflation, earns a real rate of return of 83 percent assuming he has no other expenses. This scenario closely approximates conditions as they exist, and any merchant capable of selling his crop in this manner is making excess profits.

Taking this analysis one more step, Table 6-6 projects how much prices should increase over the course of a year using the Ministry of Agriculture's storage loss rates, an 8 percent annual storage fee, and a 40 percent inflation rate. Two levels of price increase are calculated. The first one is the amount of increase necessary just to break even on an inflation adjusted basis. The second level is the increase in price required to earn a 10 percent real (inflation adjusted) return on investment. The calculation for the first level of price increase is: $1 \div (1 - \% \text{ storage loss}) \times (1 + \text{storage fee} + \text{inflation factor}) - 1$. The second price level equals: $((1 + \text{first level}) \times 1.10) - 1$.

Table 6-6

Break-even Price Levels for Stored Crops

<u>Time Period</u>	<u>1-3 Months</u>	<u>3-6 Months</u>	<u>6-9 Months</u>	<u>12 Months</u>
Storage loss	5.5%	12.5%	21.5%	46.9%
Storage fee	2%	4%	6%	8%
40% inflation	9%	18%	24%	40%
Break-even price increase	17.7%	39.4%	72%	179%
10% return price increase	29.5%	53.3%	89.2%	206.9%

This last table is an attempt to accurately reflect the investment and pricing situation facing the merchant. If he cannot sell all of his crop when the price peaks after 4-6 months, he is then faced with rapidly escalating costs (due to an increasing rate of storage loss) and decreasing price. As the next season's crop matures, prices decline more rapidly until actual harvest when the price, if the crop is good, may even be lower than that of the previous year. The previous year's sorghum is always sold at a discount from the price of the new crop. Thus, the merchant will lose heavily on any crop he holds longer than 9 or, at most, 10 months.

What the preceding analysis has demonstrated is that a well-capitalized merchant with good access to marketing channels can earn substantial returns buying and storing grain crops. These excess profits are at the expense of people throughout the Kordofan.

6.7 Alternatives to Reduce Inefficiencies in the Grain Marketing System

The primary cause of the inefficiencies in the grain marketing system is hoarding and price speculation by merchants. Even if solved, the secondary cause, storage losses, might not reduce peak season prices but rather increase profits for speculators. Both of these constraints, however, will be addressed in the recommendations that follow.

6.7.1 Government Managed Grain Stockpile

The most frequently proposed solution for reducing grain speculation is to create a government managed stockpile that would be released on to the market when prices reach a target price level. The Government organization would buy sorghum at harvest, store it in modern, properly maintained and fumigated storage centers, and sell it when prices reach levels considered to be excessive.

This solution is attractive in many ways. The release of grain on to the market would have the effect of reducing prices, and the threat of government grain being released on to the market would discourage merchants from hoarding grain for long periods because their storage expenses would continue to increase but the price level may not. A government stockpile would provide the additional benefit of serving as a buffer stock in times of extreme shortage. As there will still be increases in the price of grain despite the mitigating effects of the grain stockpile, once the initial investments have been made in the facilities and working capital, the stockpile should be self-financing.

There are many problems to overcome in such a project. High quality storage must be built and properly controlled for pests. If pests are not controlled adequately, storage losses could eliminate government profits and perhaps even create a shortage on the regional market that would drive prices up further. The selling of the grain must be carefully administered so that the crops are not merely purchased by wealthy merchants and resold at a profit. The timing, too, of the sale is critical. Because the government will own a substantial portion of grain being marketed, it must be careful not to restrict supply to the marketplace, thereby driving up prices. There is also the danger that a well-coordinated cartel of merchants could hold sufficient quantities of grain off the market so as to force the government to sell its stores early in the season, allowing prices to increase later on.

The size, logistics, and quantities of grain and capital involved will necessitate a well-organized and managed system. It may be that such a project is beyond the capabilities of the government to administer. If the management capabilities are not there, the project should not be undertaken.

The feasibility study for this proposed project must examine a number of important topics. The study must first detail as precisely as possible the mechanisms currently used by merchants to influence prices. It is unknown how many merchants there are who are key factors in affecting prices. This information will be valuable in determining how large the stockpile must be and where the storage centers should be located in order to effectively regulate market prices. The study might consider the effects and feasibility of a government floor price for grains as a way of boosting farmer incomes and encouraging surpluses.

The study must detail the mechanisms to be employed to buy crops and, more importantly, to release crops onto the market. Issues to be dealt with include whether a trigger price should be used to release crops, when the trigger price should be announced, where the crops are to be sold, what controls should be imposed on the sale of crops to ensure that they reach consumers most efficiently, how crops are to be transported, and how the buying and selling of crops should be managed.

Storage placement, design, construction, pest control, and management will be critical to the success or failure of the project and must be thoroughly examined.

The study must design a structure with management, financial, and inventory control systems adequate to handle the complex task of buying, storing, and efficiently distributing large quantities of grain. Finally, the study must decide:

1. Whether it is possible for such a mechanism to significantly mitigate speculative price increases.
2. Whether it is financially feasible for such a mechanism to perform this task.
3. Whether the Government of Sudan or any other organization is capable of administering such a system effectively.
4. Whether or not the project is feasible and how it should be implemented.

6.7.2 Crop Loans to Traditional Farmers

The Agricultural Bank currently loans money to cooperatives to finance their sesame and groundnut cash crops. Loans could also be extended to finance the portion of a farmer's grain crops that is intended to be sold. Just as with the cash crops, the grain would be stored at the Agricultural Bank at harvest time as collateral for the loan. The cooperative decides when to sell the entire stored crop which has enabled them, with the help of the Agricultural Bank financing, to hold their crops off the market until prices approach their peak.

This proposition would not affect grain prices as the number of farmers involved in the cooperative loan program is very small. If the program were successful, however, in ten to fifteen years it might be expanded to a level where it could even out the current seasonality of crop prices.

In the short run, such a modification of the current Agricultural Bank cooperative lending program would boost grain production and farmer incomes in program areas. The short-term benefits and the possible long-term effects of such a program are deemed sufficient by the consultants to warrant further study.

6.7.3 Revising the Terms of Agricultural Bank Loans to Owners of Habila Schemes

At the present time, owners of Habila schemes can store their harvest with the Agricultural Bank and receive payment at the market price for 75 percent of the crop. The merchant may then wait for prices to rise, sell the entire crop, and pay the Agricultural Bank the 75 percent originally advanced plus 18 percent annual interest and storage fees. Although this system is beneficial in that it prevents massive quantities of sorghum from being dumped on the market at harvest time, it is not in the public interest to provide loans at an interest rate below the inflation rate to wealthy merchants to use for speculating on grain. At a minimum, the interest rate should reflect a realistic cost of money. A further step could be to force repayment over a specified period of time to encourage the scheme owner to sell to the market as prices begin to rise. If a government stockpile were to be established as previously described, the loan program could be eliminated and replaced by a level of government purchase that would prevent the harvest price from falling drastically.

6.7.4 Encouraging Storage Construction

The magnitude of crop storage losses in the Kordofan is very difficult to assess. The government study previously cited gives a six month loss rate of 12.5% and a one year/ton rate of 45.9 percent for sorghum. Merchants interviewed stated that if the storage area is good and kept clean, there may be less than 3 percent loss in one year. More typical, however, are losses of 15-30 percent or even more for one year.

Merchants affiliated with the Habila scheme complained that as the number of schemes grew, the Agricultural Bank ran out of quality storage capacity, and now the merchants are finding their own storage areas and then giving the Agricultural Bank the keys so that the bank maintains its loan collateral. These storage facilities are considered to be very poor and are not maintained nor properly controlled for pests.

Merchants interviewed were unwilling to invest money in building storage facilities. The main reason they cited was that it is too expensive.

They also said that because the government owns all the land, it is more difficult to build. It is possible that storage prices are not high enough (10 piastres per 85 kg. sack per month) to support a reasonably good quality storage facility at a profit. It is also likely that merchants do not want to tie up large sums of capital in a fixed investment, especially as they may require significant sums of cash to continue and expand highly lucrative trading activities. They may be waiting for the government to provide low cost storage and not want to risk competition from a subsidized storage operation. Finally, it's very possible that they are totally unfamiliar with what it takes to build, maintain, and manage a storage facility and do not want to spend their time and risk their capital in such a business.

During the consultants' final visit to the El Obeid grain market, the merchants were very interested in a form of storage used at Gedaref called a matamura. The matamura is a greatly enlarged version of the underground storage pit used by villagers in the El Obeid area. A circular pit, 15-20 meters in diameter and 7-8 meters deep, the matamura is lined with grass and filled with a reported equivalent of 10,000-20,000 sacks of grain. The grain is piled to a height of 1-2 meters above ground level and then covered with grass and a clay cover. Like the smaller village storage pits, the matamura can preserve grains in its clay soils for years with virtually no losses.

Despite their excitement and knowledge about this matamura, the El Obeid merchants were all reluctant to be the first to try it. Their fear was that they were not experienced enough to maintain the unit and, if a problem developed such as a water problem or air being trapped inside, there would not be adequate storage for them to quickly empty the matamura into an alternative storage facility. Their fears are somewhat justified as a water problem could quickly destroy most of the grain, but they showed little creativity in trying to overcome the dangers despite the large savings possible.

Although the consultants believe that, aside from the storage needs of a government stockpile or the Agricultural Bank, there is no place for the government in the management of storage facilities, there may be a place in spreading information and initiating innovations. For example, the government might, through the Agricultural Bank, provide insurance for a portion of possible crop losses to merchants pioneering in matamura storage. If the storage system is as good as its reputation, an encouragement program of storage insurance could be initiated throughout the Kordofan. The Ministry of Agriculture should encourage a feasibility study and series of trials for matamura storage in the El Obeid area. Unfortunately, the consultant team is unable at this stage to assess the potential of the storage system having learned of it too late in the study to investigate it in detail.

A second area of intervention or policy change would be a program of land sales and loans to merchants wishing to construct storage space. The loans could be at a rate of interest that would cover the costs of administering the loans plus the current rate of inflation. This program, too, could be administered by the Agricultural Bank.

6.7.5 Encouraging Proliferation of Grain Wholesalers

In most towns in the Kordofan there is a small clique of grain wholesalers who control the business in the area. In El Obeid, for example, there are about 30 licensed wholesalers operating in the grain market. All have been there at least 20 years, and there is no room in the market for additional merchants. Government regulations restrict other merchants from selling to the shops and grain retailers. These regulations should be eliminated as they serve to protect only a privileged group of merchants. Although increased competition could moderate seasonal price increases, it is unlikely that the effect would be significant.

CHAPTER 7

LIVESTOCK

7.1 Introduction

Livestock exports contributed more than \$74 million of foreign exchange to the Sudanese economy in 1981 with the major earners being cattle, sheep, and camels. Cattle and sheep are exported to the Middle East, primarily Saudi Arabia, and additional quantities go to Sudan's neighbors in northern Africa. Camels are exported almost exclusively to Egypt, those from the Kordofan going directly across the desert from the major markets in En Nahud and El Obeid. This analysis focuses on cattle, sheep, and goats as these three animals comprise the major internal movement of livestock flowing through and moving out of the Kordofan Region.

The most reliable statistics on animal population in the Sudan are thought to be those generated by the Sudan Livestock Pilot Census from 1975 to 1977. This census combined aerial photography with a ground sample counting to estimate population. If the rates of population growth developed by the Sudanese Government and the World Bank are accurate, then the census populations adjusted to 1982 should be as indicated in Table 7-1.

Table 7-1

Estimated Livestock Population in 1982
(in thousands)

<u>Area</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Goats</u>	<u>Camels</u>
Sudan	17,815	21,403	13,486	2,598
North Kordofan	1,086	3,180	2,010	922
South Kordofan	1,701	1,095	831	2
Projected Growth Rate	3%	5.7%	3.6%	1.6%

Source: Livestock Census 1975-77.

The exact annual offtake rate of animals is not known. Studies done in the 1970s have disagreed by as much as 100 percent in assigning offtake rate to animals. For the purposes of this study, rates developed by the World Bank are assumed. Applying these rates to the population figures previously presented gives the picture, as presented in Table 7-2, of number of animals being slaughtered for home use or entering the marketing system each year.

Table 7-2

Estimates of Animal Offtakes in 1982
(in thousands)

<u>Area</u>	<u>Cattle</u>	<u>Sheep</u>	<u>Goats</u>	<u>Camels</u>
Sudan	1,336	5,351	3,372	104
North Kordofan	81.5	795	503	37
South Kordofan	127.6	274	208	-
Offtake Rate	7.5%	25%	25%	4%

Comparing these offtake quantities to numbers of livestock actually sold at the El Obeid market in 1982 would indicate that 19 percent of cattle, ten percent of sheep, three percent of goats, and eight percent of camels sold in the Kordofan were sold at the El Obeid market. These numbers are believed to be a reasonable approximation given what is known about the structure of the livestock market system. El Obeid is a central market for cattle and sheep so a 10-20 percent market share is reasonable considering that many animals bound for Omdurman bypass the city, that significant quantities of animals are traded outside the market, and that, of course, the many thousands of animals consumed locally around the Kordofan would not be traded at El Obeid. The low rate of three percent for goats is reasonable as most goats are consumed in villages and do not go through any market. In addition, goats are not a significant export and their slaughter is illegal inside El Obeid itself. Though El Obeid is Kordofan's second largest camel market after En Nahud, most of these animals are traded outside formal markets, so an eight percent market share may be reasonable for camels as well.

These rough estimations set a macro-market context, the components of which are discussed and analyzed in the text that follows. The discussion begins with the fundamental production unit: the migrant herder.

7.2 Migrant Herders

The marketing of livestock, especially cattle, is inextricably intertwined with the climate and ecology of Kordofan region as well as with the centuries old lifestyle of the migrant herder. Thus an overview of the livestock production system is an appropriate place to start in order to understand the constraints within which the livestock marketing system must operate.

Migrant herders own an estimated 80-90 percent of the cattle and most of the sheep in South Kordofan and a majority of the livestock in North Kordofan as well. Living primarily in South Kordofan during the dry season, they migrate northward with the onset of the rainy season in June or July (see map in Table 7-3). This northward migration, a tradition many hundreds of years old, occurs primarily to escape the flies that infest the southern area. The migration serves an additional purpose by relieving pressure on overgrazed areas in the South, allowing the lands to rejuvenate.

The migrants return South in October and November as the pools of water dry up in the North. Further consolidation takes place as watering holes in the South are depleted until the animals become concentrated at major sources of water around the region. In the summer months, the overgrazing of areas with a water supply becomes so severe that animals must often alternate days, drinking one day and eating the next, as the distances between the water and forage become so great.

Lack of water is a problem that constantly plagues herders and farmers with livestock throughout the Kordofan. Frequently, when a new source of water is created, the local livestock population quickly grows until the new area is overgrazed. Attempts to bring feed to the water areas or to truck water to pasturelands are not presently feasible. Lack of water, as an impediment to both the production and movement of livestock, is a problem that warrants further attention.

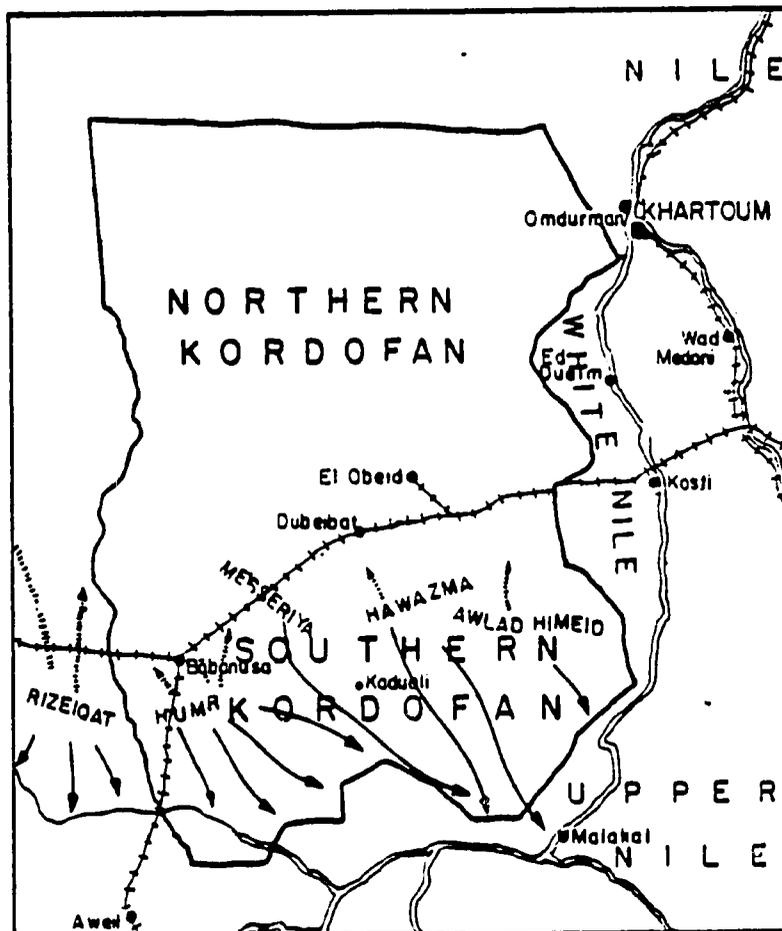
7.3 The Role of Livestock in the Migrant Herder and Small Farmer Economy

Livestock, especially cattle, are regarded primarily as a store of value rather than as a source of income. Especially for migratory herders, there are no safe or productive investments other than livestock. The animals cost little to maintain as they live off the land, retain their value even in times of inflation, and they are portable and easily converted into cash. Although a migrant will often own a farm, there are few investments available to make his farm more productive. Finally, the number of animals one owns and the size of the animals is a sign of wealth and prestige for both nomads and farmers.

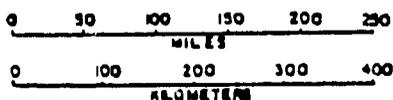
Only wealthier farmers own cattle although most farmers own goats. Very few will tend sheep as they cannot be kept in the village, they consume expensive water, and their only value is for meat. Goats, an important resource providing milk and low cost meat, are a low risk store of value as they can eat almost anything and can live in close proximity to people. Goats are frequently sold when money is needed for weeding or harvesting or if it is late in the year and the harvest was poor. This pattern of selling goats during the cultivation period is documented in Table 7-6, which shows monthly animal sales in the El Obeid market. More disaggregated data exam-

Table 7-3

NOMADIC MOVEMENT OF LIVESTOCK
IN THE KORDOFAN REGION



Source: World Bank



- ⋯⋯⋯ Rainy Season
- ➔ Beni Amer (Dec - Feb)
- Existing Railways
- Rivers
- Kordofan Boundaries

CATTLE OWNING
TRIBES

- HUMR
- MESSERIYA
- HAWAZMA
- AWLAD HIMEID
- RIZEIQAT

ined by the consultants showed that the increase in absolute numbers of goat sales at the El Obeid market during these months is due entirely to an increase in the sale of local animals. Generally, the best goats are sold during the cultivation period to be replaced by younger animals after harvest.

