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МЕЖДУНАРОДНЫЙ СОВЕТ ПО ПШЕНИЦЕ

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GRAIN HANDLING AND TRANSPORTATION FACILITIES IN DEVELOPING COUNTRIES

Secretariat Paper No.15

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FOREWORD

Problems facing developing importing countries have been given increasing attention by the International Wheat Council. The seemingly inexorable rise in the grain import needs of many of those countries has further exacerbated their already well-publicized balance-of-payment and foreign debt problems. Declining world cereal market prices have offered them little relief, for they have been offset by the strength of the US dollar, in which most grain transactions take place.

Developing members of the Council have also brought to its notice other serious implications of the unprecedented rate of growth in their requirements. Their ports and domestic transportation systems were not designed to cope with the enormous volumes of grains and other commodities passing through them. And now they cannot afford to improve them fast enough to handle their rising imports. The result has been mounting delays, increasing costs and a growing threat to the security of food supplies and consumption to large numbers, very often millions, of people.

The Council accordingly requested the Secretariat to undertake a survey of the port capacity and internal transportation situation in developing countries with respect to the movement of grain. Such a study was intended to bring these problems to the attention of the international community and, it was hoped, stimulate the financial and technical assistance needed towards their resolution.

As might have been expected, the survey shows that the great majority of developing countries are struggling to keep grain supply lines open with inadequate or obsolete equipment. Finance is needed - and this will principally have to come as assistance from sponsoring countries and international financing agencies - for more and better ports, roads, railways and storage facilities.

The information to hand suggests that factors requiring the most immediate attention were mostly connected with deficiencies in the internal distribution systems. For example, the rate of offtake from the ports is often very slow because of inadequate roads and railways and, in particular, shortages of lorries and spare parts. Improvement of the existing road systems was also a prerequisite of rural development and increased domestic production.

The Secretariat has amassed a considerable amount of material for the survey. It is nevertheless aware that there are still significant gaps in the information about conditions in various countries. It is hoped that some of the readers of this study may be in a position to supplement and update it. Any such material will be welcomed by the Secretariat which intends to release, from time to time, further papers on this most important subject.

J. H. Parotte

J. H. Parotte
Executive Secretary

GRAIN HANDLING AND TRANSPORTATION FACILITIES IN DEVELOPING COUNTRIES

CONTENTS

Page no.

PART 2 - FINANCING FACILITIES

PART 3 - CONDITIONS IN INDIVIDUAL DEVELOPING COUNTRIES

NOTES

This publication takes into account information available to the Secretariat up to the end of April 1985.

Abbreviations:

"bn."	=	billion (a thousand million)
"dwt."	=	deadweight
"ha."	=	hectare
"qph"	=	quintals per hectare
"km"	=	kilometres
"m."	=	million or metres, as appropriate
"n.a."	=	not available
-	=	nil

All figures in tons refer to metric tons, and amounts in dollars to United States dollars, unless otherwise stated.

Additional notes relating to the tables in Part 3 are set out on page 57.

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The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the International Wheat Council concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of its frontiers.

GLOSSARY OF TECHNICAL TERMS

The terms listed below have the following meanings for the purposes of this study.

Charter parties are a form of contract by which the shipowner, in return for a sum of money (the freight) agrees to carry goods by sea, or to furnish the services of a vessel for the purpose of such carriage. The agreement need not necessarily be with the importer but can be with a third party (e.g. an exporter or a shipper). There are several different forms of such contract. Of most relevance to this paper are "voyage charter parties" where the owner undertakes to provide a vessel for the carriage of specified goods on one or several voyages between named ports (or within certain ranges of loading and discharging places). Some grain is also carried under "time charter parties" under which the owner undertakes to place the use of the vessel at the charterer's disposition for a period of time during which it is agreed that the charterer may freely employ the vessel for his own account.

Standard forms of contract are used on nearly all grain routes.

