



ANALYSIS OF WHEAT POLICIES TOWARDS SELF-SUFFICIENCY
IN SUDAN

A Research Paper presented by

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(Sudan)

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This document represents part of the author's study programme while at the Institute of Social Studies; the views stated therein are those of the author and not necessarily those of the Institute.

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Dedication

This work is dedicated to my beloved wife, Asma Elamin, to my parents, brothers and sisters, and to our sincere friend Alicia Herrera, whom we pray to recover very soon.

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Abdel Moneim Suliman Elhoweris
The Hague, November 1989.

List of abbreviations

ABS	: Agricultural Bank of Sudan
ARC	: Agricultural Research Centre
AUAC	: Advisory Unit for Agricultural Corporations
DSRC	: Development Studies and Research Centre
FRC	: Food Research Centre
HCWSS	: Higher Committee of Wheat Self-Sufficiency
IBRD	: International Bank for Reconstruction & Development
IFAD	: International Fund for Agricultural Development
L.S	: Sudanese Pound
MFEP	: Ministry of Finance and Economic Planning
MOANR	: Ministry of Agriculture and Natural Resources
MOCCS	: Ministry of Cooperation Commerce and Supply
MOI	: Ministry of Irrigation
NHAPC	: New Halfa Agricultural Production Corporation
OPEC	: Oil Producing & Exporting Countries
SPC	: Seed Propagation Department
WPP	: Wheat Procurement Price

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0.0 INTRODUCING CHAPTER

0.1 The Problem

Sudan is the largest state in Africa, with tremendous potential resources, millions of arable land, and only few is cultivated. The government dominates the irrigated sub-sector, as state schemes for the production of cash crops like cotton, groundnuts, castor and food crops like sorghum, wheat and vegetables.

Due to 1980's droughts and famines which striken most of the African countries, plus many reasons just like regional conflicts in the neighbouring countries and the civil war in the southern Sudan. Millions of displaced people and refugees moved to the urban areas, the result was an increasing demand for urban staple food (bread), and the gap between production and consumption was increased to its maximum by the second half of the eighties. "Luckily" during the beginning of the eighties, United States and the Western block granted Sudan wheat as aid and concessional imports to fill the gap between production and consumption. But after 1986, some differences between the previous government and the United States government emerged, consequently the latter reduced sharply the aid of wheat and wheat flour to Sudan, which results in severe shortage of wheat products.

The previous government reviewed a policy of wheat self-sufficiency, to reach the goal by the year 1991/92.

0.2 Objectives of the study

The objectives of this study is to analyse the main reasons for wheat insufficiency, and the increasing gap between production and consumption on one hand, and the policies towards self-sufficiency on the other. Adding to that, some questions to be answered are - should Sudan aim at self-sufficiency? And if yes, at what level and at what costs in terms of competition with other crops for the scarce irrigated land. Finally the study will analyse the production and consumption policies and the best solutions to narrow the gap between domestic production and consumption.

0.3 Research Methodology

The study will be on theoretical analysis relating to concept of food security, self-reliance and self-sufficiency. The application of the theory is based on secondary data relating to the subjects of food security and self sufficiency.

0.4 Research organization

Chapter I

This chapter will introduce the problem since it was known, covering the period before the independency of Sudan till now. Also the chapter will discuss the cereals production in the three main sub-sectors of the country - The Traditional, Mechanised rain-fed, and irrigated.

Chapter II

This is the theoretical chapter, which will discuss, analyse the concept of food-security and self-sufficiency. The chapter will answer the question of self-sufficiency in wheat, is it the options? In connection to the views of free market trade, food aid, and imports from the international market, and other view concerning the vertical and horizontal expansion, and the introduction of new varieties of sorghum to reduce land under

local sorghum for the benefit of wheat and other crops.

Chapter III

We shall discuss the main factors that hampered the attainment of the goal (wheat self-sufficiency), whether they are factors concerning the natural resources, agricultural utilization, technology and economic issues regarding the main pricing policies that affect the prices of wheat sorghum.

Chapter IV

The study in this chapter tries to introduce new notion, and suggests some courses of actions towards self-sufficiency. These include consumer policies and producer policies and marketing policies, which fall within the two policies mentioned.

Chapter V

Conclusion.

CHAPTER ONE

1.0 Introduction

The potential natural resources of Sudan would make the country "the Arab Bread Basket". This was the dream of all Sudanese of meaningfully harnessed tremendous potential resources could make it a reality.

The arable land is more than 200 million feddans (1), and the cultivated land is less than 15% of the total arable land. The irrigated land accounts for 25% of the cultivable land, 80% of the irrigated lands is under the control of the government as parastatals schemes and corporations. These schemes and corporations grow cash crops mainly for export. Cotton is the major crop and also include groundnuts (peanuts) and some food crops like sorghum (dura), wheat and vegetable plus fooder for animals. The main focus of these parastatals is growing cotton crop, because it is the main export crop of the agricultural sector of the country. Less emphasis is given to other crops, such as wheat and sorghum which are defined as tenants crops (2).

During the 1980's drought that strike most of the Sub-Saharan African countries, Sudan suffered severely from its impact. The devastation caused by the famine during 1984-85 was huge, in the middle of 1985 of the 20 million-inhabitants of Sudan, 50% were affected by famine as the UN agencies estimated. These include groups ranging from pastoralists and peasants to the urban poor and refugees. Of those about one million were driven from their homes, and about 150 persons were dying everyday of starvation (Abdel Ati:1988).

Table (1.1) shows the famine stricken population in the Northern Regions of Sudan.

Table (1.1) Famine Stricken Population by Regions, (1985)

Regions	Affected	Vulnerable
Kordofan	2,830,000	741,460
Dar fur	2,870,000	751,940
Northern	150,000	39,600
Eastern	1,200,000	314,000
Central	1,350,000	353,000
T O T A L	8,400,000	2,200,400

Source: H.A. Abdel Ati, Table 1 Development and Change
April (1988)

By the mid of 1985 the situation had improved slightly; the number of affected people dropped to 8.4 million of whom 2.2 million were classified as severely vulnerable (see Table [1.1]), and in 1986 the number of affected people dropped to 5.1 million. This excludes the whole southern part of Sudan (3), where about 20% of sudanese population lives, and nearly one million people were reportedly affected (UNESCO: 1986, 9:1. Ibid).

The displaced people who escaped from famine or the civil war, and the increased number of refugees who crossed the borders from the neighboring countries added a heavy burden on the urban areas, and this was particularly affected the big cities where it created a problem of increasing the consumption of the urban staples (wheat).

Wheat has become the main staple food for the urban population in the last two decades (this will be discussed in Chapter Two). The number of people affected by famine decreased because of the good rainy seasons that followed. But the urban food staple problem was exacerbated as a result of the increasing

number of urban inhabitants. The consumption of wheat exceeded the domestic production and rose sharply since the beginning of this decade (table 1.2 and Appendix III).

Table (1.2) Wheat Production and Consumption

Year	Production	Consumption	Deficit
1981/82	142 *	314 *	(172) *
1982/83	141	414	(273)
1983/84	169	417	(248)
1984/85	79	506	(427)
1985/86	199	730	(531)
1986/87	149	630	(481)

* Quantities in '000' metric tons

Source: Food Security with an Urban Bias (1989) Table 3, p.7.

The increasing gap between production and consumption resulted from lagged production. The gap was filled by concessional imports, aid, and sometimes commercial imports. The United States through its USAID programme - succeeded to freeze the situation for some time, but in 1986, USAID suspended its aid to the country. It used aid as a political weapon to force the previous government to meet some political demands. This exacerbated the crisis from that time till now 1988/89.

1.1 Brief Historical Background

Wheat cultivation known in Sudan, thousand years ago as a result of Egyptian Nubian Civilization. Since that time and till the Second World War, wheat cultivation was confined to the northern part of the country, where about 30 thousand feddans were cultivated with wheat, enough for local consumption plus surplus used in other parts of Sudan. The experimental results

of research till that time excluded the possibility of growing wheat South to Khartoum (Latitude 15°).

During that period Sudan found a lot of hindrances to import wheat for domestic consumption, in the years of bad harvest, and to fill the increasing gap which occurred as a result of world wheat trade disturbances during the Second World War. A trial was made in the year 1942/43 (4) to grow 12 thousand feddans in Gezira scheme, which succeeded to get a yield of 500 kg/FD. This experiment encouraged the officials to expand the area to 27 thousand feddans in the year 1946/47.

Unfortunately these trials were not continued to solve the country's wheat problem. This became not feasible because at that time wheat cultivation needed a lot of labour, especially for harvesting. When new agricultural techniques were not introduced in Sudan. This plus a decreasing yield per feddan was witnessed after the first successive year (1946/47). Finally, the wheat international trade returned to its normal situation, when the Gezira administration stopped wheat cultivation by the end of 1940's.

After the independence in 1956, and the introduction of crop diversification in the Gezira Scheme, the International Consulting Committee for Research in Sudan recommended cultivation of fifty thousand feddans in the years 1959/60 and 1960/61 (ARC, mimeo to HCWSS: 1988). When the yield reached 400 and 500 kgs/FD respectively. These results again encouraged the government to intensify wheat research programme, to expand the wheat production area in the future.

Wheat became a major crop in the crop rotation, of Gezira and New Halfa Schemes. Wheat, cotton, Fallow, groundnuts or dura in Gezira four-course rotation, while wheat, cotton, groundnuts or dura in New Halfa three course rotation [Fig (1.1)].

Fig (1.1) (a) Gezira Four-Course Rotation

(b) New Halfa Three-Course Rotation

(a) Four-Course Rotation

(b) Three-Course Rotation

W	C	F	GN/D
GN/D	W	C	F
F	GN/D	W	C
C	F	GN/D	W

W	C	GN/D
GN/D	W	C
C	GN/D	W

W = Wheat, C= Cotton, F=Fallow (uncultivated), GN = Groundnuts, D = Dura (sorghum)

After the programme of the rotation intensification in the mid-seventies was accomplished. The area under wheat reached more than 500 and 100 thousand feddans in Gezira and New Halfa respectively in the year 1975/76. Then after the area began to decrease sharply to reach 170 thousand feddans in Gezira in the year 1986/87, and 30 thousand feddans in New Halfa in the year 1985/86. This will be the lowest area cultivated land "since it was introduced in the beginning of the sixties", if we exclude the year 1984/85, when the area reached Zero feddan due to water shortages in both schemes (Appendix I). The decline of wheat area was a result of deterioration in the infrastructure, which reduced the minors and canals capacities.

Hence after the rehabilitation programme was implemented in Gezira and New Halfa Schemes, area under wheat began to increase to reach its maximum in the year 1988/89, when it reached 275 and 40 thousand feddans in Gezira and New Halfa respectively.

The White Nile Schemes Administration is also growing wheat, but the area under crop fluctuates annually. All the area of wheat is confined to the Northern part of the scheme area, that is north of Latitude 13°. The maximum area ever grown was 40

thousand feddans in the year 1988/89.

The Northern region is the most suitable place for wheat production in Sudan. The climate, the awareness of farmers are among the major factors favouring growing of wheat; but the major constraint is the competition with other crops, mainly legumes and spices. The net income of legumes or spices is higher than that of wheat. In addition the agricultural sector is dominated by private owners, who are profit seeking, for that the area allotted for wheat annually is almost fixed, to meet the local consumption needs. It was 32 thousand feddans out of 179 thousand feddans cultivated in the region for the year 1987/88 (5).

1.2 Cereals Production in Sudan

In this place we will try to focus on the cereal situation in Sudan during the last two decades, the areas, average yield, total production, in the three main sub-sectors in the country.

As we have noted in the beginning of this chapter, the arable land of the country is more than 200 million feddans, while the cultivated land is less than 15% of the arable land. This is divided into three main sub-sectors and each sector has its own characteristics, methods of production, its contribution to the national cereals situation and its constraints.

1.2.1 The "Traditional" Sub-sector

The traditional rain-fed areas amount to nearly 17 million feddans, that is some 61% of the cultivated land, and contributes significantly to the food supply and export of the country. They vary in character from remote but high potential land in the south, to semi-arid zone in the north. The main products of the sub-sector are sesame, groundnuts, gum arabic, millet and sorghum. It is a sector for subsistence production mainly, with some surplus for local markets and export. The traditional sub-sector's contribution to the national cereals production is 100%

of the millet and 40% of the sorghum (AOAD: 1986; see Appendix II).

1.2.2 The "Mechanised" rain-fed sub-sector

It is the second sub-sector in area after the traditional, its area amounts over five and half million feddans, accounts 23% of the cultivated area. It consists of large estates, licenced and unlicenced private farms (6). The licenced mechanised farms account for some 3.5 million feddans (61% of the land in the subsector). While the unlicenced farms cover more than 2 million feddans, destroying huge lands of wild life, forests of gum arabic and natural pastures.