Both the nomads and the farmers tend to sell animals when they need money rather than specifically to earn a profit. The nomads will cull their herds and sell some choice animals to exporters while they are in the North. They prefer to sell in the North because there are more consumer goods available in El Obeid than in South Kordofan. They use any remaining funds to buy young cattle to add to their herds.

7.4 Merchant/Assemblers

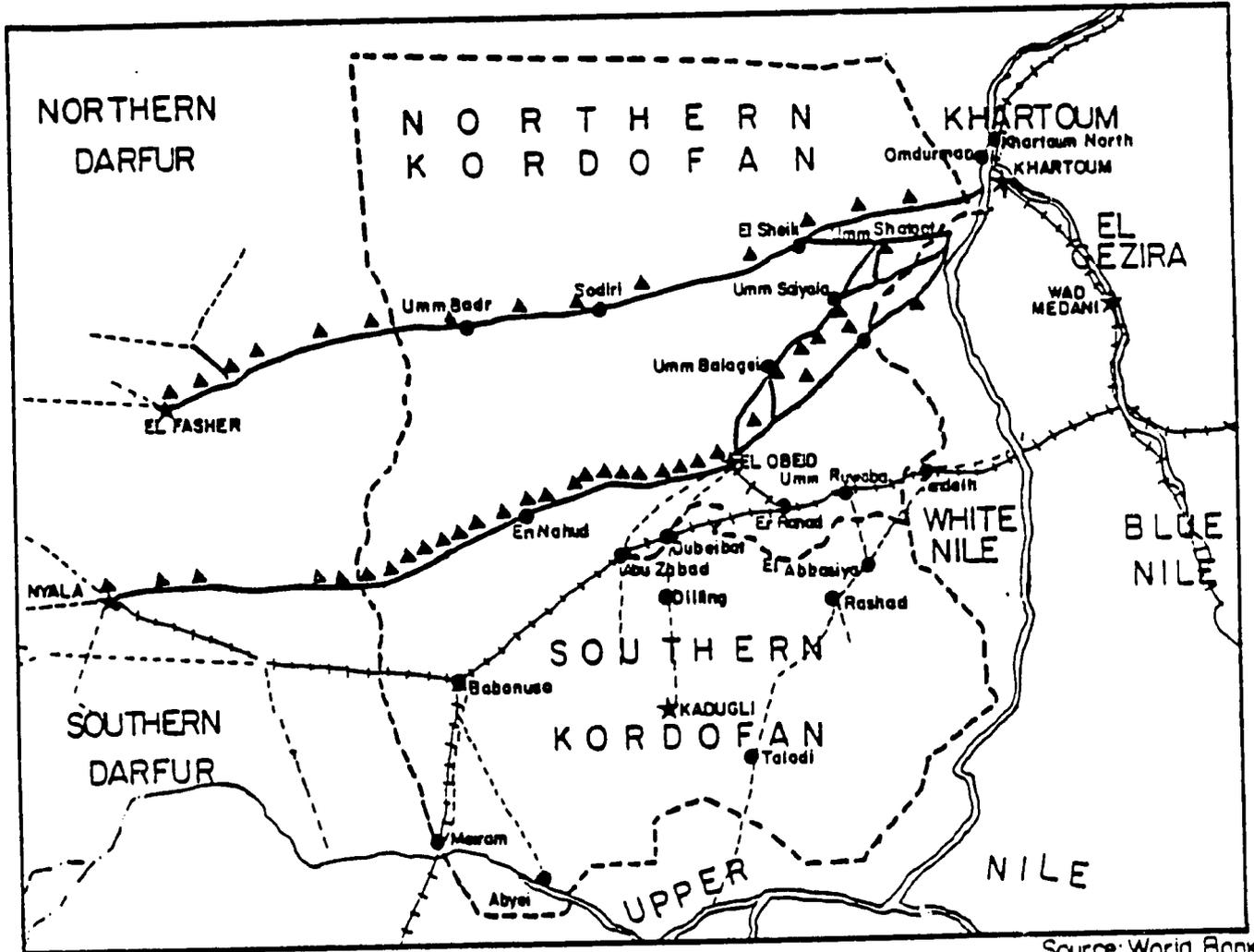
Livestock from towns and rural areas are purchased by merchants buying from villages, watering points, and town livestock markets. Purchases of sheep and goats directly from villagers is more common than is direct buying of cattle as the smaller animals can be carried out by truck.

The merchant will assemble a herd of approximately 50 animals and take them to a major market such as En Nahud, El Obeid or Omdurman. There are well established trekking routes which most merchants use (see map in Table 7-4). Animals purchased in Nyala (Darfur) proceed along the railroad tracks to El Da'ein, Abu Gabra, and north to En Nahud, Iyal Bakhit, Sodiri, Gabra and finally to Omdurman. This route has adequate water supplies during the autumn months but rarely is usable during the hot summer. An alternative route via El Obeid, El Zureiga, and on to Omdurman can be used all year because it is lined with water points. Animals passing through El Obeid will occasionally be sold if prices are very good, although as indicated in Table 7-5, most animals sold at the El Obeid market are from the Kordofan Region.

A herd coming from Nyala or El Du'ein may take 40 to 60 days to reach Omdurman. It is not uncommon for 20 percent of the sheep to be lost along the way to disease, snake bites, starvation, or theft. Cattle losses are probably closer to ten percent. Sheep will typically travel in a group of 200 and cattle in groups of 50 to 100, although the total herd size can be as many as several thousand. Each group of animals is accompanied by three or four guards/herders. The wages of the herders, the purchase of water, and the costs of the lost animals are the principal expenses of the journey.

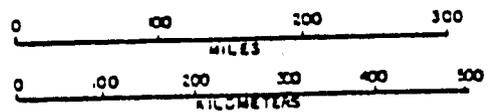
Some sheep are brought east to the El Obeid market by truck. Precise numbers are not known although estimates range from 10 to 30 percent.