Demurrage means the money pauable by the charterer or receiver to the shipowner for delays for which the owner is not responsible in loading and/or discharging after the laytime has expired.

Handy-sized vessels are those which are regarded as most generally employable and most readily obtainable for the trade in question. The size range to which the term applies has been steadily increasing in recent years.

Laydays means the period of time agreed between the parties during which the owner will make and keep the ship available for loading/discharging without payment additional to the freight. Usually the charter party stipulates either that a certain number of days are allowed for loading and/or discharging, or that the loading and/or discharging is to be performed at a certain rate per day. It is also common for the charter party to stipulate that only such time is to be counted as can actually be used for performance of the work under prevailing weather conditions. Laydays are not applicable to time charters.

Liners are vessels which provide a regular service on specific routes.

Liner terms are terms in a charter party which correspond with those prevailing in liner trades on the same route: in particular, the owner of the vessel bears the loading and discharging costs.

Low income developing countries are those with per capita incomes (as estimated by the World Bank) of less than US$805 in 1982. This figure, which is changed each year, is the limit of eligibility for the granting of IDA assistance by the World Bank.

Relationship of draughts - deadweight tonnage. The following "rule of thumb" calculations are applicable to grain freight cargoes:

Draught		Tonnage (dwt)
Feet	Metres	
under 30	under 9.1	up to 20,000
30-40	9.1-12.2	20,000-50,000
over 40	over 12.2	50,000 and over

It must be emphasized that these are averages: there are many exceptions.

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GRAIN HANDLING AND TRANSPORTATION FACILITIES IN DEVELOPING COUNTRIES

PART 1 - GENERAL SURVEY

I. INTRODUCTION

Nearly every developing country has experienced, over the last two or three decades, a rapid and sustained rise in its grain requirements. While a few countries have achieved parallel increases in domestic output, the consequence for most has been a progressively greater reliance on imports to satisfy their basic food needs. Food aid has played an important role especially in the least developed countries but, inevitably, the greater part of the imports have to be made on commercial terms. This additional financial burden has exacerbated the already severe balance-of-payments and foreign exchange difficulties of many developing countries.

These financial consequences of the expanding grain imports are now well understood, even if satisfactory solutions have yet to be found. But the huge growth in developing countries' grain consumption and, particularly, in their imports, has other implications which, while perhaps less widely appreciated than the direct financial ones, are still potentially of a most serious nature.

Traditional methods of grain transport and distribution, evolved to serve the needs of a subsistence economy, are not easily adapted to meet the concentrated high volumes required by large towns and cities. Again, while the ports of some developing countries might have been equipped to handle exports of agricultural products, few have purpose-built bulk import facilities. The relentless increase in the volumes of grain handled - imports by developing countries have quadrupled since 1960 - continually threaten to overwhelm the capacity of their ports, roads and railways. Short of money to develop their facilities, bottlenecks have become frequent, handling costs have risen, and there is a constant danger that supplies to consumers of vital foods may be interrupted.

At the Ninety-ninth Session of the International Wheat Council in November 1983, developing countries emphasized the problems they were encountering in handling their grain imports. Inadequate port, storage and transportation facilities led to waste, delay and unduly high ocean freight costs. It was pointed out that developing countries as a group showed the greatest potential for grain market growth. Development of their infrastructure would facilitate the expansion of trade and also enhance their food security. But they could not finance the necessary improvements from their own resources.

The Council accordingly requested the Secretariat to undertake a survey of the port capacity and internal transportation situation in developing countries with respect to the movement of grain. The aim of the study was to describe the present position, and also, taking into account the prospective increase in their grain import requirements, to provide evidence of the needs of developing countries for assistance to upgrade their facilities. In subsequent discussions in the Executive Committee, it was agreed that the study should also list known sources of bilateral and multilateral finance which might be available for infrastructure improvements.

The Council considered part of the study in draft form at its 101st Session in December 1984, and agreed that it should be completed and published as soon as possible as a Secretariat Paper. This would help bring the problems of the handling and transportation of grain in developing countries to the attention of the international community, and perhaps stimulate industrialized countries to find new ways of giving assistance to help overcome them.