The main crops of the sub-sector are sesame, sorghum, and recently it has begun to produce sunflower. It contributes about 48% of total production of sorghum, mainly for local or export market (Appendix II).

1.2.3 The irrigated sub-sector

It consists of over four million feddans, account 16% of the cultivated land, it is divided into:

a) Public owned schemes, covering about 3,800 thousand feddans, and accounting for 91% of the land of the subsector.

b) Large estates managed by co-operatives and/or companies, that is 244 thousand feddans, accounting for 6% of the land of the sub-sector.

c) Private schemes, about 126 thousand feddans, and make up about 3% of the sub-sector.

The main crops of the sub-sector are cotton, groundnuts, castor, beans, sorghum, and wheat. Its contribution to the national food production is about 14% of sorghum and 100% of wheat (Appendix II).

From (appendix II), one can see that in the three sub-

sectors, there is year-to-year fluctuation in area, average yield for all crops. These fluctuations were due to many factors such as environmental, socio-economic and political.

1.3 Analysis of cereals production

Analysis of the data on appendices II and III. For millet, the domestic production always cover the consumption, the country is self-sufficient in millet, no imports or exports were witnessed, even during years of low production or bumper crop. This is because millet is mainly grown in the traditional sub-sector for household consumption, with some available stock for local market and carry over to be used in the following year (Appendix III).

Sorghum production since the beginning of the seventies till the year 1986/87, covered the total domestic consumption, with a remarkable amount for export. A total amount exported reached more than 300 thousand tons, this grew to more than 900 thousand tons in 1980/81 and 1986/87 respectively (Appendix III). This was the dominant trend of sorghum production and consumption, except for the years of droughts and famines, when Sudan for the first time in its modern history experienced a domestic production that did not cover its own local consumption, which compelled the country to fill the gap through aid and concessional imports in the years 1982/83 and 1984/85. This was exceptional and happened twice during the last two decades. Nevertheless what we could say about sorghum, the total domestic production from the three sub-sectors "traditional - mechanised and irrigated" is sufficient for the domestic consumption of the whole population of Sudan with an increasing amounts for export.

Wheat total domestic production never covered the increasing total domestic consumption, during the last two decades. Hence the country became heavily dependent on imports, whether they are commercial or concessional and aid. The concessional imports accounted for higher percentage of the total imports (Appendix

III).

If we see the balance sheet of cereal production, we could note that the total domestic production enabled the country to be self-sufficient except for the years 1983/84 and 1984/85. After the drought and famine the situation improved and domestic production has led the country to be self-sufficient in cereal!

CHAPTER TWO

2.1 Theoretical framework

By the beginning of the seventies of this century, food security has become a clearly enunciated and central policy goal for most developing countries, although the problem of attaining food supply is as old as mankind. In 1974, the World Food Conference was convened under the auspices of the United Nations, where the issue of food security was the dominant theme of the conference.

Food security concept and its means of attainment has many interpretations, varies from emphasis on the role of national and international stockpile of grains, to a suggestion for each country to strive towards self-sufficiency in food production, while others still see the dismantling of barriers of food trade, which lead to improved food-market stability and efficiency (Chisholm; 1982: p.5).

To start with the issue, we must have a definition for the ultimate goal of food security, which could be summarized as the provisions of "an adequate supply of food for all people at all time" (Ibid; 1982: p.6). Or an ambitious concept for food security is adopted. "Food security may be defined as the ability of countries to meet target consumption level in the face of fluctuating production, prices and incomes" (Ibid; 1982: p.29). Or "food security is the ability of food deficit countries, or regions within those countries to meet targeted consumption level on year-to-year basis" (A. Valdes; 1981: p.1). Lastly, the term food security is defined as "access by all people at all times to enough food for an active healthy life" (World Bank, Poverty and Hunger, 1986).

Whatever the definition and its implications, governments and nations have to introduce new policies to attain the goals of food security, and to free the people from malnutrition and famines. Some countries reached the goals of food security by

attaining overall self-sufficiency, but this does not imply self-sufficiency for each of the individual commodity. Hence a principal focus should be on achieving balance between the amount and types of food required by expanding population and the availability of these food from both domestic production and imports, at calorie and nutritional level adequate to maintain the population of the specific country in good health.

In the case of Sudan, the country have an overall self-sufficiency in cereal, this is because sorghum as the main staple shows an average surplus available for export, while millet (manioc), cassava and yams which are the main staples for the traditional rain-fed producers in the western, central and southern parts of the country show also self-sufficiency. But for the wheat which recently has become the main staple for the urban and some rural population, there is a growing gap between production and consumption.

The strategic (7) nature of wheat and wheat flour could be explained by steeply raising consumption with stagnating domestic production, as a result of this the country has become heavily dependent on wheat imports. While the chronic lack of foreign currencies compelled Sudan to become dependent on food aids, that has gradually replaced commercial imports and domestic production. From all around the world Sudan has to accept wheat, many countries from the Western block doing this favour particularly the United States of America.

Hence wheat and wheat flour, which are one of the strategic commodities, consumed by a growing larger section of the population, and expected to increase annually by 12% (table 1.2), while the domestic production covering between 15% to 18% of the total consumption, mostly covered through aids and concessional imports from the West. But as long as the relations between Sudan and United States are warm, few people worried about the situation, whereby at least 60% of all wheat consumed, consisted of grants and concessional imports from U.S.A.

However after April (uprising) 1985, and the resumption of diplomatic relations between Sudan and Libya in the early 1986, plus other political different views between Sudan and U.S.A, like the civil war in the south and the implementation of Islamic rules in the country. U.S.A. sharply reduced its aid and till now (Elamin, G.M., The strategic importance of wheat and wheat flour cited from; Wel, Doornbos, Rijmakers; 1989: vol II, p.256). As a result of this, a severe short-fall in wheat and wheat flour supplies occurred, and the black market became dominant. The victims are vulnerable low income earners and urban poor. However, those are the most critically dependent on this commodity, having no access to other alternatives (Kisra) (8), which is relatively higher prices when compared to subsidised bread.

2.1.1 The increasing demand of wheat and wheat flour is the result of:

a) Increasing numbers of displaced people and refugees from drought, war areas, and neighbouring countries, to urban areas increasing the population of many towns of the country, the capital population were estimated in 1988 by seven millions (Elsharg Elawsat Newspaper; no. 3868, 1989). Because of the lack of rationing system to distribute wheat subsidised products, the scarcity and black market appeared.

b) Urban-rural migration. At the year of independence (1956), only 8.3% of the population lived in towns, the figure rose to 20.2% in 1983 census (just before the start of drought, famine, and war). When the percentage rose sharply during the years followed. This mainly is due to the lack of job opportunities in rural areas, and the concentration of most services, schools, universities, institutions, and military headquarters in towns.

c) Changes in consumers' preferences, Kisra was the most important sorghum food till the beginning of the seventies, where large segment of urban population shifted to wheat products (bread).

d) Incorporation of women in the economy. In the near past, majority of women were confined to domestic tasks, among them were making "kisra". Then during the last two decades, as a result of evolution or economical pressing reasons, many women found chances to join schools, universities, offices, factories etc, for education and/or work, as a result of that dependence on ready made wheat bread instead of home made kisra is almost total.

e) High costs of producing home made "kisra", prices of wood, charcoal and sorghum have increased sharply during last years, while bread prices were relatively low without sharp changes. Hence production or buying "kisra" became uneconomical to most of the population.

f) The wheat subsidy. This is one of the major affecting demand on wheat and wheat products encouraged a large segment of the population to shift from home unsubsidised "kisra" to bread.

The above mentioned factors are the generators of wheat and wheat flour increasing demand. During the last few years, the gap between production and consumption increased to reach more than half million tons in 1985/86 (table 1.2), with expectation to reach more than 900 thousand tons by the year 1992. As a result of this situation, the previous government's proposed recommendations on wheat policy towards self-sufficiency with the main text on "the present dependency on foreign wheat supply is undesirable, while it is possible to push domestic production to cover about 87% instead of the current 25% of the country's consumption need, within the coming four years (Wel, Doornbos, Raijmakers; 1989: vol.II, p.282).

2.2 Wheat self-sufficiency - Is it the option?

As mentioned, the definition of self-sufficiency by the World Bank is "food security, defined as access by all people at all time to enough food for an active, healthy life". The accessibility of people to food are maintained by two ways; enough income to buy food needed by the person and his family,

this factor falls in the area of distribution of income, and equal development etc, which are beyond the scope of this research. While the other factor is to secure the domestic consumption through either imports or domestic production. To maintain the domestic consumption through imports is possible to a country which has foreign currencies to sell the food from the world market. This is because dependency on aid or concessional imports is risky, and makes the country vulnerable to donors. Whereas increasing domestic production to countries with consistent climate and resources is better and recommended.

The Sudanese Consultation Bureau, came to a result - "Wheat production in Gezira scheme realise significant savings over imported wheat amounting L.S 76,208 and L.S 295 in 1982/83, 1985/86 and 1990/91 respectively. This is mainly due to the assumed increase in yield level and relatively low production costs on one hand, and the increase in projected economic prices of imported wheat per ton on the other" (Sudanese Consultation Bureau; 1982: p.40).

For New Halfa Scheme given the projection assumption underlying wheat imported prices and local costs of production, wheat realise a net dissaving, but wheat cultivation in New Halfa can be effectively competitive with imported wheat only, if one of two methods is adopted, concerning land and water charge and their increase (Ibid; 1982: p.40-41).

2.2.1 Reasons for self-sufficiency

1) To keep the country's economic and political decision independent, without pressure from any country and/or organisation.

2) To allocate funds that allotted to import wheat and wheat flour, to other important commodities that the country badly needed.

3) To conserve the environment, by reducing the consumption of wood and charcoal consumed by households. "According to

National Energy Administration (NEA), Khartoum 1980" wood and charcoal constitute about 78% of total Sudan's energy consumption and about 74% of this source of fuel were used for the household sector mainly for cooking" (Elsheikh El Magzoub; 1986) (9).

4) To improve the nutritional status of the urban poor and the population as a whole, by giving them access to reasonable price on commodities important to their diet.

2.2.2 Searching for the approval of wheat self-sufficiency policies

There are views favouring securing wheat supplies from the world market or from aid, by sales of exported cash crops, added on the land used for wheat production, plus leaving the market forces to work in prices determination. These views will be refuted.

2.2.2.1 Wheat imports from the international market

Because the gap between production and consumption of wheat and wheat flour is a reality, that no one could escape (table 1.2), yet the reasons for this widening year-to-year gap are still there. The only option to a country having small domestic production to meet the increasing consumption is to import wheat and wheat flour from the international market. But Sudan's available foreign currencies to import are very limited, putting wheat and wheat flour among the items badly needed. No one could guarantee that the limited available foreign currencies could be allocated to the imports of wheat, medicines, fuel, sugar, agricultural and industrial inputs and even military equipments. "The need to meet a spiralling demand for wheat and wheat products and an inability to produce sufficient wheat domestically, or to afford to purchase enough internationally, to satisfy that demand. This could over the next few years, become Sudan's internal economic and political problem number one" (B. Riley & C. Ward; 1988, p.8).

The experience of the past supported what we are saying. Crisis in bread, medicines, fuel, sugar, and shortages of inputs, are good examples of lack of and/or shortages of foreign currencies. So, the government or "any government" will not take the jeopardy to add more burden on the back of the deficit budget.