Table 7-4
LIVESTOCK ROUTES



Source: World Bank

- Main Stock Routes
- Feeder Stock Routes
- ▲ Water Points
- Railways
- ~~~~~ Rivers
- ★ Province Headquarters
- Towns and Villages
- - - - Province Boundaries
- . - . International Boundaries



7.5 Livestock Market Operation

Formal livestock markets exist in most of the major towns in Kordofan. For the large part they are managed by the local town council, the notable exception being the El Obeid livestock market which is run by the Livestock and Meat Marketing Corporation (LMMC), a government parastatal. The markets have a dual function providing a forum for organized and certified animal trading as well as facilitating tax collection.

The selling procedure for animals is basically the same at all markets visited. Only cattle undergo a formal auction process. They are taken individually or in lots of 4 or 5 in front of a group of buyers who bid competitively. The other animals - sheep, goats, camels, donkeys and horses - are sold at a price negotiated between the buyer and seller. There is no supervision of the negotiations so the price recorded on official records could be understated.

At each market there is a group of individuals called "damir" who guarantee the sale of each animal. The damir will know all the sellers who come from his town or area. He may even lodge the seller at his home during the course of the merchant's stay. This familiarity allows him to guarantee to the buyer that the animal is not stolen. He charges a fee for this service ranging from ten piastres for a goat, Ls 1 for cattle, sheep, and donkeys, and up to Ls 2.50 for camels and horses. If the animal turns out to be stolen or quickly succumbs to disease, the seller's damir will reimburse the purchaser.

Taxes charged at the market are low, totalling about Ls 2 for a camel in El Obeid and 30 to 40 piastres for a sheep. Additional taxes may be charged at the end of the year based on the number of animals traded. Market records may be used in assessing income taxes. For these reasons, as well as for convenience, many animals are traded outside the market. Auction market officials at En Nahud estimated that 80 percent of camels (En Nahud is the Kordofan's largest camel market), 80 percent of the sheep, but essentially no cattle are traded outside the market. Controls on cattle trading and the value of a guarantee for the animals seem to be enough to curb illegal trading. Estimates for the El Obeid area for animals traded outside the market are 50 percent for sheep and 20 percent for cattle. Although obtained from officials of livestock markets, these statistics are not verifiable and are meaningful only inasmuch as they indicate that significant tax evasion is occurring.

7.6 The El Obeid Livestock Market

The consultants visited livestock markets in El Obeid, En Nahud, Abu Zabad, Kadugli, Umm Ruwaba, and Omdurman. Of all the Kordofan livestock markets, only at El Obeid were there found reliable and reasonably complete data. En Nahud and Abu Zabad have minimal records

and, at Umm Ruwaba, only a portion of the records could be located over the course of the consultants' visit. Kadugli's records are reasonably good although it is not as important a market as is El Obeid, and the statistics are not maintained at the same level of detail.

Data on prices are believed to be suspect for two reasons. First, the prices are for a mix of male, female and very young animals in varying states of health; and, second, prices are used for tax assessments so reporting is not always accurate. In addition to these caveats, one must keep in mind that not all of the animals actually traded are sold at official markets.

Statistics from the El Obeid Livestock Market are presented in some detail in Tables 7-5 and 7-6. These figures are believed to present a reasonable reflection of the marketing of livestock in the region and, as previously mentioned, they are the only reliable detailed records available to the consultants.

The statistics in Table 7-6 on the monthly quantities of cattle, sheep, and goats brought to the El Obeid market and actually sold and their average prices substantiate a number of patterns revealed to the consultants during the course of interviews. On the farm level, one can see that the quantities of goats traded very closely corresponds to the crop seasons. This is especially true during 1981 when a large number of farmers sold goats from June to September in order to pay for food and to finance cultivation, weeding, and harvest expenses.

Sales of cattle begin to rise in July as nomadic herders arrive from the South. Cattle trading continues at a high level through December as animals making the trek from the western reaches of the Kordofan pass through the market. The dip in cattle price in August and September that occurred in both 1980 and 1981 is due to the presence of nomads selling their animals. Sales of sheep follow a similar pattern although prices are good during September and October as thousands of families buy a ram to slaughter for El Adha. In 1980, El Adha fell in the middle of October, and in 1981 it was in early October.

The geographic origins of livestock traded on the El Obeid market can be examined with the help of Table 7-5. This table shows the numbers of animals entering the market, but not necessarily sold there. A quick glance reveals that 50 percent of cattle, 61 percent of sheep, and 60 percent of goats are from South Kordofan Province, verifying the major flow of animals from the south. The figures from North and South Dafur show a relatively small number of animals from those provinces. Officials at the El Obeid Livestock and Meat Marketing Corporation indicated that only about ten percent of the animals exported from these provinces enter the El Obeid market with the remaining 90 percent going directly to Omdurman.

Table 7-5

Origin of Animals Entering
El Obeid Livestock Market 1981/82

Animal	North Kordofan	South Kordofan	North Darfur	South Darfur	Southern Region	Total
Cattle	23,280	33,745	1,545	875	1,067	60,512
Sheep	52,410	86,693	790	1,500	-	141,393
Goat	13,714	20,301	-	-	-	34,015

Source: El Obeid Livestock Market.

7.7 Buyers

Buyers at the larger livestock markets are slaughterhouse owners, exporters, or middlemen for exporters. The majority of cattle, sheep, and camels sold at all the markets visited are eventually exported. Some 90 percent of the camels sold in En Nahud make the 45-day trek across the desert and up the Nile to Cairo where they are slaughtered for meat. Cattle and sheep may see a few additional intermediaries going from El Obeid to Omdurman before making the trip to Port Sudan. Some animals may actually be sold twice in the same market before going east.

There are about sixty merchants at the El Obeid Livestock Market who buy locally and sell in Omdurman once or twice per month. There are an additional 100 or so who are based in Omdurman but make buying trips to El Obeid a few times each year. Merchants will buy cattle, sheep, and goats for resale in the Omdurman market.

Livestock trading is a very profitable business. Tables 7-7, 7-8, and 7-9 show livestock prices at the major markets from July of 1980 to June of 1982. Prices in Omdurman averaged Ls 109 higher for cattle, Ls 19 higher for sheep, and Ls 8 higher for goats than in El Obeid. Prices at Nyala and El Fasher were close enough to those at El Obeid that merchants would prefer to go all the way to Omdurman rather than sell in Kordofan.

The prices in these exhibits are not strictly comparable because animals sold in Omdurman are generally of the best quality, intended for export or for slaughter in the capital city. Interviews with merchants, however, verified that the spreads in prices are usually favorable. One merchant indicated that the average profit for selling 100 cattle in Omdurman is Ls 4,000 to 5,000 although, as indicated in Tables 7-7, 7-8, and 7-9, prices occasionally decline suddenly and merchants lose money.

Table 7-6

EL. OBEID LIVESTOCK MARKETMonthly Livestock Sales and Prices July 1900-June 1902

Month	Cattle			Sheep			Goats		
	Entered*	Sold*	Avg Price	Entered	Sold	Avg Price	Entered	Sold	Avg Price
July 00	4,542	2,785	166	14,226	6,999	22	4,455	1,644	14
August	7,580	3,459	147	14,406	10,597	23	2,366	563	13
September	9,017	4,631	150	20,905	13,893	33	2,161	601	10
October	7,282	3,808	159	21,208	12,375	35	1,526	595	12
November	9,125	2,551	153	24,125	5,320	35	1,025	425	10
December	8,227	3,098	152	11,036	3,719	29	2,252	497	16
Jan. 01	5,191	2,790	150	10,256	3,683	33	1,517	424	10
February	6,102	2,274	230	7,361	2,167	40	1,125	418	23
March	4,202	2,353	174	5,946	3,108	23	1,003	378	9
April	4,206	2,210	151	5,242	4,034	25	803	425	10
May	3,059	1,795	163	5,326	4,311	25	1,648	1,202	13
June	2,208	1,413	176	7,246	4,080	25	5,742	3,194	13
July	4,530	3,744	169	8,710	7,695	26	4,850	2,425	15
August	9,146	5,029	102	18,607	10,763	33	3,025	2,225	14
September	9,392	4,260	177	22,421	12,446	31	3,654	1,554	20
October	5,797	2,242	163	18,583	10,440	39	1,387	857	14
November	5,895	2,661	183	12,210	8,301	30	2,577	1,557	17
December	6,659	4,066	179	11,805	9,907	37	2,348	1,324	26
Jan. 02	8,497	2,705	195	13,948	9,792	33	1,732	1,128	17
February	8,836	2,718	183	11,643	8,253	39	2,507	1,820	17
March	8,021	2,624	169	8,480	6,608	36	2,072	1,735	16
April	4,235	2,002	203	9,137	7,774	35	3,018	2,222	16
May	3,026	2,181	212	8,078	7,139	34	2,927	2,375	17
June	2,601	1,929	219	8,284	6,504	33	3,991	2,607	17

* Not all animals entering the livestock market on any particular day are sold on that day. Some are entered again and sold on a subsequent day while others are never sold as the owner demands a higher price than that offered.

Source: Research and Information, Domestic Information Section, Livestock and Meat Marketing Corporation.

Table 7-7

Average Monthly Cattle Prices at Major Markets

Month	Omdurman	El Obeid	El Fasher	Nyala
July 80	303	166	165	175
August	188	147	135	143
September	171	150	145	153
October	343	159	130	120
November	175	153	130	100
December	212	150	140	102
Jan. 81	294	150	160	120
February	239	230	165	103
March	192	174	160	152
April	258	151	160	156
May	354	103	160	166
June	325	176	160	160
July	372	169	175	210
August	412	182	145	140
September	235	177	135	165
October	224	163	130	190
November	229	183	185	180
December	285	179	200	180
Jan. 82	248	195	160	180
February	257	183	170	210
March	295	169	180	200
April	347	203	195	190
May	395	212	210	180
June	463	219	230	250
2 year avg.	284	175	164	164

Source: Livestock and Meat Marketing Corporation.

Table 7-8

Average Monthly Sheep Prices at Major Markets

Month	Omdurman	El Obeid	El Fasher	yala
July 80	35	22	25	26
August	46	23	22	21
September	38	33	28	23
October	39	35	20	32
November	40	35	35	29
December	48	29	30	29
Jan. 81	26	33	35	22
February	55	40	35	25
March	56	23	35	26
April	53	25	27	23
May	60	25	35	25
June	54	25	40	30
July	46	26	30	35
August	48	33	25	25
September	56	31	35	25
October	46	39	37	21
November	55	30	28	32
December	41	37	35	30
Jan. 82	69	33	31	25
February	64	39	33	25
March	54	36	31	28
April	66	35	45	27
May	67	34	35	26
June	48	33	30	29
2 year avg.	50	31	32	27

Source: Livestock and Meat Marketing Corporation.

Table 7-9

Average Monthly Goat Prices at Major Markets

Month	Omdurman	El Obeid	El Fasher	Nyala
July 80	21	14	15	18
August	27	13	18	13
September	18	10	22	16
October	17	12	18	14
November	18	18	18	n.a.
December	18	16	15	14
Jan. 81	23	10	15	16
February	19	23	15	14
March	26	9	16	17
April	22	10	20	14
May	24	13	22	13
June	24	13	22	12
July	27	15	22	26
August	21	14	13	19
September	18	20	25	16
October	28	14	18	17
November	21	17	20	17
December	24	26	22	16
Jan. 82	26	17	20	14
February	23	17	17	16
March	26	16	22	17
April	25	16	22	16
May	36	17	20	15
June	31	17	25	15
2 year avg.	23	15	19	16

Source: Livestock and Meat Marketing Corporation.

7.8 Livestock Transport from El Obeid to Omdurman

There are three methods of transporting livestock from El Obeid to Omdurman. The most frequent movement is trekking. Some sheep go by truck, and both sheep and cattle go by train.

Trekking is the least expensive although it can take 10 to 15 days for cattle to make the journey and about 20 days for sheep. The direct costs for trekking 100 sheep, goats, or cattle is about Ls 460. The major component of this cost, about Ls 350, is for guards/herders, and the rest pays for food and water for animals. Although the animals lose some weight over the course of the journey, most merchants interviewed believed that a weight loss of a few kilos had no effect whatsoever on the price received. This attitude

could possibly change in the future as facilities for weighing animals have been installed at the new Omdurman Livestock Market. Merchants have as yet largely refused to use the weighing facilities, perhaps fearing increased tax assessments or government interference.

Rail is the favored mode of transport by merchants who move very large quantities of animals. The trip takes two to seven days. The cost for sending 95 sheep is just a bit over Ls 500, making it cost competitive with trekking, but cattle are more expensive, costing close to Ls 700 to move 25, or five times as much as it would cost to trek the animals. Railroad cars are difficult to procure. Some of the smaller merchants alleged that the big merchants can reserve livestock cars because of their influence. Approximately 15 percent of cattle and 30 percent of sheep move by rail from El Obeid to Omdurman. The consultants were given very contradictory information by different merchants concerning both the prevalence and economics of moving animals by truck. Some reported that it is common, while others maintained that it's almost non-existent. The truth is probably that only a few head of cattle and a larger quantity of sheep move by truck. The cost for truck transport, including loading, guards, and miscellaneous expenses, is about Ls 400 for 30 sheep or 12 cattle, making it a high cost option. There is also a great danger of injuring animals as they bounce and wind along the deeply rutted roads. The big advantage, however, is that a truck can travel the distance in two days or less which can be very useful if Omdurman prices suddenly rise. It is likely that more animals would move by truck if the roads were better, and improved roads would further reduce travel time, cut costs, and eliminate animal injuries.

The World Bank is supplying the LMMC with locomotives and livestock cars in order to increase the livestock carrying capacity of the railroad. One block trains of 20 double-deck cars and eight single deck cars are scheduled to commence operation between El Obeid and Khartoum in late January of 1983. Each double-deck car can carry 100 sheep on top and 100 sheep or 25 cattle below, and the single cars can carry 80 to 90 sheep or 25 cattle. The goal is for this train to make 100 round trips per year or a round trip every three and one-half days. A similar train will go into service between Nyala and Khartoum later in the year, making stops in Babanusa, El Obeid, and Er Rahad. It is hoped that this train will be able to make 50 round trips per year or one every seven days.

The rates charged by these LMMC managed trains will initially be the same as those charged by Sudan Railways Corporation (SRC). Eventually, the rates will be raised to a profitable level (the rates are currently subsidized for livestock, groundnuts, and other selected commodities). The service will be given priority on the tracks in order to speed up the trips.

The new trains will improve the movement of animals to Khartoum, and will raise the quality level of animals arriving in the Omdurman market by eliminating the long trek. The project will hopefully increase producer prices in El Obeid as a by-product.

The World Bank is also improving the major trekking routes by financing the construction of water points at key intervals. This will lower the cost and risk of trekking animals from Darfur and Kordofan to Khartoum.

7.9 Slaughtering

There is at least one slaughterhouse in every major town, as well as numerous small illegal operations. In El Obeid the slaughterhouse is government owned and operated. It does not purchase animals but rather slaughters for butchers and charges a fee. Most of the cattle are slaughtered there and perhaps half of the sheep. It is illegal to slaughter goats in El Obeid, as the government wishes to discourage butchers from selling goat meat as higher-priced mutton. An El Obeid merchant who has a near monopoly trading animal hides estimated that about 20 percent of the cattle, 40 percent of the sheep, and 100 percent of the goats slaughtered in El Obeid are slaughtered by unlicensed slaughter operations or in homes.

Slaughterhouses in the Kordofan are outmoded operations that are not designed to utilize blood, bones, and other by-products. Sanitation is limited and none of the houses visited had refrigeration capacity. Problems with spoiled meat are unlikely, however, as animals are typically slaughtered before dawn, and the meat is sold early in the morning to be consumed during the day.

7.10 Government Price Control of Meat

Officially, the price of meat is controlled in all the major towns in the Kordofan. The official price is very low, and in most areas is virtually ignored. In El Obeid, for example, the official price for a kilo of mutton without bones is Ls 2 while the butchers sell it for Ls 4. A customer insisting on the official price is likely to get the very poorest cuts of meat.

In Umm Ruwaba, officials stopped setting meat prices in 1980; however, the two largest slaughterhouse operators claimed that a butcher spent a month in jail for overcharging in 1979. These slaughterhouse owners further attested that they continue to feel obliged to keep prices low and that their business was not profitable.

Kadugli price control officials continue to take their job seriously. In early 1982, when 50 percent of the meat being sold in the city was at an illegally high price, the Town Council established a slaughterhouse cooperative which apparently brought prices down again. In Kadugli more than 100 people have been prosecuted and convicted during the past five years for violating price controls on a wide range of commodities, especially cigarettes. Officials interviewed indicated that a result of their vigilance has been that many price controlled goods are now available only in villages outside their jurisdiction because no merchant can earn a profit at the controlled price.

The control of meat prices is probably unnecessary as animals are generally available, and it is unlikely that any individual or group could monopolize the market and raise prices artificially. The full extent of the negative effects of price control are difficult to assess. In Wad Medani, unrealistic controlled prices encouraged livestock traders in 1976 to completely bypass the market and sell in Khartoum, leaving consumers without meat. The specter of enforcement is an unnecessary worry for butchers working on a small margin.

Price controls, if enforced, would tend to discourage the development of a market for high-priced, premium quality meat. Without such a market, there is no incentive to establish feedlots capable of fattening animals to their potential. Such feedlots are expensive to operate due to the high cost of feed and the scarcity of water. The establishment of feedlots would, however, provide a number of advantages: first, it would supply high quality meat for consumers; second, fattening animals in feedlots would tend to ease the burden on severely overgrazed pasture land around towns and cities; third, feedlots would reduce the seasonality of livestock trading by providing a reliable, year-round supply of meat near urban centers; and fourth, the higher prices available for quality animals would encourage both feedlot operators and livestock traders to use alternative modes of transport such as railroad and trucks rather than wearing animals down by trekking them hundreds of kilometers. The increased revenue gained by the railroad and trucking industry would ease pressures on overgrazed lands and lessen tensions between herders and farmers, the latter occasionally suffering crop losses from passing animals. A fifth advantage is that feedlots would increase the local market for excess seedcake. Improved prices for seedcake would enable processors to reduce oil prices in times, such as the 1982/83 sesame harvest, when the cost of oilseeds precludes selling the oil at a price that consumers will pay and that will cover processing costs; and, sixth, establishing feedlots would provide a general improvement in the quality of Sudanese livestock and would increase the number and quality of animals suitable for export, thereby enhancing the reputation of Sudanese animal exports internationally and generating additional foreign exchange.

It is unknown how much the lifting of price controls would facilitate the evolution of a more efficient and stationary livestock production and marketing system. At a minimum, lifting such controls would remove a major annoyance for butchers and slaughterhouse owners. Optimistically, it could generate important innovations and improvements in the livestock production and marketing systems as outlined in the previous paragraph. It is the opinion of the consultants that because price controls on meat are already being ignored, removing the controls would have only minimal, albeit positive, impact on the livestock marketing system.

7.11 Dairy

There is a very small dairy industry in the Kordofan Region. In the villages people consume milk from their own goats and cows; in cities and towns imported powdered milk is used.

There is a large demand and small supply of fresh milk in El Obeid and other large towns. A government dairy herd outside El Obeid provides small quantities of milk primarily to government employees. This operation is currently losing money. There are private dairy herders as well who charge a higher price (30 piastres per half liter versus 15 piastres by the government), but they do not come close to meeting demand.

Dairy farming in the El Obeid area, as in the rest of the Kordofan, is extremely difficult due to shortages of water and resultant overgrazing of areas around water sources. Dairymen must bring both water and feed to their milking cows. Dry herds are kept far from town and must trek between sources of water and foraging areas. Because a well-fattened milking cow may not survive the adjustment to the rigorous life of the dry herd, dairy farmers are reluctant to allow their milking animals to get too fat. Thus, instead of yielding a potential eight liters per day, the private herds yield about four liters, and government herds yield two liters.

It was beyond the scope of the study to prepare a detailed analysis of the dairy industry in the Kordofan. At present the industry is underdeveloped and believed to be only marginally profitable due to high costs of feed and water. The large excess demand for milk at current prices would indicate, however, that there is room for price improvement and profitable industrial growth.

7.12 Hides

There is no large scale tannery in the Kordofan. There are numerous small operations that dry hides and treat them with salt, but the majority of skins go to Khartoum for tanning or are exported.