The paper is in three main parts. Part 1 sets out a general survey of the ways in which developing countries handle and move their grain, and the sorts of problems they may encounter in doing so. The first section begins by considering the quantities of grain that have to pass through the ports and over the internal transportation systems of these countries and, bearing in mind likely trends in production and consumption, how much those tonnages may increase in future years. It then comments on the difficulties that may face developing countries at each stage. In importing grain, for example, they may be unable to plan their shipments so as to avoid bunching of arrivals and consequent delays. Again, ocean transportation methods and practices, now geared to the use of large bulk carriers, may put countries with limited port facilities at a disadvantage. Reference is made to the relationship between ocean freight rates and vessel types and sizes, and to the demurrage payments which are frequently a consequence of port congestion. The following section deals with problems arising in the internal transportation of grain, whether by rail, road, waterway or coastal shipping, particular attention being paid to the problems and additional expenses incurred by landlocked countries.

Part 1 ends with a summary of the difficulties which are currently being encountered by developing countries in importing and handling grain, and suggests where assistance to alleviate those problems might most effectively be directed. Such assistance can be provided multilaterally or bilaterally, and may include funding by governments as well as non-governmental institutions.

Part 2 of the report lists some of the financing facilities that might be available to help developing countires improve their infrastructure, with some recent examples of projects which have been assisted. It is based on information provided by 16 donor countries and two international institutions.

Part 3, which is by far the longest, describes the port facilities and transportation infrastructures in 67 developing countries, highlighting the problems each encounters in moving grain. Details are given, in every case, of the general grain situation in the country (production, consumption and trade) suggesting, where possible, how this might develop in future; of the ports that handle grain imports; and of the state of the transportation systems used to distribute the grain from the ports and production areas to the final user. Details of the grain handling capacities of developing countries' ports are also set out in tabular form in an Appendix at the end of this Secretariat Paper.

The countries covered account for over 90% of the total imports of grain by developing countries. All developing country members of the International Wheat Council are included in the survey, as are those non-members whose grain imports average 1 m. tons or more. Twenty-eight of the countries are in Africa, seventeen in Latin America and the Caribbean, twenty-one in Asia and one (Malta) in Europe. They span a great variety of conditions, and many different stages of development from, for example, the least-developed states of sub-Saharan Africa to high-income oil-exporting countries such as Saudi Arabia. Twenty-eight of the countries surveyed are "low-income developing countries"*, and seven are landlocked. For the purposes of this paper, certain countries which the International Wheat Council normally classifies as "centrally planned", such as the People's Republic of China and Cuba, are included with the other developing countries because they share many of the conditions and problems described.

To collect material for the study, the Secretariat sent questionnaires to a large number of developing countries, including some non-members of the Council. It wishes to record its appreciation of the many valuable replies which have been received. The Secretariat is also grateful to other individuals and organizations who have provided information for the study. Where official data could not be obtained, the Secretariat has consulted sources believed to be reliable. It should be noted that the views expressed in this paper are those of the Secretariat and do not necessarily reflect those of members of the Council.

This publication takes account of information available to the Secretariat up to 30th April 1985. Ports and transport systems are, however, being developed continuously. The Secretariat will keep a close watch on the latest developments, and update the study as appropriate. With this in mind, any readers who can amplify, correct, or bring up to date the information shown in this Secretariat Paper are invited to write to the Executive Secretary at the address given on the outside back cover.

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* See definition (following the Table of Contents).