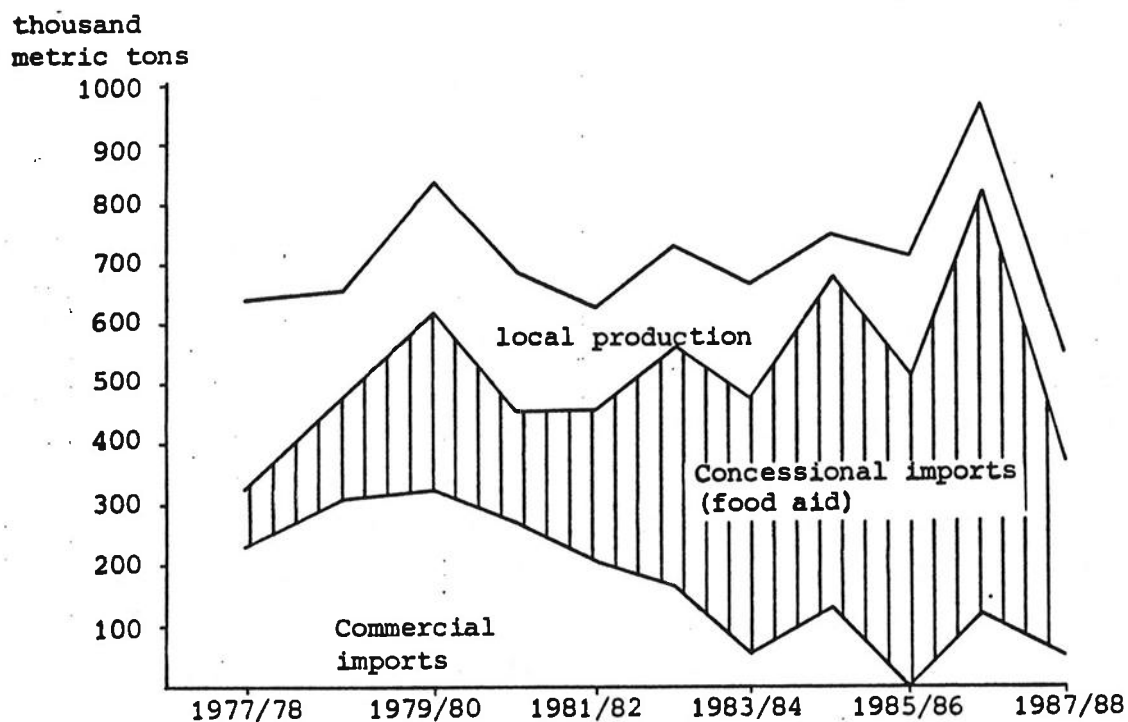
Lastly if we accept the idea of importing wheat by the returned money from exporting more cotton grown on the lands of wheat, also no one guarantee that, because even the government irrigated schemes which grow the cash crops for export, suffers a lot from inavailability of foreign currencies for maintenance, replacement, and input supply.

2.2.2.2 Dependence on food aid

"Luckily" this is what was practiced in Sudan during the last years. Sudan imported most of its wheat and wheat flour needed, through grants and concessional imports from the western block, particularly the United States, to reach in recent years more than 60% of all wheat consumed.

However high dependency on aids, has negative impacts on food security situation, because the volume of wheat and wheat flour donated by international organisations and western countries is highly linked to the government of Sudan policies, and the strength of relations with the western block, especially the United States. "In fact during the last decade wheat and wheat flour have been used as a weapon by the western block to force the governments of third world countries to implement certain policies (G. Elamin, The strategic importance of wheat, cited from Wel, and others, vol.II, p.265-266).

Fig 2.1 Total available wheat from 1977/78 - 1987/88



SOURCE: Food security with an urban bias (Fig 5)

The history of the near past told us stories about how wheat and wheat flour have been used as a weapon against the previous elected government, to impose what the western block wants concerning the civil war in the south and the implementation of Islamic Rules. "In individual cases, donors have used food aid to wring political concessions from recipients, it seems to us that only policy implication that we can draw from these incontrovertible facts is that national food policies relying on food aid supply are highly risky (A. Valdes; 1981). However if we accept the argument of a recipient that will accept all the conditions of the donors, no one could guarantee the continuity of aid programmes, even the donors, for instance the United States - " Sudan have to be able to meet wheat requirements through commercial imports, and in the process becoming a viable market for wheat exporting countries, and at the same time its vulnerability to donors' actions, which will sooner or later reduces the amount of free or concessional wheat products being provided to Sudan" (B. Riley & C. Ward; 1988, p.40).

2.2.2.3 Dismantling of barriers to food trade

The free market of wheat and wheat flour will reduce the acute increase of wheat demand, witnessed in the last years, will give producers incentives to grow the wheat if they profited from its production. However the free market will eliminate the poor wheat consumers. The intervention of the government on the wheat and wheat flour markets is a result to many political, social and economical factors. The subsidy programme which the government of Sudan has been administering for several years have indeed had a positive impacts on the nutritional status of hundreds of thousands, perhaps million of Sudanese. The reality that the bread subsidy cannot be totally eliminated within a short time period without confronting the population and/or avoiding development of serious political unrest among them, who saw their overall purchasing power declined dramatically since the beginning of the 1980's is an illusion. The near past tales told us about how the people have overthrown the Nimari regime in 1985, when he announced a sharp increase in bread prices and other strategic commodities.

2.2.3 Two ways of increasing domestic production

Other debates arguing on the increase of domestic production by introducing new policies and amendments of old ones, and maintaining infrastructure and bufferstock. We would concentrate on:

2.2.3.1 Vertical expansion

To increase production vertically, is by adding output to the unit of land (feddan). Increasing the yield per feddan could be achieved through application of technology and modern inputs, to increase the yield to its maximum. How Sudan could attain self-sufficiency by increasing output of wheat vertically, some policies and policy instruments and their implication are suggested in chapter four.

2.2.3.2 Horizontal expansion

What is meant by horizontal expansion, is to increase the land for wheat production within the climatical suited areas for its production.

The available land for wheat production in the main schemes of Sudan about 685 by 1991/92 (table 2.1)

table 2.1 Available land for wheat production by 1991/92

Scheme	available land (000) feddans
Gezira	500
New Halfa	40
White Nile	80
Northern Region	65
Total	685

Source: Wheat self-sufficiency committee draft report March 1989

In addition to table 2.1 area the Rahad scheme could add more 40 thousand feddans to wheat area in the northern parts of the scheme. While the land in the northern region does not increase very much because of the competition with other crops like legumes and spices.

The possibilities of horizontal extension in the country is enormous. More than 240 thousand feddans in the northern region, and more than 80 thousand feddans in Sag Elnaam and Japal Marra areas. But it is not this chapter's intention to deal with the feasibility of constructing new scheme to achieve horizontal expansion. We will deal mainly with the maintenance and rehabilitaion of already existing government schemes.

2.3 The hypothesis

To start with the issue this chapter hypothetically assumes "Land within the government irrigated schemes is not scarce, and the wheat is not competing with other crops for water, input...etc"

To approve what we are saying, some examples could clarify the picture. In the Gezira scheme the phase area (10) of cotton crop is 600 thousand feddans and the same area for wheat, while the area of sorghum and groundnuts is 300 thousand feddans each, plus 600 thousand feddans left fallow within the existing crop rotation (fig 1.1) and table (2.2).

Table (2.2) Proportional allocation of Gezira and New Halfa acreage

Crop	Scheme	GEZIRA (000 FDS)	N. HALFA (000 FDS)
cotton		600	113
groundnuts		300	113
sorghum		300	113
wheat		600	45

Source: W. Magar, Farm in the Gezira, from A. Zahalan. table 6.1

The decline of land for cotton in the irrigation sub-sector, mainly Gezira and New Halfa below the phase area, is not a result of the increase of land grown by wheat in a specific year. It is due to the overall decline of the schemes' land available for cultivation, which spontaneously came as a result of canals siltation, blocking, and lack of maintenance [Fig (4.1)], plus other factors like shortages of inputs etc. The area added to sorghum was increasing since the year 1973/74 to exceed its phase area (300 thousand feddans) table (2.2), without any consideration to other crops, even cotton the main cash crop.

This was so especially after the years of famine and drought when the land of sorghum increased to about 578 and 140 thousand feddans in the year 1985/86 in Gezira and New Halfa Schemes respectively (table 4.1 & fig. 4.1).

What we have said about sorghum and the land added to its production, is not applicable to wheat, because the land available for wheat decreased dramatically in Gezira and New Halfa to reach zero feddan in 1984/85 (table 3.1). What we have noted here has no significant link between wheat area and the increase or decrease of land for cotton in a specific year, because wheat did not reach its phase area since the schemes were established, and did not return to the large areas of the seventies.

It is virtually clear that the reduction of the cultivated land in the government schemes for all crops is not merely the result of the competition between those crops, but in addition, the problems of siltation, canals blocking, availability of machineries, and input. Plus the increase of sorghum area above its phase area, to affect all other growing crops, among them cotton the "cash crop". But expected IBRD rehabilitation programme for Gezira Scheme and other schemes, for the next five to ten years will solve the problem of water availability, and the debate of competition between crops for scarce water will be out of question. What is needed to be done is to bring the whole concept of rehabilitation to the centre of the development stage, and keep it there for the next several years" (B. Riley & C. Ward; 1988: p.31).

CHAPTER THREE

3.1 Factors which hampered wheat self-sufficiency

After the encouraging trials during the sixties to grow wheat in Gezira and New Halfa schemes, agricultural research on wheat was intensified to cover all the technical sides. The purpose was to expand production in both schemes and other schemes with similar climate, within the existing crop rotations (fig 1.1).

Viewing the great importance of wheat, a policy was declared in 1972. It emphasised wheat self-sufficiency by the year 1967/77. During the mid-seventies and after the completion of the crop rotation intensification programme in Gezira and other schemes, wheat area in the country reached 710 thousand feddans in 1975/76 (table 3.1).

From table (3.1) it is clear that in the period before 1980s, much progress was made in wheat area expansion, while practically nothing was achieved in improving productivity per feddan. The period of 1980s witnessed decline in both area cultivated and yield harvested, despite research findings which indicated the possibilities of much higher yields. The national acreage yield of about 0.5 ton per feddan is rather low compared to yields of about 1.5 and 2.0 tons per feddan obtained in Gezira (Gezira Scheme) and Hudieba (Northern Region) Research Station.

The insufficient production of wheat badly needed to meet increasing consumption is due to many problems that hampered the attainment of the goal of self-sufficiency.

Table (3.1) Wheat Area, A Yield, in main areas of Sudan
1975/76 - 1987/88

scheme year	Gezira		New Halfa		Northern Region*	
	Area(1)	A.Yield(2)	Area	A.Yield	Area	A. Yield
1975/76	568	388	114	280	28	714
76/77	505	294	78	260	30	733
77/78	466	471	72	320	35	543
78/79	494	251	36	190	30	467
79/80	363	476	39	330	30	600
80/81	367	230	52	290	32	633
81/82	268	420	42	460	31	656
82/83	156	602	48	521	31	652
83/84	266	417	42	595	34	853
84/85	- **	-	-	-	50	680
85/86	240	500	30	600	60	767
86/87	170	529	34	441	48	800
87/88	245	500	35	500	45	800

Source: Advisory Unit for Agricultural Corporations (AUAC)

* Northern Region includes private and public owned land

** In 1984/85 "Drought & Famine Year" no land grown by wheat in government schemes because of water shortages.

(1) Area in "000" feddans.

(2) Average yield kg/FD.

3.1.1 Impediments concerning the natural resources

3.1.1.1 Climate

Divergence of climate results in differences within the country zones. Wheat is confined to areas north to latitude 13° , where the ARC recommended growing wheat north to that latitude. However much lower yields in areas defined as wheat zones could be explained by the problems of late sowing, because here the period needed for crop successive growth is reduced, which results in low yields as compared to a crop grown on time. This factor is critical in the southern parts of the wheat area, with

less effects on the northern parts.

3.1.1.2 Water availability

Growing crops in the irrigated sub-sector, mainly wheat depends totally on water coming from the south. Areas under all crops is highly connected to the amount of rain there, and the stored water behind the main dams (11). Also the amount of water received by all crops is determined (in addition to the reason before) by canals and minors capacities which has been reduced during the last years as a result of siltation and grass blocking. Although those factors have their impacts on other crops, but they affect the wheat directly, which is totally depended on stored water.

3.1.2 Impediments in patterns of agricultural utilization

The low yield phenomenon of wheat and other crops in the irrigation sub-sector is highly linked to the implementaion of agricultural operations which are summarized below.

a) Delay of land preparation and weeding and in appropriate technology operations from the recommended dates and ways suggested by the ARC.

b) Low percentage of certified seeds use, inavailability of funds, the shortcomings of seed propagation department and lack of extension work, are among the main factors.

c) Shortages of agricultural machinery, results in bad manual seeds broadcasting and low percentage of germination. This automatically increases the seed rate .

d) High costs of chemical for weed control, deters modern control, resulting in increase of weed infestation, and the rate of yield decline.

3.1.3 Impediments in human resources

Besides labour shortages affecting cotton picking and other agricultural operations to all crops, which have its impacts on

wheat crop performance. The problem of shortages in technical cadres in research, extension, and field areas. Migration of technical capable people to Arab countries and the west is the major reason for that, affecting research findings transmission and the feedback from the growers.

3.1.4 Impediments concerning agricultural technology

3.1.4.1 Fertilizer and application

Usage of chemical fertilizer for food crops is normally low as compared to cash crops in under-developed countries. There are many reasons affecting use of fertilizer to food crops especially wheat:

- a) High prices of fertilizer mainly for the private owners.
- b) High costs of transportation between the port and the production areas, due to large distances and rough roads.
- c) The awareness of tenants and farmers to modern technology is low.
- d) Low technical information about the time the dose, and the type of fertilizer used.