Local tanneries handle only a small share of the cattle hides coming from slaughterhouses and butchers. The thickness of the skin makes them difficult to handle properly so most go to Khartoum where they are tanned and sold around the country to make shoes and other leather products. Locally treated cattle hides are used for water containers and other roughly finished items. Sheep and goat hides are simpler to treat, and some of the locally processed skins are used by shoe makers: the goat leather lining the inside of the shoe and the sheepskin providing a soft but durable upper.

There are a very small number of merchants buying and selling hides in the Kordofan. A single family based in El Obeid dominates the trade in the entire region. Managed by one of the sons, the company buys a reported 300,000 goat, 275,000 sheep, and 30,000 cattle hides per year from throughout the Kordofan. These skins are purchased in El Obeid and from 15 smaller merchants throughout the region. The dried hides are shipped to Port Sudan where they are exported by one of the seven merchants who have licenses to export hides.

The business appears to be lucrative as the hides are very inexpensive at the local level, and export prices can be quite attractive. In El Obeid, for example, sheepskins are purchased for Ls 1.25 each, goatskins for .50, and cattle hides for only 10 piastres per kilo. The hides require minimal treatment, primarily drying, before being shipped on to Khartoum and Port Sudan. A good quality sheepskin which costs about Ls 2 to buy, process, and deliver to Port Sudan can be exported for Ls 10.20.

Unfortunately, the economics of animal hide export are not as straightforward as it might appear. In order to ensure a supply of leather within the country, the government reserves and exercises the right to purchase 60 percent of the sheep hides and up to 80 percent of cattle hides destined for export. It does so at very favorable prices of about Ls 3 per sheepskin and a bit more for cattle hides, buying them for government tanneries in Khartoum.

The economics take a further twist when the role of the exporter is studied. There are only a handful of companies licensed to export hides from the Sudan, most of which have been doing so for at least a generation. It is extremely difficult to get an export license and there is a large annual fee that encourages the exporters to sell aggressively. The exporters do, however, force some conditions on their suppliers that enable the exporters to pay variable prices for the hides and to tan some skins at their own plants before exporting.

It is beyond the scope of this study to fully unravel the economics and dealings of the hide exporters. However, it is safe to say that competition is limited in this sector. The government could alleviate this problem somewhat by easing the process of licensing exporters, thereby creating more competition at the export level. This might have the effect of creating more price competition throughout the chain. The monopsonistic purchasing of hides within the Kordofan will be broken only if one or more of the smaller operators is able to greatly expand or if a well-connected and capitalized newcomer can force his way in. The present trading pattern appears firmly established, however, and is unlikely to change in the near future.

7.13 Alternatives for Improving the Livestock Marketing System

7.13.1 Transportation

The World Bank is actively engaged in improving transport systems for livestock. The livestock trains going into service in the Kordofan during 1983 will greatly enlarge the capacity of the railroad to carry animals quickly to the Omdurman market. This should increase both the quantity and rate of livestock movement. The World Bank is also improving the major livestock trekking routes by building watering points along the way. It is not anticipated that there would be a significant role for USAID to play in either of these endeavors.

7.13.2 Price Control

Although price controls are not a significant constraint on the livestock marketing system, they do cause problems for slaughterhouse owners and butchers. Eliminating price controls should not raise meat prices excessively as there are a number of butchers in all of the sizeable towns in the Kordofan, so monopolistic pricing would be unlikely. In areas where there are only one or two slaughterhouses, it might be necessary to place some restrictions on prices charged for slaughtering; however, these restrictions should not be promulgated unless there are systematic abuses.

It is possible that eliminating price controls would allow butchers to charge variable prices for different cuts of meat giving the consumer greater choice. Cuts that are in high demand will become more expensive while prices for cuts that are in low demand may actually become cheaper than the current maximum controlled prices.

Developing a market for cuts and qualities of meat might spur the livestock industry on to pay more attention to the quality of animals, perhaps even encouraging feedlots in the Kordofan. One must keep in mind, however, that Sudanese cooking and preference for meats is very different than are tastes in industrialized countries, and thus the value added from a feedlot may be somewhat lost on the Sudanese domestic market.

7.13.3 Legalize Goat Slaughter

The ban on goat slaughter in El Obeid and other towns serves mainly to move the slaughter of goats outside official slaughterhouses. There is a demand for goat meat so goats are still being slaughtered, albeit illegally. The consumers' interests would be better served if goats were slaughtered under somewhat sanitary and controlled conditions. If an unscrupulous merchant attempts to sell goat meat as mutton, his customers can buy just as easily from the butcher in the next stall.

7.13.4 Water

Improved availability of water would ease livestock transport. The World Bank is already investing in water points along major trekking routes.

7.13.5 Feedlots

There may be long term potential in the Kordofan for private investment in feedlots which could be used in combined dairy and meat production. The full potential for feedlots will be realized only when fast, reliable transport is available in Khartoum. A larger local market for higher priced, high quality meats would also encourage the establishment of feedlots. At present, however, the economics of feedlots are believed to be at best marginal and perhaps even negative in most of the Kordofan due to the high costs of water and feed and the problems of transporting fattened animals without losing the value added from the feedlot.

7.13.6 Hides

Government restrictions on hide exports should be eased, and licenses should be made more readily available to would-be exporters. The government should seek to buy hides from as many sources as possible in order to encourage competition. This will necessitate paying market prices for hides rather than setting prices by mandate. The result should hopefully be better prices for the owners of the slaughtered animals. In the long run, if all regulations were lifted and the government and other tanneries paid market prices for hides, the price of leather would increase perhaps by a factor of three and hide exports would increase. If price increases were passed along to the producer because of increased competition, producers would take more care not to damage the skins and would earn more money. Another effect might be the entrance of private entrepreneurs into the tanning business as they would be competing with government tanneries on an equal basis.

CHAPTER 8

DISTRIBUTION OF FARM INPUTS

8.1 Introduction

As part of the terms of reference for this study, the team was requested to investigate the agricultural input delivery system and the possible areas for improvement. The investigation was confined to assessing the availability of seeds and Aldrex-T (a chemical pesticide). Aside from labor, these were seen as the most significant inputs for traditional farmers in Kordofan Region. They are also important to mechanized farmers and modernized small farmers. Agricultural machinery and fuel were not included in this survey of inputs. Fertilizer, to date, is of minor importance to agriculture in the region.

8.2 Seed Distribution

The Sudan does not have a seed multiplication program that provides certified seeds for crops grown in the Kordofan Region. The distribution of certified seeds in the region has not been attempted by the government for some years. The yield of the groundnut crop particularly has decreased as well as sorghum production on the mechanized schemes. The large majority of farmers reserve seed from year to year for their planting needs. Traditional farmers who fail to reserve seed or who find themselves with an insufficient supply can usually borrow or buy from a neighbor. If they are buying at planting time, the price may be 50-100 percent above the price at harvest time. Sharecropping is another alternative to the traditional farmer if he cannot afford to buy seed. This practice is well known in En Nahud District because of the high cost of groundnut seeds. If a farmer hasn't any seeds, he can obtain them through a partnership with some one who has, usually a local merchant. A typical arrangement is that the merchant and the sharecropper agree on how many sacks are to be planted (1 sack plants approximately 1 makhammas of area: a makhammas = 1.80 acres). In addition the merchant will give one sack of millet for the sharecropper's consumption and Ls 5 for each sack of seeds to pay for additional labor. In some cases the merchant also provides water to the sharecropper. This is particularly true if the sharecropper is a migrant, such as a southerner or a nomad. The occurrence of this sharecropping arrangement probably never exceeds a few percentage points in any village since the large majority of farmers reserve their own seed.

The Kordofan Regional Ministry of Agriculture, in coordination with the Farmer's Union, distributed uncertified groundnut seed in order to stimulate production in the 1980-81 cropping season. Farmers accepting seed were required to return only an equal quantity with the harvest.

8.3 Seed Dressing

Aldrex-T, a chemical seed dressing, is sold by the Shell Company. The chemical is effective for controlling pests which attack the seeds shortly after planting. In Kordofan Region Aldrex-T is currently being used for groundnuts, sorghum, millet, and sesame. The distribution of Aldrex-T in Kordofan is summarized in Table 8-1 below:

Table 8-1

Distribution of Chemical Seed Dressing (Aldrex-T), 1982

<u>Distribution System</u>	<u>Location</u>	<u>Price</u>	<u>Quantity</u>
A. Public			
Agricultural extension	El Obeid	Ls 3.90/lb.	556 lbs.
Agricultural extension	Kadugli	Ls 4.05/lb.	222 lbs.
Agricultural extension	En Nahud	-	333 lbs.
Farmers Union	El Obeid	Ls 3.40/lb.	17,600 lbs.
Agricultural Bank	El Obeid	Ls 3.25/lb.	1,500 lbs.
Agricultural Bank	Dilling	Ls 3.30/lb.	1,000 lbs.
Nuba Mts. Ag. Corporation	Kadugli	Ls 4.32/lb.	-
B. Private			
Largest wholesale dealer	El Obeid	Ls 5.00/lb.	2,778 lbs.
Private merchants	En Nahud	Ls 5-6/lb.	-

The chart indicates that there are both private and public sources for Aldrex-T. Public sources clearly seem to be more important at this time (although the data are very sketchy). The largest distribution program is that of the Farmers Union, which is mainly concerned with the distribution of Aldrex-T to groundnut farmers in En Nahud District.

These findings fit well with the statements of farmers in En Nahud area about the importance of using this chemical to ensure higher germination rate and production of groundnuts.

The basic problem with the distribution of Aldrex-T is that while the farmers appreciate the subsidized price offered by the public sector, the supply does not satisfy the demand. There is the further problem that government services are not generally prepared to distribute the chemical widely. It becomes the responsibility of farmers to go to distribution points and collect the chemical. The private sector is much better prepared to distribute Aldrex-T. Many village shopkeepers sell the chemical in small amounts, but at a price that is prohibitive for many farmers. Part of the problem of

the high price may be due to a shortage of the supply of the chemical at the Shell Company in Khartoum. The largest chemical wholesaler in El Obeid mentioned that he often could not get as much of the chemical as he wanted. Whether import duties or restrictions contribute to the high price is an issue that was not investigated.

The private sector is capable of distributing Aldrex-T, but the high price is a major constraint. Policies aimed at increasing the supply of the chemical or reducing its cost will promote greater sales by the private sector. Moreover, the handling and sale of Aldrex-T or any other pesticide by a private vendor has to be licensed. This is required by Sudanese law although it is not presently being enforced. A strict licensing program would have several benefits. First it would allow public officials to supervise chemical sales in order to discourage excessive marketing margins and alteration of the product. Second, it would allow the Ministry of Agriculture to have an accurate estimation of the use of Aldrex-T. Both the Department of Crop Protection and the Agricultural Extension Service would use this information for developing programs to instruct farmers on the proper handling and use of this chemical,* and for assessing the annual import requirements.

8.4 Alternatives to Improve the Input Distribution System

The private sector has the infrastructure and management capability to handle the distribution of inputs. In contrast, government distribution programs have tended to be disorganized and often deliver the inputs too late for them to be of use. There is currently no program in existence to develop and distribute improved seeds.

The government should turn the distribution of Aldrex-T over to the private sector and play only a supervisory role, licensing the distributor and disseminating information. It is also important to ensure an adequate supply to the distribution system so that farmers can fill their needs and so prices won't rise.

The Ministry of Agriculture, through its Seed Propagation Unit, should actively develop and propagate improved seeds, especially for groundnuts. It is important that the new varieties be adapted to the various soil and climatic conditions existing in different areas of the Kordofan Region. Price distribution can be done by the private sector with support from the government. The support would come in the form of low prices, so the merchants can earn a profit while selling at a price affordable to farmers, and also in the form of information dissemination to educate the farmers about the potential benefits of the new varieties. This publicity could be via radio programs, pilot projects, and/or conventional extension services.

*Eight persons died last year from Aldrex-T poisoning in South Kordofan. The deaths occurred in one family when seed that had been treated with Aldrex-T was mistakenly eaten. It was a freak accident, but it does dramatize the need for caution when handling this chemical.

The storage needs as a result of these activities are as yet unknown as they have not been undertaken. There should be no problem, however, with the private sector providing storage as needed. The only foreseeable need in assisting the merchants with storage facilities is to develop pest control programs if there is a need to store seed for long periods of time.

CHAPTER 9

KORDOFAN HIGHWAY NETWORK

9.1 Introduction

The Kordofan Region has a rectangular shape, with borders about 50 kilometers wide and 700 kilometers long. Its center roughly coincides with its capital, El Obeid, located 400 kilometers southwest of Khartoum.

Annual rainfalls vary from 90 mm in the extreme north of Kordofan, which is desertic, to 400 mm in the El Obeid area (savanna grass land). Rainfall reaches 800 mm on the south border with the upper Nile region.

The region is relatively flat, with the exception of the Nuba Mountains ranging from Kadugli to El Abbasiya in the southeast. These peaks reach as high as 1,300 meters.

Northern Kordofan and some areas situated east and west of El Obeid belong to the Qoz system (sand deposited by the wind). Other areas in the center are covered with sands formed in sites. Clay plains partially covered with sand appear around and south of a line going through El Obeid. Sands become less abundant and clay type soils dominate south of a line going through Dilling.

Most of the population is concentrated in a T-shaped zone with branches, about 160 kilometers wide, intersecting in El Obeid and extending to the east, west, and south borders of the Kordofan region. In this zone population density averages 20 inhabitants/square kilometer, whereas in the north, southeast, and southwest it remains below five inhabitants/square kilometer. It is along this "T" that the main towns (El Obeid, Kadugli, Dilling, En Nahud, Er Rahad, Umm Ruwaba, and Abu Zabad) are situated and through which the main flows of products move.

9.2 The Kordofan Track Network

With the exception of the El Obeid-Kadugli and Dilling-Habila links, there is no highway in Kordofan, but rather a system of non-permanent tracks created by trucks (see map of highway network in Table 9-1). These tracks run on the natural ground and have not been the object of any improvement work. When they become too deteriorated, the drivers will abandon the original tracks and create new ones. Often several parallel tracks are available, and drivers will shift from one to the other, always in search of the one in the best condition.

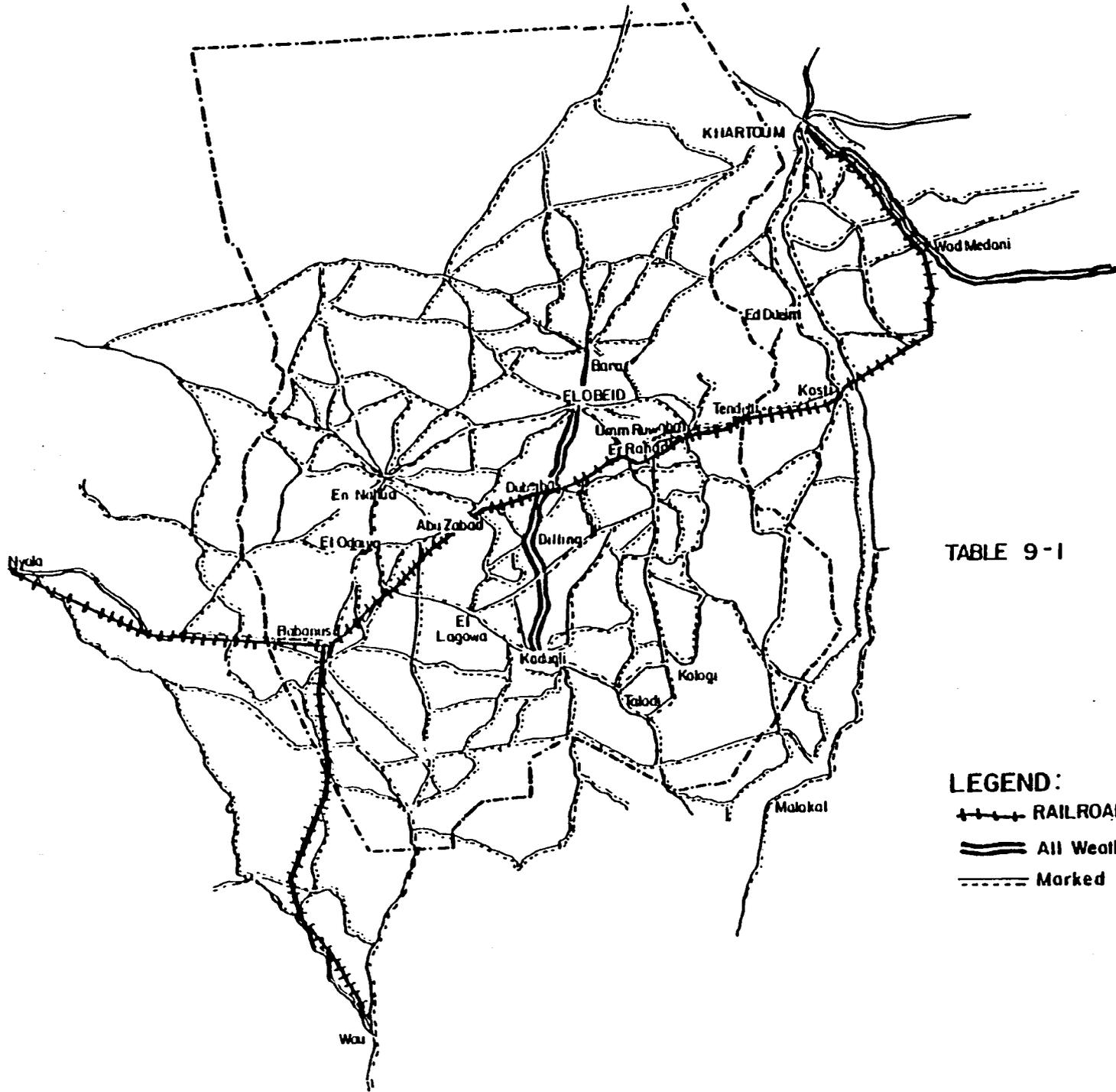


TABLE 9-1

- LEGEND:**
- RAILROADS
 - ==== All Weather Roads
 - Marked and Unmarked Tracks

When appreciating the level of service provided by this system, one should distinguish between the sand tracks found mostly north of Dilling and the clay tracks found south of Dilling, especially in the southeast of Kordofan. The sand tracks are difficult to drive over during the dry season because of the lack of cohesion of the materials. They necessitate slow speed and, occasionally, immobilize the trucks.

There is at present no consistent maintenance program. During the rains (from July to September) sand tracks often become easier to travel, as moisture gives increased cohesion to the sand. Naturally the tracks are not permanent, and temporary rivers or low overflooded areas will cause the trucks to stop perhaps for a few days. But the flow of traffic need not be completely stopped during the rains.

On the other hand, tracks running on clay soils will be completely unpassable after the rains have started, and will remain so even if bridges are built. They are, however, susceptible to some degree of maintenance after the rains have stopped. Because of the soil consistency, it is possible to repair sections badly damaged by the rains and to send a grader to level the driving surfaces. This results in improved running conditions for the vehicles and savings in vehicle operating costs. These considerations specifically apply to the system of cotton extraction roads (see Section 9.6.3) in southeast Kordofan.

9.3 The Kadugli - Dubeibat Paved Road

The construction of the 187 kilometer paved road linking Kadugli, capital of southern Kordofan, to the railroad station at Dubeibat was completed by the Road and Bridges Public Corporation (RBPC) in May 1976, using the force account system. The construction extended over a period of five years. The road has a 7-meter wide Double Bituminous Surface Treatment (DBST), but a 50 kilometer section starting 25 kilometers south of Dilling toward Kadugli has received only a Single Surface Treatment (SST). The base course is made of aggregate blended with sand. This construction required an average hauling distance of 7 kilometers to build the section between Kadugli and Dilling, and more than 20 kilometers for the roadway north of Dilling.

The road is badly deteriorated in some sections and may need reconstruction in the near future. The government is in fact looking for funds to finance this road rehabilitation. According to RBPC engineers involved in maintaining the road (see Section 9.6.1), part of the present problems result from construction shortcomings such as poor quality asphalt, insufficient cleaning of aggregate, and poor sealing of the base course.

The traffic on the Dilling - Dubeibat section seems to justify a paved road particularly because of the heavy tonnages of sorghum produced in the mechanized schemes of the Habila area and moving to the main urban consumer market at El Obeid.

The Dilling-Kadugli section, on the other hand, has a very light traffic of probably less than 20 trucks per day. Kadugli receives its consumer goods mostly from the Umm Ruwaba-Kosti area and has almost no agricultural products to send in the Dilling-El Obeid direction.

The considerations behind paving the Kadugli road were mainly political, that is to establish a permanent link with the capital of South Kordofan, which otherwise would be completely cut off from El Obeid during the four-month rainy season.

9.4 The El Obeid - Dubeibat Gravel Road

This 94 kilometer road will be the first all-weather gravel road in Kordofan. It will link El Obeid to the paved road between Dubeibat and Kadugli and, more importantly, will improve transport between El Obeid and the sorghum producing mechanized schemes of Habila.

The construction is being executed by RBPC with technical assistance from the Netherland's Government including:

- preparation of detailed engineering design
- supply of equipment and spare parts
- purchase of materials
- technical management and assistance during construction.

The cost of the project is financed by a grant from the Dutch Government.

The gravel road has final characteristics. It consists of an embankment 55 centimeters above natural ground level plus a 13 centimeter subbase layer. The width on top of the platform is about 12 centimeters, providing for a possible staged improvement to a 7-meter wide pavement. Work started in 1981. In December 1982, 62 kilometers of embankment, 42 kilometers of subbase, and five out of seven structures were completed. Road completion is scheduled for April 1984.

Total construction costs will run around \$100,000 per kilometer, according to the contractor. After completion, it is estimated that the yearly maintenance cost of the road will be about \$8,000 per kilometer.

9.5 Limited Improvement of the Dilling - Habila Earth Road

This 47 kilometer road is of primary importance for the flow of sorghum (estimated at 60,000 tons/year) commercialized from the Habila schemes. This is why the Mechanized Farming Corporation has invested about Ls 200,000 from 1975 to 1980 to improve its surface condition by the addition of selected material. This work has been performed with the help of RBPC.

It should also be noted that this road was the only one found feasible by the NORCONSULT Feeder Roads Master Plan (see Section 9.7) and that final design for its paving was recently completed by a Lebanese Consulting Firm, Dar El Anderson.

9.6 Organizations Involved in Highway Construction and/or Maintenance in Kordofan

9.6.1 Roads and Bridges Public Corporation

RBPC is a public sector agency created in 1973 to be responsible for the planning, design, construction, and maintenance of the national highways. In contrast to the Sudan Railways Corporation, it is not a self-financing agency, and it receives its funds from the government's budget (with the exception of the revenues from four toll stations situated on the Khartoum - Port Sudan Road). RBPC's budget for 1982/83 was Ls 45 million of which 40 million were allocated for new projects and construction; 2 million were allocated for administration; and 3 million were allocated for maintenance.

It is clear that funds allocated for maintenance are insufficient and that government policy changes will have to take place to accommodate the increasing maintenance costs of the expanding Sudanese highway network.

For new projects, RBPC usually employs foreign consultants to do the studies. The construction itself can be carried out by a foreign contractor or by using force account, often with technical assistance. The Dubeibat - El Obeid road construction is an example of this latter approach.

Presently, the maintenance activities of RBPC in Kordofan deal only with the Dubeibat - Kadugli paved road for which there is a maintenance unit in Dilling.

The maintenance unit's equipment is comprised of:

2 bulldozers	2 water pumps
3 motorgraders	3 concrete mixers
2 loaders	2 welding machines
14 trucks	1 aggregate spreader
4 fuel and water tanks	1 asphalt distributor
3 pick-ups	2 rollers
1 stone crusher	

The maintenance budget used in 1981/82 amounted to Ls 411,000 which was allocated as follows:

Ls 153,000	for wages
63,000	for asphalt
115,000	for spare parts
25,000	for fuel
35,000	for various local purchases

Maintenance operations included:

- recharging of the shoulders
- patching of potholes
- localized replacement of failed base course and new surface treatment
- repair of drainage structures.

It seems that the lack of adequate fuel supply by the Government is presently a major constraint which limits the length of maintained road to 30 or 35 kilometers per year. On average, the maintenance trucks are idle (for lack of fuel) about 15 days per month.

With the completion of the Dubeibat - El Obeid road, RBPC will have to get involved in the maintenance of the gravel road. Funds are provided to that effect in the project, and maintenance operations should start this year on the section of road already built. RBPC should be able to acquire the technical know-how of gravel road maintenance through the technical assistance team in place for the construction.

9.6.2 Regional Government

In theory, the Regional Governments are responsible for the unpaved network of secondary and feeder roads. The local councils should have the means of maintaining this extensive network. In practice, there are very few maintenance operations which can be carried out on unmade tracks (although some can be performed on the hardened clay tracks, as will be explained later).

In any case, all the local councils visited have shown a lack of equipment, budget, know how, and interest for the performance of improvement work on the local roads. Nor is there any provision in the local tax structure to raise funds for road maintenance.

The Regional Governments do not seem to constitute, in the foreseeable future, an appropriate structure to accommodate any program geared toward improving the condition of the unpaved secondary roads in Kordofan.

9.6.3 The Nuba Mountains Corporation (NMC)

The NMC has a maintenance unit which performs maintenance operations, starting in December, on a network of clay tracks (called the cotton extraction roads) made up of the following sections:

	<u>Length in Km.</u>
1. Kadugli - Kortala - Karling - Simeih	265
2. Talodi - Tosi - Karling	238
3. Tobi - Kologi	20
4. Abu Gubeiha - junction Tosi - Simeih	55
5. Abbasiya - Simeih	110
6. El Lagowa - Habila - Kortola - Korling	<u>230</u>
	918

These roads are used to transport cotton lint from different ginneries to the railroad station of Simeih.

Most of NMC equipment is now inoperative for lack of spare parts and, if it were not for a new bulldozer D6 and a new grader cat 120 B, both new and provided through World Bank financing, maintenance operations would have come to a stop.

Aside from the dozer and grader just mentioned, the equipment used includes an Adam grader, 2 tractors, 1 water tank, and a trailer (for fuel).

The personnel consists of:

	<u>Monthly Salary (Ls)</u>
1 Mechanical engineer	175
1 Supervisor	125
2 Mechanics	100
4 Drivers (equipment)	90
6 Plant attendants (greasers)	45
2 Drivers (tractor)	55
2 Unskilled laborers	30

Per year, the work requires about 150 barrels of fuel (at Ls 90, barrel, Khartoum official price) and nine barrels of oil and grease (Ls 250/barrel). Including the maintenance of equipment spare parts, the overall yearly cost is about Ls 100,000 (excluding equipment depreciation).

The maintenance consists of rehabilitating the washed out areas with the dozer (using natural soil) and then scraping of the track's surface with the grader (sometimes more than one time per season). The result is markedly improved driving conditions which even allow the use (unique in Kordofan) of 20 ton Fiat tractor-trailer units. About 15 miles of track can be worked on in one day.

9.7 Highway and Feeder Road Studies in Kordofan

The following roads have been the object of final design studies:

- Kosti - Umm Ruwaba (NORCONSULT)
- Umm Ruwaba - El Obeid
- Kadugli - Talodi

A feeder roads master plan was prepared in 1980 by NORCONSULT. Seven roads were studied in Northern Kordofan and 13 in Southern Kordofan. None were found feasible except the En Nahud - Abu Zabad road on the basis (very doubtful) of diverted traffic from the En Nahud - El Obeid and the Dilling - Habila roads due to sorghum traffic from the mechanized schemes. The adopted standards for feeder roads seemed too high.

CHAPTER 10

TRANSPORT SECTOR IN KORDOFAN

10.1 Vehicle Fleet

The necessity of using unmade tracks has conferred to the Kordofan's trucks fleet a remarkable homogeneity. The only truck found in the region is the typical souk lorry of 6 to 8 tons useful pay load. The most common brands are Bedford and Austin, though the Nissan model (7 to 8 tons) dominates on the El Obeid - En Nahud line.

Bedford and Austin trucks can be purchased in Khartoum from the government owned companies (Gezira Trade and Service Co. Ltd. and Khartoum Trading Cie Ltd) at a cost of about Ls 30,000. These companies import C.K.D. (Completely Knocked Down) Kits which are assembled locally (Ls 17,000 assembly cost and margin). There is no legal restriction to import vehicles and anybody can enter the transport profession. But the waiting list is long and delivery can take from six months to one year. For important buyers who have foreign exchange available and are ready to buy at least four trucks, direct import can be arranged, decreasing delivery delays.

Nissan trucks are imported by a private firm (Hassouna Auto Workshop & Store Co.) as Semi-Knocked Down (S.K.D.) kits, assembled in Sudan. Purchase price is about Ls 40,000 but delivery is immediate.

At that point the buyer owns not a truck but a chassis with windshield. He will then go to a specialized workshop in Khartoum or in El Obeid to have his truck finalized and readied for the rugged Kordofan "roads". Reinforcement of the chassis and the wheel base, plus the building of a metallic cab and platform, will cost him an extra Ls 6,000 to Ls 7,000.

The end product is a truck well-adapted to the Kordofan's lack of road infrastructure. With proper maintenance and periodic overhauls, this type of vehicle can have a 20 year useful life (as proven by the number of Ford trucks which remain in use today, although their import was discontinued 10 years ago). Naturally, during its long life the truck will probably change owners several times, typically starting with a long distance inter-city transporter and ending in the hands of a small merchant or owner - driver involved in the transport of crops from villages to local markets.

Aside from the souk lorry, the only vehicles which can venture outside the town areas are four-wheel drive vehicles, of the Landrover or Ford pick-up type.

10.2 Trucking Industry

The industry is dominated by small operators who own from one to four trucks. The owner - driver type of operations seem to account for about 20 percent of the total fleet involved. The bulk of the truck fleet belongs to owners of two to four vehicles. Bigger companies having more than five trucks and specializing in Kordofan transport number probably less than ten and are based in El Obeid and En Nahud. A large company will want to maximize use of its trucks throughout the year by shifting to paved road transport during the rainy season but the 6 to 8-ton trucks used in Kordofan are poorly suited to this kind of use.

Although the small size trucking companies which operate in Kordofan do not keep written records of their operating costs, the people involved in this activity (particularly the drivers) have accurate estimates of most of the figures involved (time spent on the roads, costs of diesel, repairs). Nevertheless, questions pertaining to yearly mileage or average age of trucks are usually not answered because of ignorance.

It is felt that because the truckers normally have been involved in their activity for a long time and because they specialize in one type of transport, they acquire by experience a thorough knowledge of their business.

There seems to be a fair amount of competition, as will be seen when looking at the different types of transport and at the spread between tariffs and costs.

Furthermore, the industry displays a good amount of flexibility, with operators moving around to meet peak demand of groundnut transport from En Nahud, sorghum transport from Habila, or cotton transport from southern Kordofan.

10.3 Maintenance of the Vehicle Fleet

Maintenance of the trucks is performed by the driver and his two assistants. It must be noted that in addition to driving and maintenance, the driver's team plays an important role in terms of arranging return freight, looking for passengers to transport, and checking the loads.

Annual maintenance will take place during the rainy season, usually in a mechanic's workshop in El Obeid. The costs will typically run around Ls 2000.

Every three years, on average, a major overhaul of the truck will be required (engine, suspension, brake, clutch). This will cost about Ls 5000, more than 80 percent of which are costs of spare parts.

Spare parts are sometimes difficult to find as lack of foreign exchange results in minimum level inventories. Purchased piecemeal, parts are expensive. Nevertheless, the negative impact of the long immobilization of trucks in workshops is minimized by the fact that vehicle maintenance is typically done during the rainy season when there are few uses for the truck. Unexpected mechanical failure would have a much more damaging effect on the truck's financial performance than does a long overhaul, which may be one of the reasons why preventive maintenance is currently practiced by many truckers.

10.4 Primary Transport of Agricultural Products

The primary transport of agricultural products takes place between the farm (or the village) and the rural or urban market where the crop is sold. The crops may be transported for a farmer, for a small merchant, or the owner/driver may purchase crops himself.

Primary transport is usually done by an owner-driver who is specialized in this type of operation and will go to two, three, or four villages per day to pick up crops from the field (or at a merchant shop) and transport them to the market. If a farmer's or merchant's groundnuts total less than a truck load, separators will be used to keep the crops of each farmer distinct. If a very small quantity is involved, crops will have to be put into bags.

A small village will probably have no truck owners and thus will use outside trucks. In bigger villages, merchants or rich farmers may own a truck, providing service to farmers of that and neighboring villages. Normally, different trucks will serve one village and personal relationships become established between the farmers and the truckers they are dealing with. The transport contract is discussed between each farmer (or merchant) and the truck operator rather than on the village level.

Primary transport involves short distances, normally less than 50 kilometers. The tracks are difficult to drive on, and assembling and loading crops is time consuming. Consequently, the rates charged are high. The consultant made inquiries in many villages and found that primary transport rate varies from 60 to 80 piastres/ton kilometer. Evaluation of these rates will be discussed in section 10.9.

In rare cases when access to the village is impossible for a truck, crops will have to be transported by camels or donkeys. This is, for instance, the situation in some villages of the Nuba Mountain area near Rashad. A camel will transport up to 6 sacks of unshelled groundnuts. Rates charged will be double that of a truck, totalling Ls 1.5 per ton/kilometer.

10.5 Secondary Transport of Crops

Secondary transport is long distance transport from the town where crops have been bought by bigger merchants to other towns for processing, final consumption, or shift to other modest transport before being exported. Transport of shelled groundnuts from En Nahud to El Obeid and transport of sorghum from Dilling to El Obeid are examples of secondary transport. The small transport companies described earlier perform this type of transport. Long distance transport contracts can be established in three different ways:

- a. direct negotiation between the parties involved
- b. use of a transport commissioner as an intermediary
- c. call for tenders.

For instance, each main town has a certain number of parking areas (six in El Obeid) where truck drivers who are going to a specific destination can deal with transport commissioners in contact with people having goods to be transported to that destination. These intermediaries, who sometimes have small shops where they sell oil or a few spare parts, charge from five to ten percent of the total transport rate for their services. For instance, they would take the driver to the merchant's store and supervise proper loading of the goods, totaling about Ls 20 to 25 to load a truck.

It is estimated that half of the long distance traffic is organized by transport commissioners. They do not set the rates the truck owners do but they are a stabilizing factor of the profession, as they would not engage in a deal if the terms were too far from the average.

A call for tenders is occasionally used by the Regional Government when the transport of important tonnages of consumer goods, subject to regional quotas, (sugar for instance) is required. This is also the way the Nuba Mountain Corporation handles its cotton transport (see Section 10.6.2).

For a given period, when the price of diesel fuel remains constant, the rates charged for long-distance transport depend mainly on two factors:

1. The direction of the heaviest flow of goods on the road: Rates for the direction of heaviest produce flows are naturally much higher than for the other direction, where enough return freight may be difficult to find. For example, during the groundnut season (January - March), rates of groundnut transport may be high (more than Ls 0.20/ton kilometer) in the En Nahud - El Obeid direction because of peak demand. Because these trucks make return trips to En Nahud to pick up more nuts, there is excess truck capacity moving from El Obeid to En Nahud, which depresses rates to Ls 0.10/ton kilometer or less.

2. The condition of the track: An occasional truck going to Sodiri on a deteriorated, semi-desertic, sandy track will ask as much as Ls 0.40/ton kilometer, when the rates on normal clay tracks are closer to Ls 0.20/ton kilometer.

Overall, rates of Ls 0.20 to Ls 0.25/ton kilometer are average for the long distance transport of agricultural crops in Kordofan. Freight rates do naturally reflect diesel fuel price, which was about Ls 4.30 per Imperial Gallon on the free market in the surveyed area during December of 1982. According to historical transport costs furnished by the Sudan Oil Seed Company, the freight rates have had an average yearly increase of 20 percent during the last ten years.

10.6 Special Transport Situations

10.6.1 Sorghum

Most of the sorghum commercialized in Southern Kordofan comes from mechanized schemes situated in the Habila area. This area has good road connections with El Obeid, the primary destination for this flow of commercialized sorghum. Furthermore, many of the scheme owners are merchants who have their own truck and are able to transport and commercialize the crop themselves.

10.6.2 Cotton

The NMC contracts the transport of cotton (both raw material and cotton lint) to the transport company which is the lowest bidder. The winning company will then subcontract to smaller companies. It is interesting to compare the costs of raw material transport by the 6-ton truck on ordinary tracks with the costs of cotton lint transport by 20-ton Fiat tractor trailer units on relatively good clay tracks (the network of cotton extraction roads maintained by the NMC).

The 1982 bid prices were 2.5 piastre/kantar mile for cotton lint. As a 6-ton truck holds 80 kantars of raw material and a 20-ton truck 400 kantars of cotton lint, the cost reduction offered by the bigger truck appears to be about 40 percent (from Ls 0.21/ton kilometer to Ls 0.13/ton kilometer).

10.6.3 Livestock

A 6-ton truck will accommodate 44 sheep, an 8-ton truck about 60. Consequently, the cost of trucking sheep will be about 4.5 Ls per head between En Nahud and El Obeid, when transport demand is not too high.

10.7 Passenger Transport

Passenger transport is significant to freight transporters as it provides extra revenues to the truck owner and thus lowers the rates charged for freight transport.

Although it is not legal, passengers routinely travel on top of the truck load, since there are very few buses available for long distance passenger traffic. Once loaded, the truck driver will stop at the parking area of its destination where the transport commissioners will have arranged for him to carry 10 to 15 passengers. Two or three wealthy passengers will pay about double the normal rate to have the privilege of riding seated in the cab.

Rates charged for passengers tend to vary for somewhat the same reasons as the freight rates. On an average, they were found to be Ls 0.33 per passenger/kilometer.

10.8 Truck Operating Costs in Kordofan

In order to evaluate the efficiency of the transport function carried out in Kordofan by the typical small transport company, it is important to compare the rates which are charged for the service with the cost of providing this service.

The following analysis of the truck operating costs in Kordofan uses financial rather than economic costs. Economic costs (which eliminate revenue transfer between economic agents and use shadow pricing to reflect true economic cost of inputs) are appropriate for feasibility studies. For the present diagnostic type study (which relates the transport to marketing of agricultural products), the proper evaluation of costs as they are perceived by the different economic agents (farmers, merchants, truck operators) is more relevant.

To gather information about truck use and costs of inputs, extensive interviews, primarily with drivers and transport commissioners, were carried out all over the region studied.

Details of computations are presented in Table 10.1. Truck operating costs were computed for both the long distance inter-city transport (secondary agricultural transport) and the short distance farm to market center transport (primary agricultural transport).

Figures used apply to the Bedford and Austin 6-ton trucks which are by far the most commonly used. The Nissan 7 to 8-ton truck would have higher operating costs (about 20 percent higher), but would lead to roughly the same ton/kilometer cost because of its higher useful payload.

Various cost components include:

1. Vehicle amortization per kilometer:

Vehicle purchase costs and related other costs have been mentioned in Section 10.1. Vehicles used for primary transport are usually much older than the ones used on main tracks. They have normally been purchased as used vehicles by present owner.

Yearly mileage of vehicles is low for the trucks involved in primary transport because daily mileage is limited. Each day a truck driver will typically visit three villages situated, on an average, about 20 kilometers from the next town market, which represents only 120 kilometers of driving per day.

Yearly use of the truck is limited. Outside of the few months of peak demand at the village level, the trucks based in villages or small towns and owned by merchants or farmers are not intensely used. After March, when most of the crop movement is completed, the owner-driver-operators involved in primary transport will tend to shift to long distance transport where they meet strong competition from better trucks operating permanently along these lines.

2. Insurance and other charges:

It has been found that because of Islamic prohibitions, the Kordofan small operator will not contract for insurance other than the mandatory third party insurance which costs about Ls 100/year. Other charges are limited and include annual license fees (Ls 50/year) and local taxes at collecting points along the roads.

3. Driver and assistant costs:

The driver has two assistants who travel on the load with the passengers and help him with the many small tasks such as digging out the truck when it is stuck deep in the sand.

Drivers and assistants have a base monthly salary (in the order of Ls 150 for the driver) to which out-of-station allowances and occasionally incentives are added. During the rainy season they may receive only half of their base salary.

4. Maintenance costs:

Truck maintenance conditions and costs have been mentioned in Section 10.3. Some maintenance costs have been assumed for both types of transport, as the extra maintenance cost of older trucks working in villages compensates for their yearly reduced mileage.

5. Diesel and oil costs:

Diesel consumption is very high due to the difficult driving conditions. Diesel consumption varies somewhat according to the surface quality of the track, from less

than 9.0 gallons/100 kilometers on a clay track to more than 11.0 gallons/100 kilometers on the worst sand tracks of northern Kordofan. On an average, a consumption rate of 10 gallons/100 kilometers is typical under Kordofan driving conditions. A ten percent increase reflects the more difficult access to villages and fields.

According to the survey, oil consumption represents six percent of fuel consumption. Diesel and oil per gallon prices taken into account are respectively Ls 4.3/gallon for diesel and Ls 15.0/gallon for oil, average "free market" prices in Kordofan, in December 1982 (see Section 10.10). Diesel and oil for primary transport are assumed to cost 15 percent more, as some of the truck owners based in villages have less ready access to the free market.

6. Tires:

There is a tire producing plant in the Sudan. The Sudanese tires are not in high demand, as their lower price apparently does not compensate for their shorter useful life when compared to imported products. Truck owners replace their tires on an average of once a year.