3.1.4.2 Agricultural mechanisation

Wheat is one of the crops that needs mechanisation from land preparation to harvesting. But the shortages of tractors, spare parts, agricultural equipments and harvestors reduces the efficiency of agricultural operations and decline the yield. High cost of machinery and equipments are the major factor affecting their feasible use, plus other factors aggravating the problems:

- a) Shortage in spare parts and maintenance.
- b) Increasing machinery varieties, which increase problems of maintenance.
- c) Fragmented small tenances in the Northern Region, reduces the efficiency of machinery operations.
- d) Shortage in technical cadres necessary for operating and maintaining those machines.

3.1.4.3 Seeds

The weakness of the Seed Propagation Department, which is the result of fund shortages, and low extension awareness among wheat growers, resulted in low percentage of certified seed usage.

3.1.5 Impediments in the economic area

3.1.5.1 Infrastructure

Despite the availability of some railways routes, and paved roads, crossing most of the production areas. But their bad condition, continuous deterioration, reduces their efficiency and finally increase cost of production mainly inputs and increases losses of crops in transportation.

3.1.5.2 Tenancies and tenancy size

In all government schemes, tenancies and tenancy sizes were known within the existing crop rotation, the area for each crop varies from 5 feddans in Gezira, New Halfa for instance, to 11 feddans in Rahad. No problems could be mentioned here except complaints of highland with less water, or lowlands with much water. Differently the problem in the Northern Region and White Nile pumps schemes, land is fragmented to small sizes, affecting the introduction of modern technology.

3.1.5.3 Agricultural extension and training

The available small number of trained extension cadres, and shortages in methods of communications and training, are the results of funds inavailability, which leads to the extension shortcomings.

3.1.5.4 Saving and agricultural finance

In the government schemes, wheat growers do not expect loans for their crops, because schemes' administration identify wheat as tenant crop, giving the wheat growers the surplus of inputs after satisfying the cotton crop. As a result tenants fall in the grasp of speculators, who give them loans in advance to get part of their harvest (Sheil System) (12). Private farmers also suffer from the short role played by (ABS). Insufficient funds to all of them leads the majority to the same route of the tenants.

3.1.5.5 Agricultural marketing and prices

State intervention in crop pricing policies, and price announcement, affects directly areas under each crop in the coming years. Concerning announcement, there is a committee annually formed to declare wheat and sorghum prices. It was witnessed that price announcements never come in time, and tenants and farmers don't have its early announcement advantage.

Sorghum and wheat crops have two types of price determination, which affects the demand and supply for both of them.

a) Sorghum Floor Price

The state announces annually before crop harvesting a price for sorghum, covering the costs of production plus a margin as a profit to encourage small sorghum growers to continue its production in the future. This is mainly to avoid the collapse of prices in the pumber crops years. Those who benefitted from this policy are rich farmers and merchants who have access to the ABS branches anywhere in the country. Selling their crop to ABS with relatively good prices, discouraging them. "Although they are the target group of the bank", taking the amount of money allocated by the state for sorghum purchase in a specific year, and at last they store the crop to the years of bad harvest to increase their profits. The result is increasing prices of

sorghum and sorghum products (Kisra), compelling consumers to shift to wheat subsidised products.

b) Wheat Ceiling Prices

On the other hand the state announces annually a price for wheat at the beginning of the season, before wheat planting (normally delayed), called ceiling price. This price covers the costs of production plus a margin as a profit. But normally the demand is more than the supply, then prices tend to increase in the free market, where tenants always prefer to sell their crop to, rather than submitting it to scheme administrations. The rationale of this policy is to reduce the margin between producers and consumers' prices, implementing a subsidy to both groups. But the state is always trying to reduce the subsidy through price intervention favouring consumers and discouraging producers.

c) Consumer Subsidy

In addition to those policies mentioned before, affecting wheat productivity and production which we could call them production policies. There is a factor affecting wheat consumption and automatically narrowing or widening the gap between production and consumption. That is consumers' subsidy which is one of the major policies affecting the amount consumed. It is a state intervention to reduce wheat and wheat flour prices to vulnerable poor people, without altering prices paid to producers.

An argument which the author realises which is now under discussion - who are the real beneficiaries of this policy, and are these prices merely consumers' policies not altering producers' prices. The answer for both is, whoever benefitted from this policy are other who are not in real need for it; the second answer is consumer subsidy strongly affects producers' prices.

CHAPTER FOUR

4.0 Policies towards self-sufficiency

4.1 Introduction

"Although we acknowledge the importance of climate in ultimately setting a ceiling in crop yields, we also contend that climate alone is not the primary factor which causes very low wheat productivity in the Sudan. Many other factors either singly or in interaction, can influence wheat grain production and productivity, even before climate sets its reign" (Global 2000; 1988: mimeo).

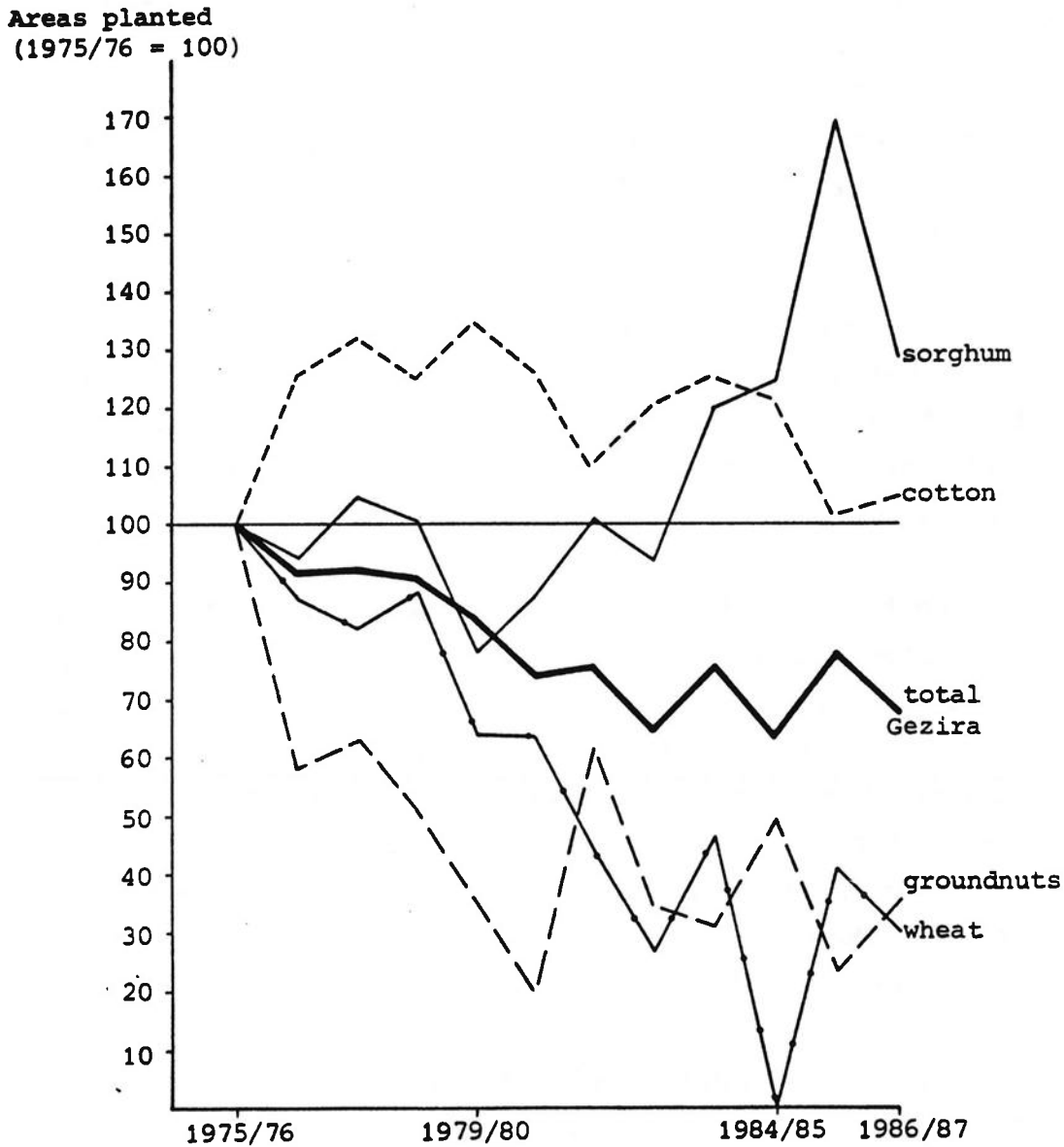
Natural resources, technology and the availability of inputs are the major determinants of a country's ability to raise its food production from an existing level to one higher up. However resources will not be adopted by producers in the absence of appropriate incentives and suitable economic environment.

By examining the impediments affecting wheat production and other crops in Sudan, we will conclude to: Virtually all policy reform programmes focus on the need to increase food and agricultural production, should focus on ways to create greater incentives to domestic agricultural production. Departing from this point we refer to the opinion of Sudanese Consultation Bureau; wheat have a comparative to be grown in Gezira scheme, with conditions for New Halfa scheme, and other schemes north to latitude 13° in the irrigated sub-sector.

Concerning the government owned schemes, all of the schemes and corporations are deteriorating in infrastructure, machinery equipments, vehicles, spare parts etc badly need maintenance, replacements and rehabilitation. This deterioration comes as a result of accumulated problems of siltation and canals blocking, and lack of capitals to purchase spare parts, affecting seriously the areas for all crops, reducing the phase area for most crops dramatically, specially the wheat. As a result of these factors,

areas under most crops were fluctuated at a decline rate, especially the wheat (fig. 4.1 & table 4.1).

Fig (4.1) Gezira Scheme: Index numbers of areas planted (1975/76 = 100)



Source: Food security with an urban bias, Vol. I, Fig (7)

Table (4.1) Gezira and New Halfa crops areas 1981/82-87/88

scheme years	Gezira (Area '000' FDs)			New Halfa (Area '000' FDs)		
	cotton	sorghum	wheat	cotton	sorghum	wheat
1981/82	435	344	268	58	51	42
82/83	484	321	156	80	48	48
83/84	498	410	266	84	57	40
84/85	465	420	-	75	60	-
85/86	410	578	243	68	140	30
86/87	415	443	180	73	70	34
87/88	NA	NA	252	NA	NA	35

Source: Advisory Unit for Agricultural Corporation (AUAC) reports

Luckily in the past few years, many programmes were implemented to rehabilitate the government scheme, mainly financed by IBRD, and other donors like Kuwait Fund, IFAD, OPEC, etc. Although the results of these programmes were tangible, the ultimate success expected was not fulfilled, as a result of many factors, including the dominance of canal siltation problems. More or less these programmes had their impacts on stopping the continuous decrease of land to all crops (fig. 4.1), and relative high yields compared to the period before (fig. 4.3).

Also IBRD is intending to start a rehabilitation programme for the irrigation system of Gezira Scheme and others during the coming two years for periods varying between five and ten years. By solving the problems of canal blocking and siltation, the potential land for each crop within the existing crop rotation will increase remarkably, where the land for each crop reaches the phase area (table 2.2). In Gezira and New Halfa schemes areas available for wheat production will reach 500 and 40 thousand feddans respectively. The area added from the White Nile Pump Scheme will increase to 80 thousand feddans, "if the

problem of canal ditching, and pumps maintenance or replacements is solved". While the Northern Region private and government land can add 65 thousand feddans. As a result of these improvements in the infrastructure means, the land available for wheat production will reach 685 thousand feddans (HCWSS; 1989: final report). Which will increase remarkably the production, if other policies are introduced to increase the productivity, which we will deal with later in this chapter.

4.2 The sorghum notion

Here we will suggest a notion to expand the area under cotton, groundnuts, wheat, and to decrease the area under sorghum, which exceeded the phase area a long time ago (fig. 1.1 & table 2.2). Last year witnessed an area increase under sorghum crop to reach more than 500 thousand feddans in Gezira and more than 100 thousand feddans in New Halfa. The total maximum area in the two schemes reached 718 thousand feddans in the year 1985/86 (table 4.1).

What had happened during the years of drought and famine was justified. Then after by the help of schemes administrations, through pressure from political power and Farmers Trade Union, or indifference, areas of sorghum began to roll around 450 thousand and 100 thousand feddans in both schemes despite the disappearance of reasons of that increase. Also the sorghum yields in the irrigation sub-sector is higher from that of the rain-fed sub-sector, by less than 50%, which is not significant despite the added inputs for its production, like water, pesticides etc.