10.9 Results and Interpretation of Vehicle Operating Cost Computations

The results presented in Table 10.1 indicate the following conclusions:

1. The figures computed for long distance transport show the importance of the passenger transport, which in fact largely contributes to the positive margin realized by the owner of the truck. The figures must be regarded as rough indications because of the number of hypotheses which have to be made. Nevertheless they tend to show a reasonable margin of Ls 10,000 per year. Considering the high rate of inflation and the impact of devaluation on the cost of imported trucks, this margin (which corresponds to a 28 percent first year rate of return) appears acceptable and reflects a fair amount of competition in the long distance transport sector.
2. The results of the primary transport cost estimates help to explain why the rates charged for this type of transport are so much higher than those of the long distance transport (respectively Ls 0.70/ton kilometer and Ls 0.2/ton kilometer). First of all, the truck operating costs are much higher on a per kilometer basis essentially

because of the reduced yearly mileage over which fixed costs have to be amortized and also because of the higher variable costs resulting from the use of older trucks, which consume large quantities of expensive diesel and oil.

Second, the total yearly tonnage of freight is very limited because of the short period of crop transport demand from the farms and the absence of return freight (there is almost nothing to be taken to the villages).

Third, the truck will not have many paying passengers to transport because most of the farmers are still busy in the fields and farmers accompanying their crops to be auctioned at market, for instance, would not pay for their seats. Also, the personal relationship between the truck owner and driver and the villagers often prevents him from charging for the few passengers from the village.

Nevertheless, according to the costs and revenues computed, the truck owner involved in primary transport of crops from villages to urban markets will have a Ls 12,700 profit per year. This profit appears to be higher than the one realized for a truck involved in long distance transport. Furthermore, if one takes into account the fact that the capital invested is less important for the primary transport (often carried by the older trucks) than for the long distance transport (which uses more recent models such as Japanese Nissan), one has to conclude that the small transport operator dealing at the farm level probably benefits from the more limited degree of competition met in this specific sector of activities. However, the supply side remains adequate as confirmed by the farmers interviewed in villages, who almost never complained of a shortage of trucks to move their crops.

10.10 The Fuel Situation in Kordofan

As indicated in Table 10.2, gasoline and fuel are sold by the Government in Kordofan (as in the other regions) at official prices in quantities which vary from year to year and do not reflect the actual demand.

Normally, a transport company is granted a yearly quota according to the number of trucks operating. When a truck has been loaded, the driver will receive from the El Obeid regional council an official load certification which he can use to buy the fuel at the official price from a local gas service station. However, in Kordofan, the gas stations have been closed for years and no fuel is available for the private sector at the official price. Diesel fuel is available on a parallel "free market" at a price which was averaging Ls 4.3 per gallon (Ls 190 per barrel) in Kordofan during December 1982 (when the official price in Khartoum was Ls 2.0 per gallon).

In contrast to gasoline, which is often difficult to get and whose prices vary widely, diesel fuel was said to be almost always easy to get on the free market, at least in the main centers. Apparently the free market obtains its supply from big merchants who ship the fuel directly from Khartoum and keep it in store in Kordofan. In view of this relative equilibrium of fuel supply and demand in Kordofan, the market price for fuel must be a reasonable approximation of the true economic cost of fuel.

Table 10.1

Truck Operating Costs in Kordofan

	Long distance transport (Secondary transport)	Short distance transport (Primary transport)
Vehicle: Bedford/Auston (6 T.)	29,000 ¹	-
Body and reinforcement	6,000	-
Minus tires	- 2,000	-
<u>Subtotal</u>	33,500	16,750 ²
Residual Value (R.V.) ³	16,750	8,375
Present Value of R.V. ⁴	8,500	4,250
Amounted to be depreciated	- 25,000	12,500
<u>Yearly costs</u>		
Depreciation ⁴	6,100	3,050
Insurance	100	100
Other costs	300	100
Fuel	17,200 ⁵	10,900 ⁶
Oil	3,600 ⁷	2,300 ⁸
Tires	2,500 ⁹	1,700 ¹⁰
Maintenance	3,000	3,000 ¹¹
Driver + 2 assistants	5,500 ¹²	4,500 ¹³
<u>Total costs/year</u>	38,550	25,650
Yearly mileage (km.)	40,000 ¹⁴	20,000 ¹⁵
Total costs/km.	0.96	1.28
<u>Yearly revenues</u>		
Freight	34,200 ¹⁶	35,700 ¹⁷
Passengers	14,300 ¹⁸	2,650 ¹⁹
<u>Margin per year</u>	10,200	12,700

See notes on next page.

Notes to Table 10.1

- ¹Cost of Bedford/Austin chassis and windshield before devaluation.
- ²Assumes truck is purchased used at 50 percent of its original value.
- ³Assumes truck loses 50 percent of its value after six years.
- ⁴Assumes discounting over six years at 12 percent.
- ⁵10 gallons/100 km at 4.3 Ls/gallon.
- ⁶11 gallons/100 km at 5.0 Ls/gallon.
- ⁷Six percent of fuel volume at 15.0 Ls/gallon.
- ⁸Six percent of fuel volume at 17.2 Ls/gallon.
- ⁹Assumes tires are changed every year.
- ¹⁰Assumes tires are changed two years out of three.
- ¹¹Assumes rougher tracks and older trucks make for reduced mileage.
- ¹²Assumes salaries (300 + 150 + 100) over eight months and four months at half salary.
- ¹³Assumes salaries (250 + 125 + 75) over eight months and four months at half salary.
- ¹⁴200 days at 200 km/day.
- ¹⁵150 days at 130 km/day.
- ¹⁶100 percent capacity in one direction, 50 percent in the other at Ls 0.20 per ton km, minus five percent for transport commissioner.
- ¹⁷25 percent in one direction, empty in the other direction, at Ls 0.70/ton km.
- ¹⁸Ten passengers with two in front seat at Ls 0.033/passenger km minus ten percent for transport commissioner.
- ¹⁹Four passengers on load at Ls 0.033/passenger km.

Table 10.2

Government Gasoline and Fuel Sales in Kordofan

	Gasoline		Fuel	
	Kordofan (t)	Sudan (%)	Kordofan (t)	Sudan (%)
1970	4,850	5.1	21,240	7.8
1971	4,990	5.1	23,530	7.9
1972	4,799	4.8	23,741	8.0
1973	4,479	4.4	20,119	6.3
1974	4,381	4.2	19,505	6.1
1975	4,399	4.0	19,164	5.5
1976	4,296	3.4	23,309	6.1
1977	4,602	3.1	23,618	5.4
1978	2,760	1.7	25,002	5.6
1979	3,095	1.8	25,770	5.4
1980	1,219	0.6	18,273	3.6
1981	2,138	1.0	20,534	3.8

Source: General Petroleum Corporation - Khartoum

CHAPTER 11

RAILROAD TRANSPORT IN KORDOFAN

11.1 The Sudanese Railway Administrative Structure

The Sudan Railways Corporation (SRC) is owned by the government and is run by a General Manager who reports to the Transportation Ministry. The Ministry of Finance also exerts control over the budget, which it can modify. It must approve any change in the rate structure.

The decision was made in 1976 to regionalize the administrative structure which was previously centralized in Atbara. Five regional headquarters have been created: Atbara (Northern Region), Port Sudan (Eastern Region), Khartoum (Central Region), Sennar (Southern Region), and Babanousa (Western Region).

The administrative reorganization has been very slow to be implemented. It has met with mixed reactions from personnel, at both management and operational levels. It seems that one of the purposes of this regionalization is to counteract the power of the strong labor union controlling 20,000 workers in Atbara. In this respect, it may be positive, as the SRC may be faced with some difficult decisions relative to its excess personnel in the future.

11.2 The Railway Network

The railway is a single track 1,067 millimeter gauge. The total network is about 4,760 kilometers long. The sections which are most relevant to Kordofan are the lines from El Obeid - Er Rahad - Sennar - Khartoum (624 km.), Atbara - Haiya - Port Sudan (1,411 kilometers) and the Y-shaped line from Er Rahad to Babanousa with two branches to Nyala (Southern Dafur) and Wau (Bahr El Ghazal).

The track is presently 50 Lb/yard west of Abu Zabad station, 75 Lb/yard east of Abu Zabad up to Sennar, and 90 Lb/yard on the main line to Port Sudan.

The railroad to El Obeid was finished in 1912. The western sections to Nyala and Wau were built more recently (1956-1961), but the rails used were 50 Lb rails taken from other parts of the network. This is one of the reasons for the poor condition of the track in Kordofan -- at least until the recent shift to 75 Lb/yard track (see Section 11.7). Other problems have been traced in a recent study* to poorly supported track joints, dirt filled track, and narrow embankments.

*Sudan Railways Track Rehabilitation and Modernization Study.
Parsons Brinckerhoff CENTREC International, Inc.

There are presently, west of Abu Zabad, 25 sections totaling 193 kilometers where the speed of trains is restricted to 10 to 20 km/hour between Khartoum and Nyala and only 15 km/hour between Babanousa and Wau. Despite this slow speed, there are frequent derailments.

Furthermore, as soon as the trains start, the railroad tracks in Kordofan become subject to frequent problems such as flooded sections and washouts. These may require up to one week to be repaired. Naturally, this occurs during the period when truck traffic is almost completely stopped because of the lack of all-weather roads and when permanent railway liaison would be particularly valuable.

During the three months of July, August and September 1981, 211 trains were run on the line between Er Rahad and Babanousa, indicating a rainy season traffic level which is on average reduced by 20 percent because of track failures.

It can be seen from Table 11-1 that the line's capacity is not and will not be a problem in the foreseeable future. The most heavily traveled section in the network is Khartoum - Atbara where 44 percent of the practical capacity of the line is used. In the Kordofan region, the Sennar - El Obeid section is used at 19 percent capacity and, west of El Obeid, the line is used at about 20 percent or less of capacity.

11.3 The Rolling Stock and Its Maintenance

According to Sudan Railway annual reports, the stock of wagons was 6,264 freight wagons (408 livestock wagons and 110 tank wagons) and 1,177 passenger coaches in 1981/82. A large amount of the wagons and coaches are out of order - probably more than 30 percent. Locomotive stock included: 254 main line locomotives, 55 percent of which were available, and 340 shunting locomotives whose availability was 66 percent in 1981/82.

The low availability of wagons and locomotives results from inadequate maintenance, which itself can be traced to:

- lack of spare parts
- poorly equipped workshops
- management and personnel problems (lack of middle management and low productivity of poorly trained workers).

It is doubtful that the increase of workshops in the regions (regionalization program) will have much positive impact on this maintenance problem. Rather, funds to buy spare parts, machines, and tools; management improvement; and personnel training programs are needed.

11.4 Financial Situation of SRC

The financial situation of SRC is presented in Table 11-2, giving the revised budget estimate for 1980/81.

This document shows an operational deficit of Ls 5.5 million, which, despite 4 million in government subsidy, grows to a deficit of about Ls 15 million after interest charges (Ls 11 million) and repayment of loans (Ls 2.5 million) are taken into consideration.

Although the consultant was told that final figures for 1981/82 were not available, it is known through informal channels that the deficit has gone above Ls 20 million for this last year.

It is important to briefly review the reasons for this difficult situation, in order to evaluate possible corrective actions.

A. Receipts of SRC

SRC revenues are too low because of insufficient demand and inappropriate rates.

The demand (passengers and freight) is falling (see Table 11-3) as the quality of service is falling and competition from trucks is increasing. Faster and more reliable service is the way for the railroad to gain a bigger share of the total transport market and to generate additional business where there is no competition from trucks.

The Ministry of Finance and Economics fixes the timing and amount of increase of the rates in accordance with the Railway Act. It has been the government's policy to subsidize rail transport of some goods (including export cash crops such as groundnuts, sesame, and cotton) by keeping the rates low -sometimes apparently below operating costs. Unfortunately for the SRC, however, the government more often than not neglects to actually deliver the funds allotted for the railway subsidies.

There is some reason to hope for a change since in 1980/81 the Government did pay a subsidy of Ls 4 million. For 1981/82 the subsidy by the Government will be Ls 18 million of which 6 million will come from the General Petroleum Corporation. Furthermore, a study has been recently performed by a railroad consulting specialist, SOFRERAIL, with the purpose of establishing the true economic and financial, fixed, and variable costs of moving different types of goods on different sections of the network. Once available, the results of this study can be used to compute appropriate commercial rates or to estimate a justified subsidy to be provided to SRC if the Government does not want some of the users to pay the total cost of the service they receive.

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B. Expenses

a. Personnel expenses

In 1980/81 personnel expenses amounted to about Ls 42 million, which was 66 percent of total expenses and 73 percent of total revenues.

These personnel expenses are much too high because the number of employees (more than 35,000) is excessive. Given this high number, the average salaries are relatively low so that personnel quality is low. Top management people have recently been leaving SRC, middle level management is almost non-existent, and motivation and qualifications are low at the worker level. The number of employees (see Table 11-3) has increased whereas the traffic handled has diminished. It is almost certain that service quality would increase following a reduction in personnel and proper use of the proper savings (for instance, to buy spare parts). A visit to the Atbara railroad center clearly showed the underemployment of many. In the field, it was difficult to believe that a small railroad station such as Umm Ruwaba needs 43 people to function (total monthly salaries: Ls 7,000).

b. Spare parts

Spare parts, which amount to Ls 9 million annually, should be increased as a percentage of total expenditure, since it is evident that increased spending on spare parts and other maintenance related items is mandatory to improve the general performance of the SRC.

c. Interest charges

Interest charges include about Ls 6 million interest due yearly by SRC to the central Government and to the Bank of Sudan. Considering that the Government is responsible for some of the financial difficulties of SRC by refusing to allow SRC to set proper rates and by delaying payment of bills of more than Ls 10 million owed to SRC, it would seem reasonable to find a way to ease these local interest charges.

11.5 The World Bank Programs and the Livestock Project

The World Bank has been involved with the Sudanese Railroads since 1958 through four different loans totaling about Ls 105 million.

- The first loan in 1958 helped the dieselization of the network.

- The second loan in 1965 was geared toward acquisition of locomotives, wagons, and workshop equipment.
- The third loan in 1974 was for workshop equipment and technical assistance.
- The fourth loan in 1977 was for change of sleepers, purchase of track maintenance equipment, signaling and telecommunications, a workshop in Port Sudan, and technical assistance.
- The fifth loan is presently being negotiated with the World Bank, which is insisting on a study to establish the operational and managerial deficiencies of SRC in order to set up technical assistance programs.

This situation is of interest for other potential donors as it is becoming clear that policy and managerial questions should be addressed as well as equipment and infrastructure provided.

Also of importance to the marketing of products out of Kordofan is the Livestock Marketing Project partially financed by the World Bank (see section 7.8). This project has incurred long delays. Ten locomotives have been purchased but for the time being they are used for normal traffic. It must also be noted that sheep are flown from Khartoum to Saudi Arabia and that there is a plan to lengthen the El Obeid airport to accommodate the same large planes which would then fly the sheep directly from El Obeid.

Although the consultant has not looked into the economics of this operation in any detail, it is doubtful that plane transport could compete with railroad transport to Port Sudan. This is assuming that SRC will provide adequate service to the Livestock and Meat Marketing Corporation (LMMC), an assumption which was apparently discarded by the private promoters of the project.

11.6 Tonnage Flows on the Kordofan Network

The traffic density figures presented in Figure 11-1 clearly show the relative importance of the different sections as far as the average tonnage flows are concerned. It points out that in Kordofan there is a considerable difference in the level of service if one is located east or west of El Obeid.

Er Rahad is just an ordinary station for the trains going to and from El Obeid, but it is an end station for the traffic going (or coming from the west) to Babanousa. This is because east of Er Rahad heavy trains are used whereas only lighter trains can proceed west of Er Rahad, due to the poor condition of the western network and the low demand level.

Heavy trains have 30 wagons of 30-ton payload so they can have 900 tons. Light trains have 20 wagons and can haul only 600 tons. If one further considers that on the Er Rahad - Babanousa line there are 30 percent less freight trains than on the Er Rahad - Kostti line (see Table 11-4), that the locomotives of the western network have a lower availability than elsewhere, and finally that the track is also in worse condition, one can see the service level (chance of getting an empty wagon) west of El Obeid is probably 25 percent of what it is east where waiting time already varies from one week to sometimes several months.

This is one of the reasons why groundnuts, for instance, are trucked from En Nahud to El Obeid rather than sent to the Abu Zabad railroad station.

The traffic density chart also indicates that most of the Kordofan railroad network is not financially viable because of the low transport demand. The previously referenced Parsons Brinckerhoff study computed the estimated profitability by section. It found that in 1977/78, except for the Port Sudan - Khartoum - Sennar line which had a surplus of Ls 5 million, the network was losing money - about Ls 0.8 million for Sinar - Nyala and Ls 0.9 million for Babanussa - Wau. Imposing rates that reflect operating costs would therefore somewhat increase the railroad transport costs for Kordofan.

11.7 The USAID Financed Railway Rehabilitation

In 1981 USAID initiated a five year program with SRC comprised of a PL480 Title III local currency program for a total amount of Ls 12.9 and a first year allocation of Ls 4.6 million. The project, aimed at the western network, includes:

- water systems for 47 stations (west of Kostti)
- wooden sleepers for the Er Rahad - Abu Zabad section where track was changed to 75 Lb/yard
- an underground communication cable from Babanousa to Wau.

The project has started slowly, but according to SRC officials interviewed in January 1983, it is now making good progress.

It was impossible to obtain any details on the watering station project. However, the Abu Zabad - Er Rahad section is now completed and work has started on the underground communication cable. In order to make up for the late start, it has even been decided to proceed from both ends. The completed cable will belong to SRC.

11.8 SRC and the Transportation of Agricultural Products

When one asks people in Kordofan what they think of the railway as a means of transport for their crops, one obtains widely different

answers, but generally the big merchants who export HPS groundnuts or other crops from El Obeid to Port Sudan are relatively satisfied with the situation. The reason is simply that SRC gives priority to the export crops (groundnuts, gum arabic, and cotton) over other products.

The Sudan Oilseed Co. would, in case of difficulty in obtaining wagons in El Obeid, contact the Ministry of Commerce which would then contact the Ministry of Transportation to grant priority to the 22,000 tons of groundnuts taken by this company from Kordofan (of which 17,000 tons are from El Obeid, 13,000 tons from Babanousa, 1,550 tons from Er Rahad, 60 tons from Umm Ruwaba, and 63 tons from Abu Zabad).

These figures show the wide disparity between El Obeid and the other stations as traffic generators of agricultural products. They are confirmed by the figures given in Table 11-5 and Table 11-6 which indicate the tonnages loaded on rail at different stations in Kordofan. Rates are given in Table 11-7.

Table 11-1
RAIL LINE CAPACITY IN 1981/82

Rail Sections	Technical Capacity	Practical Capacity	Actual Capacity Used	Capacity Used/ Practical (percent)
	Number of trains to and from			
Haiya - Port Sudan	30.6	21.4	8.8	41
Atbara - Haiya	33.4	23.4	7.0	30
Khartoum - Atbara	32.0	22.4	9.9	44
Senner - Khartoum	34.2	23.9	7.1	30
El Obeid - Sennar	30.0	21.0	3.9	19
Er Rahad - Babanoussa	15.3	10.7	2.2	21
Babanoussa - Nyala	17.7	12.3	2.1	17
Babanoussa - Wau	10.4	7.2	1.2	17

Source: SRC - Atbara - Time Table Section

Table 11-2

SUDAN RAILWAYS CORPORATION BUDGET

1980/1981 Revised Estimate (Ls)

<u>Receipts</u>		
Passengers	8,920,000	8,920,000
<u>Merchandise</u>		
Cotton and cotton seed	3,830,000	
Grain - Sugar	10,220,000	
Other foods (local)	1,875,000	
Local Produce	3,430,000	
Black & white oils	17,775,000	
Food (imported)	225,000	
Other imports	8,160,000	
Livestock	985,000	
Miscellaneous	2,125,000	
Total Merchandise		48,625,000
Total Railways		57,545,000
<u>Working Expenses</u>		
Personnel	41,895,900	
Stores	9,103,000	
Fuel	5,702,000	
Depreciation	4,041,550	
Miscellaneous	1,844,200	
Total Expenses		62,586,650
Deficit		- 5,041,650
Other Activities	- 481,000	
Subsidy from Sudan Government	4,000,000	
Deficit		- 1,522,650
Interest charges	-11,020,510	
Appropriation repayment of loans	- 2,283,770	
Deficit of the year		-14,826,930

Source: SRC Budget July 1, 1981 to June 6, 1982

Table 11-1

SUDAN RAILWAYS PERFORMANCE INDICATORS

	<u>Revenues</u> <u>(Ls millions)</u>	<u>Costs</u> <u>(Ls millions)</u>	<u>Revenue/</u> <u>Costs</u>	<u>Freight</u> <u>Ton/km.</u> <u>(millions)</u>	<u>Passengers</u> <u>Pax./km.</u> <u>(millions)</u>	<u>No. Employees</u> <u>administration</u> <u>& railways</u>	<u>Turnaround</u> <u>time per</u> <u>wagon</u> <u>(days)</u>
1974-75	24.98	27.03	0.92	2,175	1.101	33,360	16.5
1975-76	33.10	29.78	1.11	2,620	1.166	34,915	16.5
1976-77	33.58	31.64	1.06	2,415	1.294	34,510	17.3
1977-78	33.08	32.65	1.01	1,555	1.192	35,112	21.9
1978-79	38.72	45.79	0.85	1,456	1.057	35,448	25.6
1979-80	52.84	55.29	0.96	1,966	1.061	35,671	24.0
1980-81	56.07	63.90	0.88	1,594	1.170	35,487	22.3
1981-82	66.04	69.63	0.95	1,512	.900	35,307	21.9

Source: SRC Atbara, Sudan Railways Annual Reports and Sudan Railways monthly statistical statements.

Table 11-4

ACTUAL TRAINS RUN ON THE WESTERN NETWORK

Years	Kosti - El Obeid		Er Rahad - Babanousa		Babanousa - Nyala		Babanousa - Wau	
	Passengers (000)	Goods	Passengers (000)	Goods	Passengers (000)	Goods	Passengers (000)	Goods
1975-76	409	1,165	213	819	208	658	206	345
1976-77	629	1,040	299	750	299	500	199	360
1977-78	322	627	150	292	173	224	85	252
1978-79	320	860	98	265	113	336	49	175
1979-80	450	991	151	518	189	488	67	259
1980-81	504	967	244	740	204	566	95	368

Source: SRC Atbara Planning and Economic Research Department.

Table 11-5

GOODS MOVED BY RAIL IN AND OUT OF EL OBEID

	1978	1979	1980	1981	1982 ¹
<u>From El Obeid²</u>					
Shelled Groundnuts (T)	48,409	47,563	35,511	28,209	35,070
Sesame (T)	na	211	699	629	1,936
Cakes (T)	1,686	13,049	10,794	6,294	5,001
Gum Arabic (T)	11,271	14,578	11,847	16,415	30,366
Watermelon Seeds (T)	5,298	5,655	13,061	9,064	4,273
Karkadee (T)	108	309	170	241	277
Cattle (head)	186	na	120	215	276
Sheep (head)	2,959	2,200	2,100	5,274	8,462
<u>To El Obeid</u>					
Total Moved (T)	84,276	86,723	78,669	78,389	63,156 ¹

¹Until October 1982²List of goods is not exhaustive

Source: Sudan Railway Corporation, El Obeid Corporation.

Table 11-6

AGRICULTURAL PRODUCT FLOWS OUT OF PRINCIPAL KORDOFAN STATIONS
(.000 Tons)

	Babanousa	El Fula	Abu Zabad	Dubeibat	El Obeid	Er Rahad	Simeih	Umm Ruwaba
Groundnuts								
1980-81	4.8	0.4	-	0.4	32.3	3.7	-	3.7
1981-82	8.5	0.1	-	-	32.3	2.5	-	1.6
Sesame								
1980-81	-	-	-	-	0.7	2.2	-	0.1
1981-82	-	-	-	-	2.3	0.5	-	2.9
Oil Cake								
1980-81	-	-	-	0.2	14.0	0.2	-	8.9
1981-82	-	-	-	-	5.1	0.9	-	2.5
Gum arabic								
1980-81	-	-	-	-	12.9	0.4	-	1.4
1981-82	0.1	-	-	-	13.9	0.7	-	0.9
Melon Seeds								
1980-81	-	-	-	0.1	11.5	0.1	-	-
1981-82	0.5	0.1	-	-	6.2	0.1	-	-
Karkadee								
1980-81	0.2	-	-	-	0.3	0.1	-	0.3
1981-82	0.1	-	-	-	0.3	0.1	-	0.4

Source: SRC Atbara, Planning and Economics Research Department

Table 11-7

SRC FREIGHT RATES FOR AGRICULTURAL PRODUCTS
FROM EL OBEID TO KHARTOUM AND PORT SUDAN (Ls)

	1978	1979	1980	1981	1982
El Obeid - Khartoum (624 km)					
Shelled Groundnuts	7.1	8.6	12.7	14.0	21.4
Sesame	10.5	12.8	14.1	15.5	21.4
Cakes	7.4	9.0	13.4	14.7	26.1
Gum Arabic	10.7	13.0	15.2	16.8	21.4
Watermelon Seeds	7.4	9.0	13.4	14.7	26.1
Karkadee	14.1	17.1	23.7	26.0	49.5
El Obeid - Port Sudan (1,411 km)					
Shelled Groundnuts	13.9	17.0	25.2	27.7	42.2
Sesame	20.7	25.2	27.8	30.6	42.2
Cakes	14.6	17.8	26.4	29.0	51.5
Gum Arabic	21.2	25.8	30.0	33.0	42.2
Watermelon Seeds	14.6	17.8	26.4	29.0	51.5
Karkadee	27.8	33.8	46.7	51.3	97.9

Source: SRC Atbara, Planning and Economic Research Department.

CHAPTER 12

EVALUATION OF THE EXISTING TRANSPORTATION SYSTEM

It has been shown in the preceding chapters that the transportation system available to move the agricultural products both within Kordofan and out of Kordofan to Khartoum or Port Sudan for export present the following main constraints:

- Truck transportation is expensive, especially for the farmer who has to transport his crops from the field or the village to the next rural or urban market.
- Transport by rail is cheap but involves long waiting times and is unreliable, particularly when small tonnages are involved.

Nevertheless, the system does exist and is relatively efficient at moving the existing tonnages of commercialized agricultural products.

The small transport companies of the private sector are very dynamic and have been able to adapt themselves to the lack of infrastructure and provide service where there is a demand.

The priority given by the SRC to the movement of cash crops helps to ensure that export crops reach Port Sudan within acceptable time periods.

The system is slow but the value of time is limited in the traditional farm sector except if heavy crop losses are incurred during their transport cycle, which does not seem to be the case in Kordofan. The only high percentage of losses were reported for sorghum and in that case speculative motives were usually involved rather than transportation constraints.

The road system is non-permanent (at least for the truck transport), in particular in the areas where clay soils are found. But the crops do not need to move during the rainy season and their marketing is not directly affected (although the production process may be affected by the lack of all-weather roads prohibiting access to extension workers and easy movement of workers and mechanized equipment).

The road system is difficult to improve because of the high construction cost of gravel and paved roads. The present construction project in Kordofan indicates that a gravel road would cost at least Ls 150,000 per kilometer and a paved road Ls 300,000 per kilometer. If one assumes a relatively low 12 percent first year rate of return, that means that user cost savings should generate respectively Ls 18,000 and Ls 36,000 for optimizing the construction of a

gravel or a paved road. It has been shown that the average cost per ton/kilometer was Ls 20 using a 6-ton truck on a track. One can estimate the other relevant ton/kilometer costs on different surfaces with light and heavy trucks to be:

	paved road	gravel road	earth track
6-ton truck	.10	.13	.20
20-ton truck	.07	.09	-

Assuming that a gravel road would induce 50 percent of the tonnage to shift to heavy trucks, and a paved road 100 percent, one has a very rough estimate of thresholds which would indicate optimum construction timing:

- from track to gravel road: 200,000 ton/year
- from track to paved road : 280,000 ton/year

A construction project could naturally still be feasible for lower tonnages; how much lower would depend on the traffic growth rate. For a 12 percent growth rate, a gravel road would be feasible for a first year traffic volume of about 100,000 tons.

It remains to be seen if the existing system can accommodate significant tonnage increases. It has been shown that the railroad capacity is no problem, but that practical performance very much depends on policy issues which will be addressed in the recommendations.

For road transport, the primary sector is the possible constraint. It is felt that if the demand growth is on the order of 15 percent per year, the private sector will be efficient enough to absorb it without unduly high cost increases.

This raises the question of evaluating the impact of the agricultural research and related extension programs on the marketing of products. If the program is dealing with a limited specific geographical area, its impact should be great in terms of percentages of increased marketed production. But then it should be possible to identify specific actions--such as building a feeder road to improve access to the area.

If, on the other hand, the agricultural project is extensive and covers an entire region, its impact is bound to be wider spread but more limited in terms of increased transport demand. The system should then be able to accommodate this limited excess demand without difficulty and without need for particular investment.

CHAPTER 13

CONCLUSIONS AND RECOMMENDATIONS

13.1 Introduction

There are a number of constraints on the agricultural marketing system in the Kordofan. Some of these constraints appear to be system-wide, encompassing most, if not all crops. Other constraints are more crop specific.

Constraints to the transport of agricultural goods exist in both road and rail transportation systems. Some constraints can be lessened through policy changes, but often will require investment in infrastructure and operating systems. These constraints impact all of the crops being studied as well as livestock.

In this section, the system-wide problems of credit, information, and water availability will be addressed first. Then issues particular to the study's target crops groundnuts, sesame, gum arabic, sorghum, and millet will be examined on a crop by crop basis. Finally, recommendations to improve the transportation systems will be presented.

13.2 Small Farmer Credit

The high cost and stringent terms of existing credit sources for small farmers does not allow the farmer to cultivate his entire holdings nor reap the full benefit of his labors. The farmer growing grains, oilseeds, or other crops needs money to purchase seed and inputs for planting, hire labor for weeding, and feed his family during the growing season. Gum arabic collectors need funds to purchase water as well as money to live on while they tap and collect the gum. Farmers who use loans from local merchants to finance their cultivation costs are often forced to sell their crops immediately upon harvest when prices are at their lowest.

The Agricultural Bank has programs in Umm Ruwaba and El Obeid to provide loans to small farmers who are members of cooperatives. These loans are initially production loans, financing cultivation costs, but continue on after harvest as marketing loans, financing the farmer's crop inventory until prices have risen. The loans are administered in three installments intended to coincide with planting, weeding, and harvest time needs. After the harvest the crops are taken to a storage facility provided by the Agricultural Bank. The officers of the cooperative choose when to sell the crop because the entire output of the cooperative is sold at one time.

The Agricultural Bank is currently financing only groundnuts and sesame, although there are plans underway to include gum arabic. The result of these loans has been an increase in the area of cash crops planted by the participating farmers as well as an increase in farmer incomes since the crops are held off the market until prices have reached favorable levels.

Recommendation: The Agricultural Bank should expand the lending program to include additional crops and new geographic areas. The lending program could include cash crops such as karkadee, water-melon seeds, and gum arabic as well as the portion of a farmer's grain crop that he intends to sell. The procedures for granting and collecting loans would not have to be changed. The geographic impact of the program can be enlarged by establishing branches of the Agricultural Bank in market centers such as En Nahud and Babanousa. The number of farmers who benefit from the program could be further enlarged by loaning to additional cooperatives in the areas currently served.

This program will require a long term commitment of what could become large sums of money. Loans for the 1982-83 season totalled only Ls 400,000 to forty-two cooperatives. Although cooperative development is a long, slow process, it is conceivable that such a loan program could eventually serve hundreds of cooperatives with many thousands of members. The sums being loaned would quickly reach millions of pounds.

There are many issues that must be resolved if such a program is to be successful. Of paramount importance is to allow cooperatives to form and enter the program on the initiative of their members. Forcing or hurrying the formation of cooperatives will cause the system to break down. It is equally important that the program not be expanded faster than the Agricultural Bank is capable of managing.

The expanded credit program would have to provide additional, high quality storage space. Providing financing for truck purchases by cooperatives might further increase their ability to effectively market their crops, as well as facilitate transport of crops to storage. The loan program could also provide an excellent channel for increased extension services, making available vital inputs such as improved seed varieties and Aldrex-T.

The present combination loan to finance production and inventory creates the greatest benefit for the farmer by increasing the area planted, the yield, and the price received. It is also somewhat risky for the Agricultural Bank because bad weather greatly increases default rates. A less risky, though less beneficial program, would finance inventory using the crop as collateral. A low interest rate could be charged since the default rate would be zero. The farmers would benefit from the increased price they would receive by selling later in the year. In the case of sorghum especially, this increase could be very significant.

13.3 Market Information Services

Under existing conditions, the well-capitalized merchants use radio-telephones to stay informed about price movements at the markets around the Kordofan on a daily basis. Smaller merchants get their information from large merchants, and villagers learn of prices by word of mouth from passing truck drivers. It is likely

that information reaching remote villages is both out of date and somewhat garbled having been passed via a number of intermediaries. Other price and market information, such as movements of international prices, changes in government policies, and projected availability of fuel and agricultural inputs, are available on a timely basis only to the large, well-connected merchants.

Not only is market information somewhat slow to reach rural areas, but information on improved seed varieties, planting, and cultivation techniques, and other crop production data may take years to reach the traditional small farmer. Current extension services do not have the staff, vehicles, or fuel to adequately disseminate the outputs of agronomic research.

Recommendation: A radio program directed to traditional small farmers in the Kordofan Region should be established. The purpose of the program would be to provide market information, news, and forecasts. The program would give daily prices for all agricultural commodities and livestock at all the major markets in the Kordofan, as well as Khartoum and Port Sudan prices where relevant. The program would explain issues affecting the crop markets such as government policies, projected crop production, and developments in world markets.

Once the radio network is established, it could also be used to provide production oriented extension information such as details of new production techniques, tools, and inputs that can improve the harvest. Farmers would be notified about where they could get additional information and where they could go to see new techniques employed.

The program would require some foreign exchange to purchase radio transmitters and equipment for boosting the signal to cover a wide geographic area. It would probably be possible to use existing staff at various markets and at the Regional Ministry of Agriculture to perform many of the required functions.

13.4 Improve Quality of Groundnuts

Sudanese groundnuts are small in size and, by international standards, poorly shaped and thus command low prices from export markets. The groundnut seed stock used in the Kordofan is twenty years old and should be replaced. Improved, certified seeds would increase the size, quality, and quantity of nuts produced.

Recommendation: There is a need for investment in seed multiplication and distribution in the region. The lowest cost method of distribution would probably be to provide the seeds at village auction markets. A more comprehensive method would be to distribute the seeds directly at villages. This would be more expensive, however, and would require foreign exchange for fuel and vehicles.

In order to better ensure that the seeds will be used for planting, they should be distributed within six weeks of planting time. Because farmers are especially short of cash at this time of year, the seeds could either be exchanged one-for-one for the present seed stock (which would then be sold) or the improved seeds could be "loaned" with an agreement that the farmer will return an equal quantity of seeds following the harvest.

13.5 Devise an Integrated Pricing Strategy for Gum Arabic

Gum arabic prices are set somewhat arbitrarily throughout the system. Because the Sudan has a near monopoly on the world market, the Gum Arabic Company can set almost any price and sell at least some gum. What is not known is the price, based on supply and export demand statistics, at which revenues and profits could be maximized. Floor prices are set at a minimal level with the government taking the largest share of the export revenues. Floor price levels do not address the fact that gum arabic trees are a natural defense against desertification and that a policy of high floor prices and overproduction might have a cost-effective environmental impact by establishing a high enough economic value for the trees so that they are not consumed for firewood or building material.

Recommendation: A study should be funded to devise an integrated pricing strategy for gum arabic. The plan would set export prices and floor prices so as to maximize foreign exchange revenues and profits, encourage production levels, and promote cost-effective cropland and rangeland conservation.

Phase one of the study would be a thorough analysis of the international market for water soluble gums. The purpose of this phase would be to determine the industrial uses for which gum arabic has a comparative advantage over competing natural or synthetic gums. Once these uses have been determined, the study should establish the price at which producers would substitute gum arabic for the gum currently used. This information can be used to project the potential sales volume of gum arabic at different prices. The study should further seek to discern the likelihood and cost of each user switching to or increasing the use of gum arabic. Finally, the study should determine how important security of supply is to each producer and what costs would be incurred by the producer if supply were curtailed.

The second phase of the study would examine the effects of prices on supply, deriving short-term and long-term production scenarios assuming different price levels. Variations on these scenarios would include possible investments that the Gum Arabic Company could make to speed growth in production and to stabilize the source of supply. One such investment would be a buffer stock to ensure supply during dry years. Another possible investment would be improving water availability.

A third phase of the study would determine the environmental impact of expanded production. Gum arabic trees are a natural barrier against the encroaching desert. In recent years many have been cut down because they have a higher economic value for firewood or building material. Gum trees are also important to the fallowing cycle for crop land. The increase in the value of cash crops relative to gum arabic has disrupted this cycle and reduced fallowing periods, speeding erosion and depleting the land. Improved gum prices would encourage farmers to preserve trees and pursue proper fallowing practices. The study should thus evaluate the impact of different price levels on desertification and land deterioration and attempt to quantify the value of these savings.

The final phase of the study would utilize the data compiled in the first three phases to devise an optional pricing strategy to yield maximum long term benefits to the Sudan. Export prices would be set so as to maximize revenue. Floor prices would be set to maintain production at a level conducive to supplying the needs of the market, maintaining an adequate buffer stock, and promoting land preservation practices in a cost-effective manner. Taxes would be reduced if necessary to boost floor prices. In order to achieve the goal of cost-effective land conservation, it may be proper to set prices at a level that causes over production. If so, the study should determine how these excess quantities of gum should be disposed of - whether by storage, lowering the export price and selling, or by other means.

13.6 Buffer Stock for Gum Arabic

The Gum Arabic Company currently has plans to establish a buffer stock to supply export markets during years of poor production. A reliable supply source is extremely important to gum arabic users. The Sudan lost many customers following the low gum arabic output in 1972-73.

Recommendation: The Gum Arabic Company should seek to quickly fulfill this goal and publicize the existence of the buffer stock. This is important in order for the Sudan to project an image of being a reliable supplier.

13.7 Eliminate Monopoly of Gum Arabic Company

The Gum Arabic Company is reaping excess profits from its position as the monopsonistic purchaser and monopolistic exporter of gum arabic. The company's gross margin (the difference between the Port Sudan delivery price and the export price) was 41 percent in 1979 and 55 percent in 1981, while the producer floor price declined from 42 percent of the export price to 32 percent over that period. Before tax, profit margins have been 20-25 percent of sales.

Recommendation: The Gum Arabic Company's export monopoly should be eliminated. The company should, however, maintain certain roles in the marketing system such as setting export prices based on the results of the study described in Section 13.5. It would remain responsible for building and maintaining an adequate buffer stock and would maintain floor prices for producers, buying excess quantities in the event of over production. Finally, the company would continue to export gum arabic.

Eliminating the monopoly of the Gum Arabic Company will encourage competition between merchants purchasing gum at auction markets, bidding up prices paid to producers. The increased prices would raise farmer incomes and encourage them to increase output.

13.8 Government Managed Grain Stockpile

There is a great deal of hoarding and price speculation in the Kordofan sorghum market. During the last three years, the peak price for sorghum in El Obeid has always been at least double the harvest price. These increases cannot be accounted for by storage losses, storage costs, or inflation. It is obvious that grain is being held off the market because there is always a large quantity of the previous year's harvest being sold in December and January.

The hoarding and price speculation is very expensive for consumers. The producers get little of the price benefits because they generally must sell their crop soon after harvest.

Recommendation: The Sudanese Government should create a stockpile of sorghum to be used to temper price increases. The Government organization would buy sorghum at harvest, store it in modern, properly maintained and fumigated storage centers, and sell it when prices reach levels considered to be excessive.

The solution is attractive in many ways. The release of grain onto the market would have the effect of tempering second price increases, and the threat of government grain being released onto the market would discourage merchants from hoarding grain for long periods as their storage expenses continue to increase while the price level may not. A government stockpile would provide the additional benefit of serving as a buffer stock in times of extreme shortage. The project should easily pay for itself and generate a profit since the government would be receiving the benefit of the increase in prices.