It is simple and possible to reduce the land for sorghum production to go back to its phase area in Gezira and New Halfa and other schemes, to increase the land for other crops were affected seriously, by the sorghum area expansion. But as we mentioned before schemes administrations were under pressures from Farmers Trade Unions, or political powers, to ignore debates

concerning the subject, and to continue expansion of sorghum areas, and to maintain tenants' own staple food which they grow alone. Also schemes administrations identify sorghum as the tenant crop, without any obligations towards it, except water if needed. But for cotton mainly, groundnuts and wheat, the country will benefit from adding hard currencies from exporting cash crops (cotton, groundnuts) and filling the expanding gap between production and consumption of wheat.

To bring the notion to reality, we suggest to grow all of the phase area of sorghum in all government owned schemes, by a high yielding variety of sorghum (HYV), like (Hagien 1) which has shorter life span, less water needs, and yields three times the local varieties. The rationale for this notion - the tenants will have high production from the new variety for their household consumption and/or for market, if they prefer local varieties "which is most probable". The schemes administrations or the ABS should buy or substitute their product to local varieties. Then they can transport (Hagien 1) product to the flour mills to use it for blending with wheat flour to bread making, as we will discuss later. Also the tenants have the advantage of the crop stalks for animal fodder, and building their huts or cooking as it was pursued when they were growing local sorghum varieties.

By achieving the rehabilitation programmes objectives, the government schemes will be able to expand areas for all crops to reach their phase areas. Concerning the vertical expansion or to increase yield per feddan, the state have to introduce, review, and organise food policies, so as to give incentives to wheat growers to strive towards increasing domestic production. Policies concerned are for supply and demand sides, which we could call production and consumption policies. Finally although we will discuss and/or analyse those policies, but more focus will be towards production policies in government owned schemes.

4.3 Suggested courses of actions towards wheat self-sufficiency

Government policies play a very definite role by providing incentives or disincentives to crop yields and production, however the influencing angle of those policies is planning. Planning activities should be made in a framework which allow for a reasonable time to the implementation by defining the areas to be sown, and inputs requirements, plus incentives to growers. Hastily made planning, causes plans to be ill-implemented and in most cases fire back to the original intention. Planning wheat area for each year, should be by amounting seed and other inputs required, water availability, to be secured as early as the spring of that year, or earlier the better, so as to cater for essential inputs needed.

Initially, the chapter suggests some courses of action toward self-sufficiency to increase domestic production and managing consumption. By achieving these policies whether they are producer policies to increase yield vertically or horizontally (13), and other policies such as marketing policies. Area under wheat will increase and also yields, as a result of these policies the total domestic production will increase. Table (4.2) shows areas, yields and total production estimations for the coming three years.

Table (4.2) Sudan estimated areas*, average yield**, total production*** 1989/90 to 1991/92

year scheme	1989/90			1990/91			1991/92		
	area	ave.y	t.pro	area	ave.y	t.pro	area	ave.y	t.pro
Gezira	400	800	320	450	1000	450	500	1200	600
New Halfa	40	700	28	40	800	32	40	1000	40
White Nile	75	800	60	80	900	72	80	1000	80
N. Region	50	1000	50	60	1200	72	65	1400	91
SUDAN	565	825	458	630	975	626	685	1150	811

* Area in '000' feddans

** Average yield Kg/FD

*** Total production in '000' tons

Source: First draft, National Committee of Wheat Self-sufficiency, table 2, March 1989.

4.3.1 Consumers' policies (demand side)

Demand on wheat witnessed a critical increase during the last few years, as a result of many factors mentioned before. One of them is the crucial consumers' policies. The Ministry of Commerce Cooperation and Supply, and Food Research Centre Studies, noticed the per capita consumption of flour is 150-200 Kg, while the Institute of Industrial Consultation and Research estimated 180 Kg for urban people and 108 Kg for rural people (Moanr; 1988: Planning Administration).

Based on that planning Administration of MOANR estimated the demand on wheat for the coming years in table (4.3).

Table (4.3) Estimated wheat and wheat flour demand for 1989/90 to 1991/92

	1989/90	1990/91	1991/92
Wheat in tons	660	750	825 *
Wheat flour in tons	250	275	300 *

* Quantities in '000' tons.

Source: Planning Administration (MOANR) report. Dec, 1988.

Pricing policies are to increase wheat production by incentivating producers or restricting consumers or consumption (management of demand). Hitherto state policies were not enough and strong to fulfil the goals, but in reverse they increased imports through aids and concessional imports, left the country vulnerable to donors. While it suppose to eradicate production

hinderances and consumption attractiveness.

Nevertheless, most of the marketing and procurement policies were concerned mainly by the consumption policies, where the national treasury suffers the burden of subsidy, which changes annually in connection with the exchange rate, international prices, costs of production, average yield and the total production. The state subsidise wheat into two ways, producers subsidies and consumer subsideis. For consumers the national treasury pays the difference between the annual announced and the mills prices. Wheat consumer subsidy was L.S. 100 million in 1986/87, expected to increase to L.S. 896 million in 1991/92 (Ibid; 1988).

Table (4.4) Wheat consumption and production 1989/90 to 1991/92

	1989/90	1990/91	1991/92
Consumption	980	1030	1080 *
Production	458	626	811
Deficit	522	404	269

* Quantities in '000' tons

Source: First draft, Higher Committee of Wheat Self-sufficiency; March 1989.

Management of demand is the most crucial policy to reduce expanding consumption of wheat and wheat flour. Suggested solutions could help in attaining the goal of self-sufficiency in a rather short period, releasing the country from the international power traps, securing the demand of wheat through achievements of supply policies and demand policies. Suggested consumers' policies are as followed.

4.3.1.1 Gradual decrease of wheat subsidy

By decreasing the consumer wheat subsidy, which is the

difference between procurement price announced by the government annually, and the price of mills. Gradual increase of mills prices will reduce the gap between the producer price which was L.S 1181 in 1988/89 and the mills price by 20 to 25% with the minimum reduction in the subsidy from consumers in an optimum period.

4.3.1.2 Bread price differentiations

An alternative to the above suggestion is to subsidize bread prices to targeted group in urban and rural areas, although the total quantities of wheat flour needed by this group is not clear in the absence of guidelines, we tentatively assume 35-40% of the total flour consumed. The special bread for those poor should be made from composite flour, distributed to named bakeries located in areas of those targeted groups for this purpose.

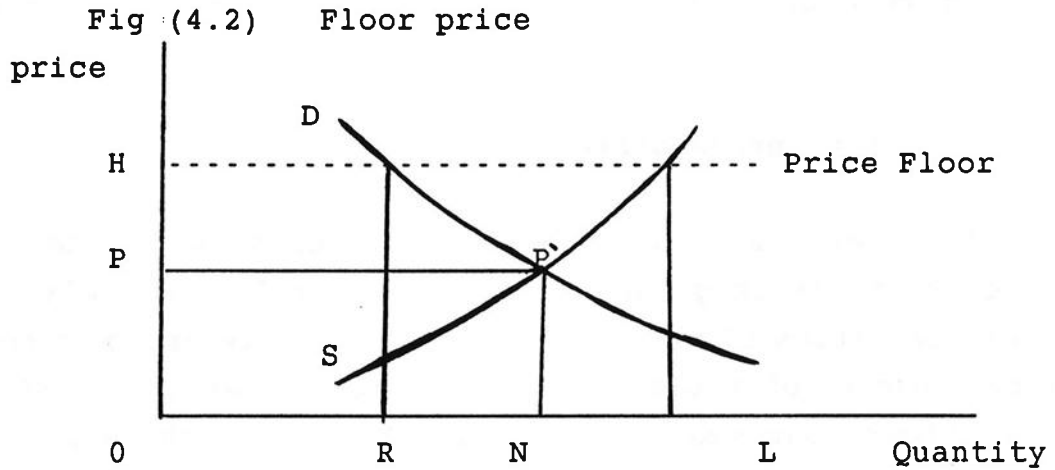
Those two mentioned suggestions are not easy to implement. For the first suggestion it is impossible to decrease bread subsidy, without the introduction of new policies to increase the real income of poor people as a concern, by increasing the per capita annual income. As for the second suggestion, the state have to install new bakeries in the poor people areas, and to establish an administration for bread distribution to people who are in need.

Away from the impracticality of the two suggested solutions, "at least in the mean time", we still believe in some policies which can work in satisfaction with producers policies.

4.3.1.3 sorghum pricing policies

Sorghum is the competitor and substitutor of wheat, the sorghum floor price announced by the state annually have its impact on wheat ceiling price of that year. Although the main objectives of those state intervention in the prices of both are to give incentives to the crop growers the sorghum floor price

always cover the cost of production plus a margin as a profit to incentive producers to continue its production in the coming years.



Source: G.M. Meier, Pricing policy for development management, fig. (1.21).

(OP) and (ON) are equilibrium price and quantity, (OH) represent the government imposed price, as a result the quantity supplied (OL) will exceed the quantity demanded (OR), resulting in a surplus of the amount RL, where the state buy the surplus usually through ABS, storing it to the coming years.

While the wheat ceiling price brings in a shortage between the quantity demanded and supplied, which tend to make prices increase as we will see later.

The price of sorghum product (Kisra) is always high, because the state does not intervene to establish consumer price for sorghum. Hence consumers shifts to wheat products which have controlled prices, here we will point at the strong distinction between the both pricing policies. Because sorghum producers have no hindrances on price increase, in contrast they have protection from price fall in years of bumper crops. While wheat producers are not allowed to increase price more than the ceiling announced price, reducing quantity supplied making the shortage.

There must be one of two solutions to avoid this problem, by freeing the market of both wheat and sorghum, or to secure an annual amount of sorghum to be purchased by ABS, or other government agencies, especially in the bumper crops yearst, to be sold to vulnerable people in other years.

4.3.1.4 Composite flour policy

Composite flour is the combination of wheat and non wheat flour used in bakery products. In the case of Sudan it is sorghum whether it is domestic or high yielding variety (HYV), and millet which have been successfully applied to composite flour bread production.

The Food Research Centre (FRC), started its research in 1969 to develop composite flour bread using sorghum and millet, it is not the Sudan's experience alone, similar studies have been established in Senegal, Niger, Nigeria, Ethiopia and other African countries. As a result of the successful experiments the USAID was convinced to support the commercial trials of composite flour bread in the capital (Khartoum). The pilot plants are still working successfully. The technology experimently improved sorghum and millet flour about 10 to 30% can be mixed with wheat flour to produce good bread compared to 100% wheat bread. Using hybrid sorghum (Hagien 1) at 40% can produce a good bread. The addition of 10% sorghum flour to any type of wheat flour at any extraction rate will produce excellent bread, using 20-40% depends on the quantity of wheat flour extraction rate and sorghum or millet quantity (FRC; 1988: mimeo).

By adding sorghum lines to the existing wheat flour mills with variable capacities using the same bakeries whether they are traditional or modern, without any changes or modifications, composite flour bread could be produced successfully. Table (4.5) shows the amount of sorghum for blending at 30% extracting rate reduces the amount of wheat needed to more than 240 thousand

tons by 1991/92.

Table (4.5) Percentage of self-sufficiency
during 1989/90-1991/92

ITEM	1989/90	1990/91	1991/92
1) Consumption	980	1030	1080
2) Production	458	626	811
3) Sorghum for blending 30%	137	188	243
4) Total 2) + 3)	595	814	1054
5) Deficit	385	216	26
6) % of Self-sufficiency	61%	79%	98%

Source: First draft, Higher Committee of Wheat Self-sufficiency,
March 1989.

4.3.1.5 Encouraging home made (Kisra)

By establishing smaller factories using gas or electrical energy to reduce the costs of other energy like charcoal or wood (Kisra), could be a substitute of bread, if it is secured in relatively low prices.

4.3.2 Producer policies (supply side)

Most of the increase in the cereals output in Sudan, either in rain-fed, traditional or mechanised and irrigation sub-sectors, has come mainly from area expansion, only a little came from yield increase. Data on the area in the major food crops, confirms the belief that the area of all crops has increased since the mid of the seventies, while the yield was stagnated or even declined (figs. 4.3, 4.4 and 4.5).

Fig (4.3) Wheat & sorghum area in the irrigated sub-sector
1975/76 - 1987/88

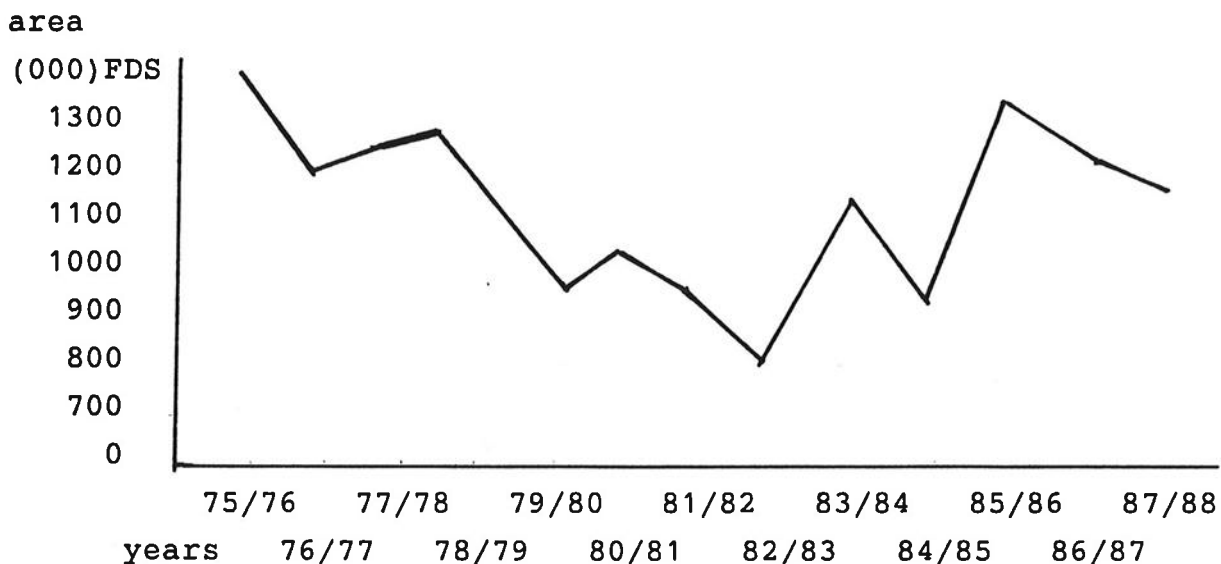
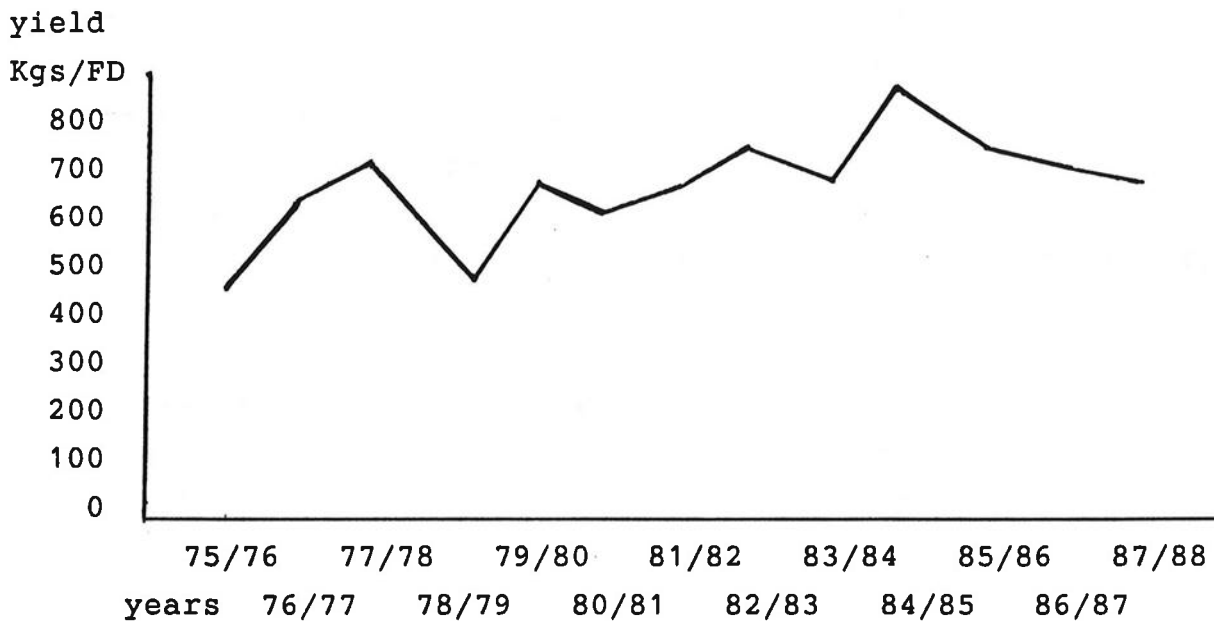
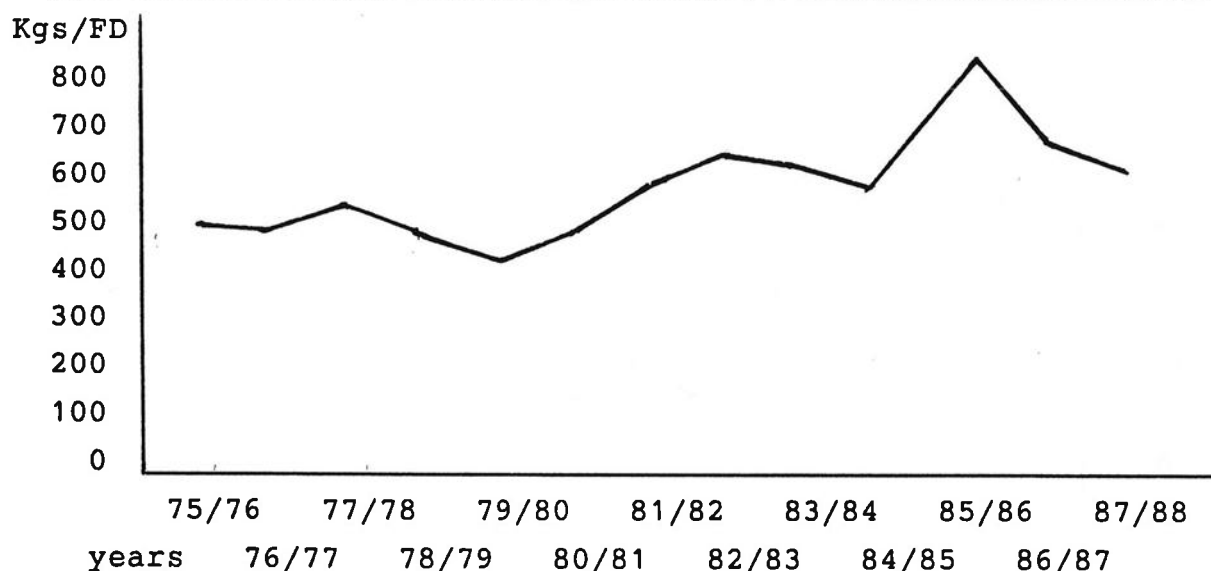


Fig (4.4) Wheat average yield in the irrigated sub-sector



Source (for these 3 figures): Advisory Unit for Agricultural Corporations (AUAC)

Fig (4.5) Sorghum average yield in the irrigated sub-sector



Policies affecting food supply or production could be divided into inputs and marketing policies.

4.3.2.1 Inputs policies

The major costly means of production are the various inputs including land, labour, and capital, many factors affecting the tenants besides land tenure, inputs subsidies, taxes on output, credit extension, research and education (USDA; 1981: 166). Because we are concentrating on government schemes, we merely trying to give a review of land tenure in these schemes.

The previous production relation between the tenants and schemes administrations was known as the joint account relation, where the three partners - tenants, scheme administration, and central government share the gross profit by 40, 35, 25% respectively. Tenants duties are husbandry practices, schemes administrations secure inputs, funds, supervision, while the central government gives land and water. By 1981 this system was abolished and replaced by a new system called the individual account, where the government lease the land to tenants on nominal rates and calculate water charge for each crop annually establishing what is called "land and water charges". Schemes

administration calculates the costs of inputs and water charge and agricultural operations, all these items plus 1% allocated to regional government and 2% allocated to social services in the schemes' areas, will be deducted from the gross cotton revenue, to give the tenants the net revenue.

Inputs subsidy for food production was not practised in Sudan, whether through special package programmes targetted to certain areas or group of farmers on a certain crop and/or a subsidy covering all the food crops growers in the three sub-sectors. Although a subsidy of inputs have been used more commonly to cash crops which offer hard currencies contrary to food crops (the cotton example). Luckily, wheat in the government schemes received some of those subsidised items mainly targetted to cotton.

A) Fertilizer

The ARC recommends 2N (14) of urea fertilizer and 1N of Triple Super Phosphate fertilizer (TSP) for each feddan of grown wheat. Also ARC recommends 2N urea to cotton, but reality is different (table 4.6).

Table (4.6) shows that the amount of fertilizer received by cotton is much higher compared to the amount received by wheat on feddan's base. In 1978/79, areas under cotton and wheat were 498,024 and 493,436 feddans respectively, the amount of fertilizer received by cotton was 45,698 metric tons, that was 92 Kgs per feddan, which was higher than the recommended dose (80 Kgs per feddan), while the wheat received 20,018 metric tons, that was 41 Kgs per feddan which is about half the recommended dose (80 Kgs per feddan). What we have noticed for the year could be noticed in many years, for instance the year 1987/88 when cotton received 122 Kgs per feddan which is 150% higher than the recommended dose while the wheat received less than 20 Kgs per feddan, that was 25% of the recommended dose (15).

Table (4.6) Gezira Scheme , urea fertilizer application to
cotton and wheat 1978/79 - 1987/88

year	cotton area*	fertilizer#	wheat area*	fertilizer#
1978/79	498024	45698	493436	20018
79/80	540890	55009	362504	26919
80/81	533790	53379	367354	29354
81/82	435314	47165	267863	18925
82/83	484315	59829	155760	12443
83/84	497729	65019	265824	13291
84/85	475652	60414	0	0
85/86	400528	43378	242498	18713
86/87	415074	43595	179867	15924
87/88	383037	46579	252313	4952

* feddans # metric tons

Source: Gezira Reports

TSP fertilizer was not practised in large scales, whether in Gezira Scheme or other schemes. However the past experience witnessed no large scale trials to approve the recommendation of ARC. By adding 2N of urea fertilizer and 1N of TSP in a package of inputs, wheat yield per feddan will reach three times the known yield (ARC; 1988: mimeo).

Finally we stress on the continuity of fertilizer subsidy to wheat crop in government schemes and private lands, whenever there are state intervention on producers and consumers pricing policies.

B) Seeds

The importance of high quality of seeds in terms of viability and purity in attaining high productivity cannot be overemphasized. The weakness of Seed Propagation Department results in the use of less viable and pure seeds, where tenants store the coming years seeds by their own methods of storing,

following no scientific measures, which results in low yielding crops and dissemination of pest from the previous crops. To strengthen Seed Propagation Department, they submit some recommendations to the higher Committee of Wheat Self Sufficiency (Seed Propagation Department; 1988: mimeo). We stress on:

1) By identifying the land for wheat annually, the Seed Department will be able to secure the seeds needed, when the tenants will be committed to grow them.

2) Specification of a clear production relation, similar to that of cotton, because to treat the wheat as a tenant crop will lead to an uncontrolled use of seeds and other inputs (15).

3) The availability of other inputs needed because certified seeds will not give the expected yields apart from a package of inputs.

C) Husbandry practices

These include land preparation, sowing, irrigation, pest control, and harvesting.

1) Land preparation is one of the major factors affecting wheat yields, wheat will not grow well with either too much or too little water. When the land is improperly levelled most of the wheat in the field is either in too wet or too dry conditions, while very little receives proper irrigation.

By practising good land levelling in the proper time supervised by the schemes' staff, high yields could be expected.

2) The recommended sowing date by the ARC is late October to mid-November in Gezira, New Halfa, and White Nile schemes. The relations between yields and climatic conditions revealed a close correlation between relative humidity and temperature from ear emergences to maturity and grain yield. Sowing later than the recommended date decreased grain yields. Maxican varieties respond differently to late sowing dates (table 4.7), which summarizes the research results on sowing dates at optimum fertilizer levels, and using recommended dwarf varieties.

Table (4.7) Yield Kgs/FDs and relation to sowing dates

Scheme	15/10	20/10	30/10	10/11	14/11	29/11	14/11	29/12
Gezira	1300	-	1300	-	1100	900	600	-
N.Halfa	-	800	-	700	-	400	-	-

Source: Akasha, A. Gabur, and Annual Report Gezire from Sudanese Consultation Bureau; 1982, Comparative study of cost of growing wheat in Sudan and importing it, table (2.2).

To achieve the advantage of proper sowing dates we suggest dissemination of extension work among tenants through trials experiments.