There are many problems to overcome in such a project. High quality storage must be built and properly controlled for pests. If pests are not controlled adequately, storage losses could eliminate government profits and perhaps even create a shortage on the regional market that would drive prices up further. The selling of the grain must be carefully administered so that the crops are not

merely purchased by wealthy merchants and resold at a profit. The timing, too, of the sale is critical. Because the government will own a substantial portion of grain being marketed, it must be careful not to restrict supply to the marketplace thereby driving up prices.

The size, logistics, and quantities of grain and capital involved will necessitate a well-organized and managed system. It may be that such a project is beyond the capabilities of the government to administer. Although this is a higher cost solution (though certainly not higher cost than a badly managed government system), there may be adequate revenues to justify such an expense.

13.9 Revise Terms of Agricultural Bank Loan to Owners of Habila Schemes

At the present time, owners of Habila schemes can store their harvest with the Agricultural Bank and receive payment at market prices for 75 percent of the crop. The merchant may sell the entire crop later, when prices have risen. He then must repay the Agricultural Bank the money advanced plus 18 percent interest and storage charges. Although this system is beneficial in that it prevents massive quantities of sorghum from being dumped on the market at harvest time, it is not in the public interest to provide loans at a rate of interest less than inflation for wealthy merchants to use for speculating on grain.

Recommendation: The terms of Agricultural Bank loans to Habila scheme owners should be revised. At a minimum, the interest rate should reflect a realistic cost of money. A further step could be to force repayment over a specified period of time to encourage the scheme owner to liquidate inventories as prices begin to rise. If a government stockpile were established, the loan program could be eliminated to be replaced by government crop purchases at harvest time.

13.10 Encourage Storage Construction

The magnitude of crop storage losses in the Kordofan is very difficult to assess. The government study previously cited in this report gives a six month loss rate of 12.5 percent and a one year rate of 46.9 percent for sorghum. Merchants interviewed stated that good, clean storage can keep annual sorghum storage losses below 5 percent. More typical, however, are annual losses of 15-30 percent. Losses for non-grain crops are generally less significant because the crops are not stored for long periods of time.

Merchants appear unwilling to invest in quality storage space despite the savings that would accrue. The reasons for this are not entirely clear. Most probably the merchants are reluctant to tie up large sums of money for long periods of time. It is also thought that universal government land ownership creates a further disincentive to invest. Merchants also lack knowledge about storage construction and pest control.

Recommendation: The Sudanese Government should establish a program to encourage investment in grain storage capacity. The first step would be to facilitate the purchase of land. Construction could be encouraged by providing loans from the Agricultural Bank. The loan would be at a positive real rate of interest, covering the costs of administering the loan and the costs of inflation. Merchants could be encouraged to innovate with new designs of storage (such as the matamura storage construction used at Gedaref) by providing insurance for the crops stored in this new way.

13.11 Price Control of Meat

Meat is officially price controlled throughout the Kordofan. Price controls are rarely enforced, however, so the controls are viewed more as an annoyance than as a major constraint on the livestock marketing system. It is possible, though, that price controls are impeding the establishment of price differentials for different qualities of meat and animal parts. If so, the result might be disincentives to improving the quality of animals for domestic markets.

Recommendation: The Regional Government should encourage town councils to abolish controls on the prices of meat. In areas where there are only one or two slaughterhouses, it may be necessary to control prices charged for animal slaughter; however, no controls should be imposed unless repeated, systemic abuses occur. At the retail level, it is believed that there is adequate competition among butchers to maintain reasonable consumer price levels.

13.12 Slaughter of Goats

It is currently illegal to slaughter goats in El Obeid and in many other cities in the Kordofan. The purpose of this regulation is to prevent butchers from selling goat meat as higher priced mutton. Goats are still slaughtered in large numbers, albeit illegally, because there is a significant demand for goat meat.

Recommendation: Town councils should legalize the slaughter of goats. It is better for consumers to have goats slaughtered under the more sanitary auspices of licensed slaughterhouses. Consumers who believe that they have been sold goat meat in the place of mutton have the option of complaining to the authorities and buying from a different butcher.

13.13 Dairy

There is a high demand for and short supply of milk in cities throughout the Kordofan. Villagers have their own animals to milk. Only a few urbanites own milking animals, and most purchase imported powdered milk. Although it was not possible to precisely detail the economics of dairy farming in the Kordofan, there does appear to be potential for dairy herds to operate profitably, at least in the El Obeid area.

Recommendation: Entrepreneurs should develop dairy herds around El Obeid and other urban centers. It is further recommended that the government-managed dairy herd outside El Obeid be sold off as it is poorly managed and losing money and is of only minor benefit to its clientele.

13.14 Animal Hides

The marketing of animal hides in the Kordofan is characterized by monopsonistic purchasing of hides at low prices, rudimentary processing, and export at substantially higher prices via a small clique of hide exporters who are insulated from competition by the difficulties of obtaining an export license for animal hides. National Government regulations stipulate that government tanneries can buy large numbers of hides from merchants at low prices. The hides are processed for use by the domestic leather industry.

Recommendation: The Government should ease restrictions on granting export licenses for animal hides. In addition the government should seek to purchase hides from a large number of sources to encourage competition. This will necessitate paying higher prices for hides rather than setting purchase prices by mandate. These actions should increase prices paid to producers by increasing competition in the marketing chain.

13.15 Water

The scarcity of water is primarily a production, rather than a marketing, constraint. The high cost and difficulties in obtaining water consume a large share of the traditional small farmer's income. Farmers in the El Obeid area may have to spend Ls 1.50-2.00 per day to supply water for their families if there is no local water supply. In some villages, 25-50 percent of the population may move to El Obeid during the summer because there is not enough water available in the villages.

Lack of water is a direct constraint for farmers seeking to collect gum arabic, as they consume large quantities working in the sun. It also prevents farmers from maintaining more than a handful of animals. The time and money spent obtaining water could be more productively spent in hiring labor for weeding or for buying inputs to increase yields.

13.16 Improve Fuel Distribution

The Government should establish price levels more reflective of the economic value of fuel and revise the fuel quotas of the regions. Normal distribution of gasoline and diesel should be aimed at.

13.17 Raise Revenue for Road Maintenance

The Government should find a way to finance the increasing maintenance requirements of the expanding paved road network. Creation of a highway maintenance fund financed by gasoline and diesel taxes could be a solution.

13.18 Discourage Regional Government Organization from Entering Transportation Sector

The regional government and other parastatal organizations should be discouraged from entering the transportation sector themselves, but should work with the private sector.

Examples in Kordofan include: a regional joint venture between the regional government and the French Renault Cie to provide heavy trucks; and the willingness of NMC to acquire trucks to transport its cotton.

This type of activity by the public sector is not warranted when the private sector is performing adequately. Non-professional transport outfits tend to have low use of their trucks, poor maintenance, and low efficiency.

13.19 Creating a Road Maintenance Brigade in Kordofan

Such a brigade would have several purposes:

- a. Execute maintenance work on the clay tracks of Southern Kordofan after the end of the rainy season. It is a similar task to the one presently performed by the NMC on some of its cotton extraction roads. It would consist mainly of filling the "Khor" with on-site material pushed by a dozer and leveling the track's surface with a grader. Initially, the brigade could work on those tracks not worked by the NMC and which are, in theory, the responsibility of the local councils. As the maintenance capability of NMC has been steadily decreasing because of its inability to maintain equipment, the brigade could take over because the importance of the so-called "cotton-roads" (or wind roads) extends well beyond the transport of cotton.
- b. Construct minimum standard feeder roads. These would simply consist of access clearance with a dozer or grader, filling in of minor crossings, and placing an eight centimeter-thick layer of selected subbase type material.

With an average haulage distance of 15 to 20 kilometers, costs should be around \$12,000/kilometer and the brigade could build five kilometers/week. This type of feeder road could justify itself on the basis of 10,000 to 15,000 tons of agricultural products (or other goods) being transported over it per year.

The choice of location of these feeder roads would be based on the requirements of the agricultural development program.

- c. Spot improvements on the sand tracks. This would involve mainly crossings and low areas. The equipment required would be one bulldozer, one grader, ten tipper trucks, one roller, and two water tankers for a total cost of about \$1.7 million. A technical assistance program with one highway engineer for two years and one mechanical engineer for two years should also be considered (\$0.4 million).

The Working Fund would depend upon the type of work the brigade is engaged in; one could assume \$1.0 million/year. The total program would represent an investment (essentially foreign cost) of about \$4.0 million. The problem remains to find an appropriate structure in which to include the brigade. It appears from the study of the highway maintenance performed in Kordofan that the most appropriate structure would be the Road and Bridge Public Corporation (RBPC), which already has two centers in Kordofan. The RBPC is involved in the maintenance of a paved road and will become involved with gravel roads. This would mean extending the responsibilities of RBPC, which are presently limited to the National highway network.

13.20 Other Road Transport Improvement Related Investments

There are several possible investments which may, in the future, appear of value in improving the transport and marketing of agricultural surpluses. In order to judge the value of these investments, one would have to know type, location, and quantities of surplus productions.

In the case of surplus sorghum production located in the Habila area, one would consider the following projects:

- Construction of Habila - Dilling Road (the only feeder road found feasible by the Norconsult feeder road study)
- The reinforcement of the Dilling - Dubeibat section of paved road (particularly if at the time envisaged the pavement deterioration is such that it is not financially feasible to maintain it through normal maintenance procedures)
- The phase 2 construction of the Dubeibat - El Obeid road (particularly if applied maintenance does not seem sufficient to preserve investment in the subbase).

In the case of surplus groundnut production located in the En Nahad area, one would consider a feasibility study of the En Nahud - El Obeid road with an extensive origin destination traffic survey to pinpoint the important traffic occurring in this entire subregion.

13.21 Improve Coordination Between Donors Financing Projects for Sudan Railway Corporation

It appears advisable to establish better coordination between the numerous donors involved in financing projects with the SRC. This is required to give donors the leverage necessary to have difficult policy recommendations implemented by the Government and SRC management.

13.22 Grant Sudan Railway Corporation Greater Autonomy in Setting Rates

SRC must be granted a greater degree of autonomy by the Government regarding its financial operation. Commercial rates must be set to at least cover direct costs and possibly to generate enough cash flow to buy necessary spare parts, machines, and tools. If SRC cannot set its own rates, the Government should provide a subsidy equal to the difference between revenues resulting from imposed rates and from appropriate commercial rates.

13.23 Improve the Quality and Decrease the Quantity of Sudan Railway Corporation Personnel

SRC must control its spiraling personnel costs, which implies progressively reducing the number of employees, while at the same time increasing their qualifications.

More generally, SRC should recognize that it has serious management shortcomings which foreign exchange alone will not solve, but which may be eased through appropriate technical assistance programs.

13.24 Funds for Railroad Improvement Investments

The PL 480 local currency program initiated by USAID recognizes the fact that even with drastic operational and managerial improvements, the lack of communication, weak 50 lb/yd track, and the lack of water at stations would be constraints on the level of service. Furthermore, the program is dealing with the western part of the Kordofan, which is most in need of improvement. The fact that this part of the network is not financially viable for SRC using the present freight rates, does not prevent a donor from realizing a feasible investment there within the framework of a wider regional development project.

Even if the most important section of the railroad is El Obeid - Kosti, as far as the transport of agricultural products from Kordofan is concerned, the improvement of the El Obeid - Babanousa section will have a positive effect on the livestock marketing project and more generally on the flows of products originating west of El Obeid.

Consequently, it is recommended to pursue the present level of involvement corresponding to this project. As upgrading of the Er Rahad - Abu Zabad section is realized, the project should continue with the re-laying of the Abu Zabad - Babanousa line. The watering station project and the communication cable to Wau have fallen behind schedule and should be continued. The next priority for the communication system appears to be the Er Rahad - Babanousa section.

Appendix A



Merchants Bidding
At En Nahud
Auction Market



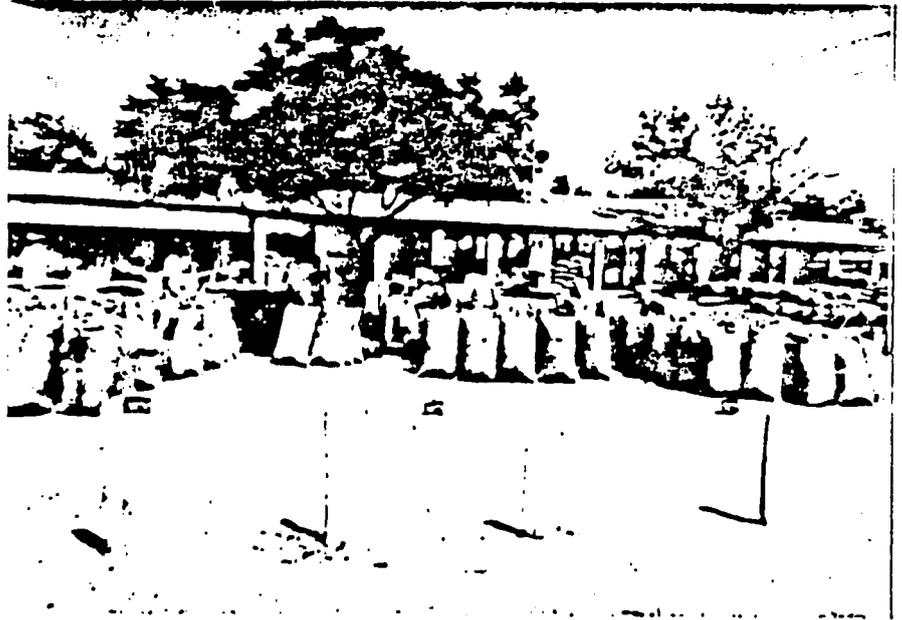
Groundnuts In Piles and
In Sacks At En Nahud
Auction Market



Groundnut Oil
Processing In
En Nahud



Merchants Bidding
At El Obeid Auction
Market



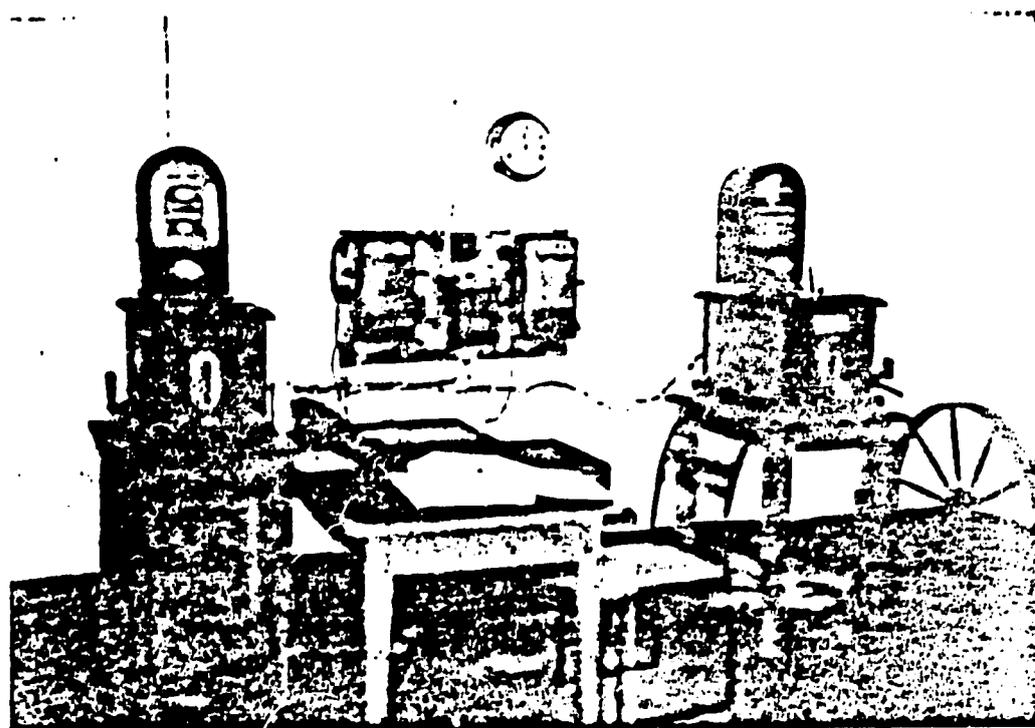
Groundnuts Separated
Into Lots At El Obeid
Auction Market



Sorghum At
El Obeid
Grain Market



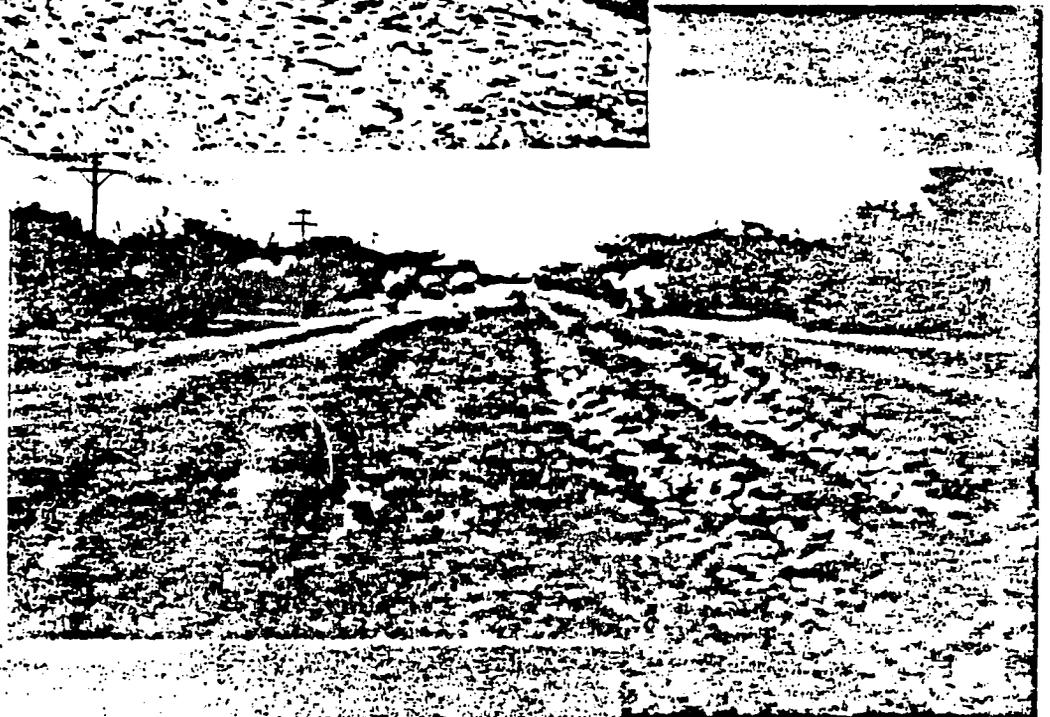
Construction of Dubeibat - El Obeid Gravel Road



Typical Railroad Communications in Kordofan



Sand Trucks In
North Kordofan



Clay Tracks Damaged
During Rainy Season
In South Kordofan



Clay Track
Cotton Road Graded
By Nuba Mountain
Corporation in
South Kordofan

Appendix B

APPENDIX B

DEFINITIONS OF TERMS AND QUANTITIES

1. Aldrex-T: pesticide commonly used by farmers to treat groundnut and others seeds.
2. Ardeb: unit of measure often used by grain wholesalers; equals two 85-kg. sacks.
3. Damin: "guarantee;" term used for person at livestock market who guarantees that an animal being purchased is in reasonable health and is not stolen. The damin is financially liable to the purchaser for the full price of the animal should it prove to have been stolen or die immediately after the sale.
4. Dubai: small scale urban merchant who buys cash crops (typically groundnuts) from farmers in quantities of one sack or less for resale either at the auction market or directly to a large merchant.
5. Feddans: area of land equalling .99 acres or .4 hectares.
6. Gibana: market use tax on cash crops at the rate of Ls .15 per kantar.
7. Hafir: natural or man-made pond that fills with water during the rainy season. Hafirs are an important water source for some villages.
8. Kantar: unit of measure equal to 45 kg. or 99 lbs.
9. Small kantar: unit of measure used for cotton equal to 50 kg. or 110 lbs.
10. Makhammas: area of land equalling 1.78 feddans, 1.80 acres, or .73 hectares.
11. Mid: unit of measure used for crops (especially grains) equal to 4.125 liters.
12. Shiishna: "estimation;" a form of government administered rural market for cash crops where the weight and price of the crop is estimated for tax assessment purposes.
13. Ushur: a 15 percent tax assessed by rural councils on the value of cash crops. Tax is collected at rural and urban auction markets.

14. Weights for sacks of crops:

<u>Crop</u>	<u>Sack Weight</u>
Groundnuts (unshelled)	45 kg. (1 kantar)
Groundnuts (shelled)	73 kg. (1.6 kantars)
Gum arabic	80-90 kg. (1.8-2 kantars)
Millet	85 kg. (1.9 kantars)
Sesame	81 kg. (1.8 kantars)
Sorghum	85 kg. (1.9 kantars)

Appendix C

APPENDIX C

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Appendix D

Statement of Work

Title

A Study of Present Constraints and Necessary Changes to Improve Agricultural Marketing Systems in the Kordofan Region of Western Sudan.

Background

USAID is designing a proposed Western Agricultural Production and Marketing Project (650-0054). The PID and PP will be developed in the first and second quarters respectively of FY 1983.

The project will seek to extend improved technology and expand marketing opportunities in the Kordofan region. The on-going Western Sudan Agricultural Research Project (650-0020) is developing improved production systems for area farmers through a farming systems approach to research. The proposed project intends to assist in the transfer of this technology through extension activities and improved input delivery systems. An equally important output of the project will be improved commodity marketing systems, thus providing financial incentives for farmers to increasingly produce marketable surpluses.

Purpose

The purpose of this study is to provide a diagnostic analysis of marketing systems in the Kordofan Region and to identify interventions (structural, policy, investment) required to improve (1) farmer access to rural markets and (2) technical and economic efficiency of the agricultural marketing systems.

The study will be a major input for the design of the proposed Western Agricultural Production and Marketing Project.

Justification

Traditional rainfed agriculture in the project area has a comparative advantage in the production of several agricultural commodities and the potential to significantly increase production (groundnuts, sesame, sorghum, gum arabic and livestock) for both domestic and export markets.

In order to encourage farmers to innovate and increasingly produce a marketable surplus, the farming systems and producer incentives must be improved dramatically. Incentives can be communicated to farmers via more favorable price policies and improved commodity markets and input delivery systems. However, it is believed that the present marketing system does not encourage farmers to increase production for the market. Village markets are poorly developed and physically isolated from larger markets in the region and these are not adequately linked to the major markets (including export markets) or consuming centers where there is an effective demand for agricultural commodities. This is primarily due to inadequate

physical and economic infrastructure (roads, rural market centers, storage and processing facilities), and means of haulage (carts, trucks, rolling stock).

The structure, conduct and performance of agricultural marketing systems in the region need to be analyzed to identify and define appropriate policy reforms and investment needs in order to improve farmer access to markets and the overall efficiency of the marketing system. Transport constraints and constraints to private investment in the transport sector need to be better understood to identify cost-effective investments and transport policies which can improve the outreach and efficiency of the regional transportation network in both the short and longer term.

It should be noted that a separate study is being undertaken through the Agricultural Planning and Statistics Project (650--0047) to develop Supply and Demand Projections for the three major crops in the production area (peanuts, sesame and sorghum) for two time periods; the present and five years hence.

Demand projection will be sub-divided into domestic consumption (utilization) and export potential. Supply and demand projections will be based upon present price levels and import - parity prices. This information at least in preliminary form will be available to the consulting team.

Scope of Services

1. Study the structure, conduct and performance of key agricultural markets (examples to be provided), including the means to transfer commodities from village to terminal markets and ultimate consuming centers. Identify necessary policy changes and public and private investments necessary to (a) increase farmer access to rural markets and (b) increase intra- and inter-regional commodity trade and (c) increase private sector participation in agricultural marketing and processing.
2. Determine the relative importance and costs of alternative means of transport (road and rail) used for the marketing of agricultural commodities within and outside the region and identify technical and economic constraints inherent in the present transport system;
3. On the basis of transport and marketing constraints identified above, describe (and cost-out) cost effective investment priorities and policy reforms which could substantially improve the efficiency of the marketing systems in the project area in both short and longer-term (longer-term here to be within 10 years);

4. Investigate the potential for the processing of agricultural commodities within the project area and the potential role of promoting small to medium scale rural processing industries, including marketing needs and prospects for private sector ventures; and
5. Investigate the potential role of private sector participation in the development of an improved agricultural input delivery system in the project area.