3) Some of the wheat areas may not receive the recommended numbers of irrigations, wheat needs 7 - 8 irrigations with 14 days intervals during vegetative growth and every 10 days during seed formation (ARC; 1988: mimeo). Low crop yield may result in improper canals maintenance or shortages of fuels or electricity in the case of pump schemes, and poor water management. The first obstacle could be solved when the rehabilitation programme starts, while the other should be solved through coordination between the two ministries - MOANR and MOI.

4) Improper pest control results in low yielding and/or poorer crop quality, for proper pest control we suggest consistent pesticide use to avoid bad harvest in the case of insects and diseases. As for weeds, pre-irrigation is highly recommended because the pre-sowing cultivation can destroy the first flush of weeds. However the problems of irrigations hamper this operation in the mean time. Instead chemical weed control could be used as a temporary alternative.

5) Delay of harvesting resulted from combine-harvestors shortages may lead to excessive loss to shattering, plus birds and rats damage. Capital to be invested for farm machineries

is badly needed. This could be attained through incentives given to owners, for instance minimizing taxes, customs, or other charges to agricultural machineries. And to encourage cooperatives that own machineries, also schemes administrations could afford some capitals for this purpose.

D) Research

There is a long period between starting research efforts and the discovering of useful findings. The ARC strived during the last 25 years to intensify wheat research in Sudan which resulted in high experience gained by its scientists. However the orientation towards cash crops, shortages of trained technicians, migration of experts, poor laboratory equipments, and little integration with the rest of the agricultural sectors, deter the successful role of the ARC.

In the last few years, with the help of foreign aids from OPEC and ICARDA, ARC tried to implement research findings in tenants' plots which had very encouraging results of high yields, confirming the consistency of Sudan climate for wheat production when the inputs are secured and technical and administrative information plus the prudent supervision are available (Ibid; 1988).

Saskawa Global 2000 (SG2000) to Sudan, trials experiments approved in two consecutive seasons (years) the recommended husbandry practices and other production policies if followed gives a crop yield exceeds one ton per feddan in areas considered as marginal (White Nile Scheme area). "After two years of trial demonstrations on few thousand hectares of land SG200 is convinced that Sudan can become self-sufficient in wheat, within two or three years (Wel, Doornbos, Raijmakers; 1989: Food security with an urban bias, V.II).

E) Extension

The extension has long been recognised as the "agent of

change" in modern agriculture. Odd enough, his role in developing countries is very much underestimated. Problems of organisation and training, lack of transportation methods and other resources, the relevant information to convey and limited transmission of feedback to the research, are the most important hindrances of extensionists' performance. However after the Training and Visit programme (T&V) was established by the World Bank finance, we assume by bringing together the research scientists, the extension agents, and the growers to interact in such a way. A continuous flow of experience and communication is generated, so as to provide training for the extension agent and the growers and feedback information to ARC scientists.

F) Credits

Without credits tenants are not able to buy inputs and to accomplish agricultural operations. Credits for food production crops is underdeveloped in the government schemes, although the schemes administration give cotton growers credits in a shape of loans like land preparation loan, picking loan, etc. On the other hand they do not give any loans to food crops, the only thing they offer "if available" is fertilizer. Lack of credits compel tenants to sell their crop, through the shell system as we discussed before.

Better credit system through schemes administration such as cotton, will encourage tenants to grow high yielding crops.

4.3.2.2 Marketing policies

Marketing of agricultural products are procurement, transportation, storage and packing. It is an important part of the cost of the product and plays an important role in stimulating or discouraging production. Here we intend to emphasise over the role of the procurement policies. But before we move to that policy instrument, we would like to stress on the role of transportation and storage facilities which affects the production of wheat in a specific year. For instance because

of the bad conditions of most of Sudan's roads and the problems of the railways, costs of transporting inputs and output is rather high, especially for a crop with a restricted price. The result is to discourage tenants to grow the crop during the coming years.

A) Processing policies (wheat mills)

For wheat we mean here the availability and capacity of wheat mills to produce wheat flour and/or composite flour. The current installed milling capacities amount 540 thousand tons per year. But due to shortages of wheat actually supplied to them, the output of these mills has never reach the installed capacity. The main reasons for that is the already milled wheat imported from abroad on concessional bases, "because donors are frequently under pressure from their own domestic food processing and handling lobbies to provide processed, value added grain product as a substantial part of their food aid programmes (B. Riley & C. Ward; 1988).

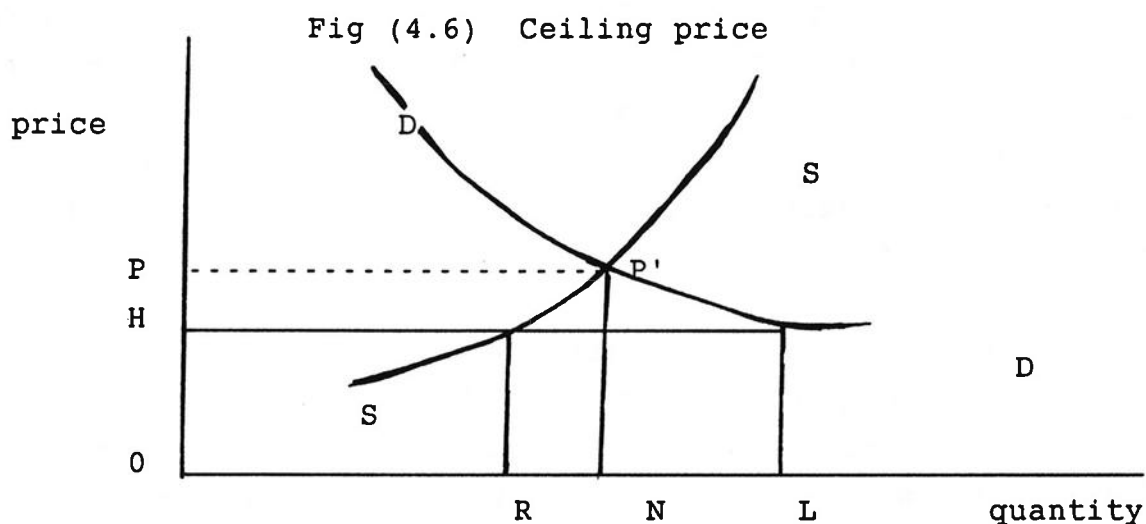
If we grow our wheat domestically, the milling capacities will deter the goal, because of the difference between the expected consumption and the mills capacities. "The government of Sudan has not been put under pressure to encourage, or even allow the expenditure of foreign exchange to rehabilitate and expand domestic milling capacities (Ibid; 1988). The fact is that the already installed mills have the capacity to mill more than half million tons annually, with a possibility to add more lines for sorghum milling." It is clear that excess milling capacity does exist and that milling unlikely to prove a constraints in the short to median term. However there are enough private entrepreneurs who would be willing to invest in mills should a need develop (Sudanese Consultation Bureau; 1982).

C) Procurement policies

Government intervention in food crop marketing is for equity concern and price stabilization, contradicting these, price

policy decision plays a more important role in the production of cash crops, the influence of prices on food output is limited by the traditional nature of much food production which is largely outside the price system.

Wheat pricing policies in Sudan is through announced producer price, strongly linked to consumers' subsidy, the producer announced price suppose to be announced at the beginning of the season (before land preparation), and it is called wheat ceiling price. Fig (4.5) illustrates the concept of ceiling price.



Source: G.M. Meier, Pricing policy for development management. Fig (1.20).

The equilibrium price without outside interference would be $(OP) = (NP')$ and the equilibrium quantity would be (ON) , when establishing ceiling price the price will be (OH) , but the quantity supplied will be less (OR) than the quantity demanded (OL) , and a shortage will appear.

The announcement of wheat ceiling price is calculated by one of these three ways.

a) Price depends upon parity price (C & F) Port Sudan, where the state calculate the price of wheat delivered at Port Sudan in U.S. dollars, using the official exchange rate to convert it

into Sudanese pounds (L.S.), adding to them costs of loading handling etc. plus transportation to Barakat (Gezira HQ). Finally deducting the estimated costs of production per metric ton, then they will have the revenue which is around 20%. By multiplying the profit per ton to the expected yield per feddan they will have the profit per feddan.

b) Price leads to similar return that the producers got last year. The announced wheat procurement price for the year 1987/88 was L.S 1001/M.T. while the cost of production was L.S 642/M.T., the profit was L.S 359/M.T. The estimated cost of production for 1988/89 was L.S 960/M.T. and the estimated price is L.S 1319/M.T. with 37% profit.

c) Price based upon cost of production plus a margin profit equals to that of the previous year. The actual cost of production for 1987/88 was L.S 321, and the net return per feddan was L.S 180. Therefore the percentage profit per feddan was $180/320 = 56\%$.

The cost of production for 1988/89 was expected to be L.S 480/FD.

The expected profit per feddan = $L.S\ 480 \times 56\% = L.S\ 269$

The total return per feddan = $L.S\ 480 + 269 = L.S\ 749$

Average yield per feddan = 0.5 ton/FD

Total return per ton = $L.S\ 749 \times 2 = L.S\ 1498$

Thus the wheat procurement price WPP = L.S 1498

For the first option there is no producer subsidy (PS) since (WPP) equal the import parity price, while the consumer subsidy (CS) will equal the difference between the (WPP) price L.S 1181 and the price of mills L.S 469. Thus the amount of subsidy will be 712/M.T.

To the second option (PS) = $L.S\ 1498 - 1181 = L.S\ 317/M.T.$
The (CS) = $L.S\ 1319 - 469 = L.S\ 850/M.T.$ The total subsidy will be 988/M.T.

While the third option (PS) = L.S 1498-1181 = L.S 317/M.T.
whild (CS) = L.S 1498 - 469 = L.S 1029. The total subsidy will
be 1349/M.T.

Reducing the total subsidies, that the state pay for
producers or consumers, because of the apparent political, social
and economical hindrances. Consumers' subsidies dismantling are
difficult if not impossible in the meantime. Where we suggest
to reduce the total subsidy burden by choosing the first option,
where there is no producer subsidy and the total subsidies are
at minimum.

CHAPTER FIVE

5.0 Conclusion

Sudan was faced by critical wheat and wheat flour supply shortages since 1986. This is due to the heavily dependency on concessional and aid wheat imports from the western block, particularly the United States. Because the relation between Sudan and the United States before 1986 was good, no one at that time was bothered about the problem. However after the resumption of the relations between Sudan and Libya, the United States reduced its aid to Sudan sharply, arguing some political differences between the two countries, concerning the Islamic rules and the civil war in the south.

5.1 Self-sufficiency: a summary of the argument

Growing wheat domestically to reach self-sufficiency is possible and feasible if some conditions are fulfilled, that is wheat production in Sudan is possible if the state changed, maintained, some policies and policy instrument to reach the goal. These policies are divided to producer and consumer policies starting from policies to enhance production and productivity, to policies to reduce the dominance of black market and ease the handling of the product to the mills. Ending with policies to reduce "in the meantime" the demand of wheat by gradual decrease of consumer subsidy or rationing subsidised bread to targeted group, to using composite flour, and encouraging home made 'kisra'.

This argument is backed by the debate of 'heavy dependency' on concessional and aid imports, in one of the strategic commodities is risky, because even the donor are not willing to continue this role. On the other hand the country (any country) has to strive to secure hard currencies to import wheat from the international market. If we suppose the availability of that amount of money needed annually to import an increasing quantity of wheat, giving it the privilege among other commodities badly

needed. The prices, the supply of wheat in the international market are hardly predictable. And/or the political differences deter the supply of wheat to (X) country (sanction of wheat to the Soviet Union in the beginning of this decade). This leads to the issue of self-sufficiency of the country, using its own resources (water, land, labour) with the help of some imported inputs to attain self-sufficiency.

The argument of self-reliance is very important to a country building its own relations with any country in the world, implementing its rules, coming from its population without any interference from any country, organisation and community. Self-reliance is very important to any country to implement its own strategies towards the its own goals.

5.2 Concluding note

Attaining self-sufficiency is one of the major condition to reach food-security, in connection with fulfilling some conditions mentioned before, giving access to that commodity by the whole population, by rationing the available quantities to targetted group in the short run, and by redistribution of income in the long run will indeed fulfil the goals of food-security.

This could be attainable, through political, economical and social strategies, to feed the population from domestic production on one hand, and reaching the goals of self-reliance, food security through self-sufficiency on the other hand.

FOOTNOTES

- 1) 1 Feddan (FD) = 0.42 hectares
1 Feddan (FD) = 1.038 acres
- 2) Tenant crops are the crops which schemes do not give them emphasis and inputs etc, and were sold by the tenant or consumed at the household level.
- 3) There was a severe civil war in the south since 1983, when the previous dictator - Nimari, imposed Islamic rules to the country.
- 4) Sudan's financial year starts July 1st, ends June 30 of the next year, to match crops growing till harvesting.
- 5) Ministry of Agriculture (Northern Region) 1988 report.
- 6) Licenced farms are farms which were distributed by the government, and have the benefits of the supply of fuel and pest control. While unlicenced farms are farms cultivated without the permission of the government.
- 7) The strategic nature of wheat, came as a result of its high importance to urban population, who constitute the majority of elites, political power, trade union etc.
- 8) Kisra is home made bread from sorghum flour.
- 9) Cited from Base year Energy Supply (Demand Balances and demanded projection methodology). Annex I, March 1983, National Energy Administration (NEA). Ministry of Energy and Mining, Khartoum - Sudan.
- 10) Phase area, the planned area for each crop within the rotation of the scheme (Fig 1.1 and table 2.2).

- 11) Sudan's main dams are ERROSERIS and sennar on the Blue Nile, Khashm Elgirba on Atbra river, and Jabal Awlya on the White Nile.
- 12) Sheil is the system where rich farmers and merchants give the tenants money needed severely, before the crop harvest, and return it in kind, as an agreement between the tenant and the rich farmer. The tenant is always under pressure to accept an agreement which is not fair to him.
- 13) Vertical expansion is to increase the yield by area (here its feddan) and horizontal expansion is to increase the production by adding more land for production.
- 14) 1N = 40 Kgs of fertilizer
- 15) The schemes administration always like to reduce the debits of tenants to the scheme, because in the case of cotton they just deduct the costs charged from the gross income tenant received, but for other crops it is not possible, usually tenants sell their crops and escape paying the costs to the schemes. This resulted in accumulated indebtedness.

APPENDIX I

Wheat area, average yield (ave. y) in Gezira, N. Halfa & Northern Region (1975/76 - 87/88)

scheme year	Gezira		New Halfa		Northern Region	
	area*	ave. y#	area	ave. y	area	ave. y
1975/76	568	388	114	280	28	714
76/77	505	495	78	260	30	733
77/78	466	471	72	320	35	543
78/79	494	251	36	190	30	467
79/80	363	476	39	330	30	600
80/81	367	230	52	290	32	633
81/82	268	420	42	460	31	656
82/83	158	602	48	521	21	652
83/84	266	417	42	595	34	853
84/85	-	-	-	-	50	680
85/86	240	500	30	600	60	767
86/87	170	529	34	441	48	800
87/88	245	500	35	500	45	800

* Area in '000' FDs

Average yield in Kg/FD

Source: Compiled by the author from different sources.

APPENDIX II

Cereals area (*), average yield (**), total production (***)
for the three sub-sectors in Sudan

Crops	75/6	76/7	77/8	78/9	79/0	80/1	81/2	83/2	83/4	84/5	85/6	86/7	87/8
<u>sorghum</u>													
TRADITIONAL													
area	2621	2788	3036	3310	2680	3020	3120	2780	2839	2687	3215	2793	2043
ave. y	200	240	270	310	210	230	280	190	130	170	250	150	80
t. pro	520	674	813	1011	566	700	887	520	357	457	813	428	158
MECHANIZED													
area	3062	3030	3087	3301	3226	3434	5532	5305	5502	4534	8537	8190	5615
ave. y	390	300	300	350	290	350	390	220	210	250	270	290	140
t. pro	1182	914	936	1162	935	1214	2150	1185	1129	1134	2331	2395	799
IRRIGATED													
area	628	471	539	591	443	503	527	524	613	663	903	830	707
ave. y	460	450	500	440	380	420	530	580	550	500	770	550	500
t. pro	288	212	268	259	168	209	279	304	337	332	699	454	350
<u>Millet</u>													
TRADITIONAL													
area	2701	2773	2984	3074	2320	2604	2910	2772	2711	3095	3980	3590	Na
ave. y	140	170	170	180	130	190	170	120	120	50	100	80	Na
t. pro	370	472	487	550	309	492	504	338	314	158	410	285	Na
<u>Wheat</u>													
IRRIGATED													
area	690	639	601	566	457	437	329	233	349	115	360	282	345
ave. y	330	460	530	300	510	420	430	610	480	690	550	560	560
t. pro	225	294	318	170	233	223	148	151	169	79	199	157	184

* Area in '000' feddans (FDs)

** Average yield in Kgs

*** Total production in '000' metric tons (M.T.)

Source: Department of Agricultural Economics (MOANR),
'CAS' and the yearbook for different years.

Appendix III (1)
Cereals Balance Sheet (1970/71 - 1986/87)

Year	SORGHUM BALANCE SHEET										Stock Loss Factor	Stock Loss	Closing Stocks		
	Opening Stocks (Calc.)	Domestic Production	Commercial Imports	Concessional Imports	Total Imports	Exports	Total Domestic Supply	Losses	Seed	Animal Feed				Processing Availability	Total Domestic Consumption
1970/71	100	1534	0	0	0	2	1632	02	16	33	82	1420	141	31	110
1971/72	110	1530	0	0	0	37	1663	03	15	33	83	1448	102	22	110
1972/73	79	1300	0	0	0	60	1319	66	19	26	66	1142	60	13	79
1973/74	47	1692	0	0	0	102	1637	82	21	33	92	1419	385	85	47
1974/75	300	1691	0	0	0	98	1883	94	21	30	94	1636	426	94	300
1975/76	332	2160	0	0	0	48	2444	122	22	49	122	2128	428	95	332
1976/77	333	1790	0	0	0	94	2029	101	24	41	101	1762	452	100	333
1977/78	352	2062	0	0	0	133	2281	114	24	45	114	1984	495	109	352
1978/79	366	2373	0	0	0	133	2696	135	19	54	135	2353	495	109	366
1979/80	469	1269	0	0	0	196	1542	77	24	31	77	1333	602	133	469
1980/81	267	2068	0	0	0	338	1997	100	32	40	100	1725	342	76	267
1981/82	276	3272	0	0	0	262	3286	164	26	66	164	2866	365	78	276
1982/83	1222	1938	0	0	0	416	3998	200	31	80	200	3487	1568	347	1222
1983/84	1571	1819	0	0	0	262	3286	160	28	64	160	2792	2017	446	1571
1984/85	740	1097	0	0	0	19	2368	118	46	47	118	2038	950	210	740
1985/86	3	3522	0	0	0	141	3384	169	41	68	169	2937	4	1	3
1986/87	840	3282	0	0	0	932	3190	159	40	64	159	2767	1078	238	840

Year	MILLET BALANCE SHEET										Stock Loss Factor	Stock Loss	Closing Stocks		
	Opening Stocks (Calc.)	Domestic Production	Commercial Imports	Concessional Imports	Total Imports	Exports	Total Domestic Supply	Losses	Seed	Animal Feed				Processing Availability	Total Domestic Consumption
1970/71	0	439	0	0	0	0	439	22	7	0	0	410	410	0	0
1971/72	0	441	0	0	0	0	441	32	9	0	0	410	410	0	0
1972/73	0	355	0	0	0	0	355	19	9	0	0	328	328	0	0
1973/74	0	284	0	0	0	0	284	14	9	0	0	261	261	0	0
1974/75	0	403	0	0	0	0	403	20	9	0	0	374	370	4	0
1975/76	3	388	0	0	0	0	391	20	9	0	0	363	356	1	3
1976/77	5	449	0	0	0	0	454	23	11	0	0	421	411	2	5
1977/78	8	500	0	0	0	0	508	25	11	0	0	471	462	2	8
1978/79	7	552	0	0	0	0	559	28	8	0	0	523	513	2	7
1979/80	8	309	0	0	0	0	317	16	9	0	0	292	282	2	8
1980/81	8	491	0	0	0	0	499	16	10	0	0	464	456	2	8
1981/82	7	509	0	0	0	0	516	25	10	0	0	470	470	2	7
1982/83	8	341	0	0	0	0	349	17	11	0	0	370	310	2	8
1983/84	8	314	0	0	0	0	322	16	11	0	0	275	285	2	7
1984/85	7	158	0	0	0	0	165	10	14	0	0	143	126	3	7
1985/86	14	410	0	0	0	0	424	21	14	0	0	390	369	4	14
1986/87	16	285	0	0	0	0	301	15	12	0	0	274	259	4	16

Appendix III (2)

Cereals Balance Sheet (1970/71 - 1986/87)

WHEAT BALANCE SHEET										0.05		0.02		0.18		0	
Year	Opening Stocks	Domestic Production	Commercial Imports	Concessional Imports	Total Imports	Exports	Total Domestic Supply	Losses	Seed	Ritual Feed	Processing	Net Domestic Supply of flour	Net Consumption	Stocks (equival)	Stock Loss	Closing Stocks	
																	Domestic Supply
1970 /71	8	162	n/a	n/a	128	0	298	15	3	0	54	226	226	0	0	0	
1971 /72	0	124	n/a	n/a	160	0	284	14	2	0	51	216	216	0	0	7	
1972 /73	7	152	n/a	n/a	158	0	317	16	3	0	57	241	226	0	0	18	
1973 /74	18	235	n/a	n/a	136	0	309	19	5	0	70	295	265	0	0	36	
1974 /75	36	269	n/a	n/a	126	0	431	22	5	0	78	327	279	0	0	58	
1975 /76	58	263	n/a	n/a	173	0	494	25	5	0	89	375	313	0	0	76	
1976 /77	76	289	n/a	n/a	158	0	523	26	6	0	94	397	330	0	0	82	
1977 /78	82	312	n/a	n/a	147	0	541	27	6	0	97	410	338	0	0	88	
1978 /79	88	166	75	n/a	150	0	479	24	3	0	86	366	302	0	0	77	
1979 /80	77	232	100	100	340	0	649	32	5	0	117	495	409	0	0	105	
1980 /81	105	218	291	291	477	0	800	40	4	0	144	612	359	0	0	105	
1981 /82	308	142	135	118	253	0	703	35	3	0	127	539	314	0	0	274	
1982 /83	274	141	192	353	545	0	960	48	3	0	173	736	414	0	0	393	
1983 /84	393	169	41	434	475	0	1037	52	3	0	187	795	417	0	0	461	
1984 /85	461	79	200	532	732	0	1272	64	2	0	229	978	506	0	0	576	
1985 /86	576	199	93	536	629	0	1404	70	4	0	253	1077	730	0	0	623	
1986 /87	423	149	116	661	777	0	1349	67	3	0	243	1036	630	0	0	495	

Note: The breakdown of imports between commercial and concessional is not available for the period 1970/71 to 1977/78

CEREAL BALANCE SHEET

Year	Opening Stocks	Domestic Production	Commercial Imports	Concessional Imports	Total Imports	Exports	Total Domestic Supply	Losses	Seed	Ritual Feed	Processing	Net Domestic Supply	Net Consumption	Stock (Rctg)	Stock Loss	Closing Stock
1970 /71	108	2135	n/a	n/a	128	2	2369	118	26	33	135	2056	1922	142	31	110
1971 /72	110	2135	n/a	n/a	160	37	2388	119	26	33	134	2075	1973	108	22	86
1972 /73	86	1807	n/a	n/a	158	60	1991	100	31	26	123	1711	1639	78	13	65
1973 /74	65	2211	n/a	n/a	136	102	2310	115	35	33	152	1975	1579	422	85	337
1974 /75	337	2353	n/a	n/a	126	98	2718	136	35	38	172	2337	1881	488	95	333
1975 /76	393	2811	n/a	n/a	173	48	3929	166	36	49	211	2866	2391	510	96	414
1976 /77	414	2528	n/a	n/a	158	94	3006	150	41	41	196	2579	2073	543	96	414
1977 /78	442	2874	n/a	n/a	147	133	3330	166	41	46	211	2865	2313	592	102	442
1978 /79	481	3091	75	n/a	150	63	3734	187	30	54	221	3242	2313	592	111	481
1979 /80	555	1810	100	100	225	133	4099	187	30	54	221	3242	2313	592	111	481
1980 /81	555	1810	100	100	225	133	4099	187	30	54	221	3242	2313	592	111	481
1981 /82	591	1118	135	118	253	135	4505	125	46	66	291	3885	2203	671	80	591
1982 /83	1504	2420	192	1607	1799	416	5307	265	45	80	373	4544	2160	1852	349	1504
1983 /84	1209	1334	200	1082	1475	186	4564	190	62	64	347	3882	2592	2420	448	1973
1984 /85	593	4131	93	536	629	141	5212	261	58	68	422	4403	3012	1522	242	1279
1985 /86	1279	3716	116	661	777	932	4840	242	55	64	402	4077	2979	1223	161	1062

Note: Breakdown of imports between concessional and commercial n/a before 1978/79

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