II. GRAIN MOVEMENT IN DEVELOPING COUNTRIES

There are enormous variations in the demands which grain movements impose on the port and transport systems of different countries. Consider for example the contrast between some small island states, where the main town is also the only port, and those large nations whose principal centres of population are separated by enormous distances from the nearest coast. In the island, flour and feed mills may very often be within the port area, or adjacent to it. Vessels can then discharge onto conveyor belts which take the grain directly into the storage bins. Provided grain shipments arrive regularly, handling and transportation difficulties are rarely encountered. In many larger countries, on the other hand, their rapidly expanding urban areas may very well be at one end of a tenuous supply line, consisting of unsurfaced roads or badly maintained railways, with a congested port hundreds of kilometres away at the other end, perhaps even in a different country. Deliveries in such circumstances can be erratic and the flow of supplies easily interrupted. Grain may pile up in the port, while desparate needs go unsatisfied elsewhere.

Difficulties in providing adequate facilities for grain handling and transportation are compounded because the pattern of grain movement is constantly changing. It is broadly true to say that the amounts of grain that have to be handled by developing countries have greatly increased, and are likely to go on doing so. But future rates of increase of imports and of domestic production may well be different from those of the past, with important implications when new facilities are being considered. The factors underlying these trends in consumption and imports are explored in the following sections.

1. Trends in consumption

Since about 1950, the total amount of grain consumed in developing countries has been increasing by about 40% each decade, and it shows every sign of continuing to do so until beyond the year 2000. By then, these countries would be consuming nearly four times as much as they did in 1960. While growth rates in individual developing countries naturally vary to some extent from the average, grain use is growing rapidly in nearly every one of them.

Four main factors lie behind this enormous increase. The first - and most important - is the continuing rapid rate of population growth. The total has grown on average by 2.3% a year since 1960 and is expected* to go on rising at nearly 2% a year for the rest of the century. The increase in some regions is considerably faster - for example, the rate in sub-Saharan Africa was 2.6% a year in the 1960s and 1970s, and may exceed 3% in the 1980s and 1990s.

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* Population projections quoted in this study are mainly derived from tables in the World Bank Development Report 1984.

Secondly, there has been a continued, if slow, improvement in per capita food consumption in developing countries in most parts of the world. Statistics published by FAO* suggest that average daily calorie supplies in developing countries increased by 13% between 1964-66 and 1979-81 (from 2,074 calories per person to 2,350). The most marked improvement was in Asia (15%), but even Africa, despite its tremendous food problems, managed an increase of some 7%**, although the position in sub-Saharan Africa will, however, undoubtedly have suffered a serious setback as a result of the latest natural and man-made calamities.

The third reason for the rise in grain consumption is changing food habits. In some developing countries there has been a switch away from non-cereal staple foods (e.g. yams and cassava) towards grain. This tendency is often associated with urbanization. For similar reasons, there have been changes in the shares of different cereals in the average diet, with maize often giving place to wheat or rice.

A fourth factor, which as yet is mainly confined to the higher-income developing countries, is the increasing use of grain for animal feed. Between 1960 and 1980 total non-food use of grain in developing countries rose from 64 m. to 170 m. tons - in other words, from 18% to 24% of their total grain use. Allowing for seed, industrial use and waste, most of this increase is attributable to animal feed use of coarse grains in such countries as Brazil, Egypt, the Republic of Korea and the Philippines. It was suggested in IWC Secretariat Paper No. 14 ("Long-term Grain Outlook")*** that this trend was likely to continue, and might even gather pace in some countries, up to the end of the century, when total "other uses" could amount to some 350 m. tons.

2. Growth of grain imports

The increase in grain consumption has been so large as to outpace production growth in all but a few developing countries, necessitating a greater reliance on imports to maintain food supplies. This growth in imports by developing countries over the last thirty years has, in fact, been one of the most remarkable phenomena of the world grain economy. In the early 1950s they averaged about 15 m. tons, including 10 m. tons of wheat, 3 m. tons of rice, and only 1 m. tons of coarse grains. At that time the group as a whole was a net exporter of both coarse grains and rice. A decade later grain imports had doubled, and by the early 1970s they averaged about 45 m. tons, of which two thirds was wheat. By 1982/83 they had more than doubled yet again (Table 1). An interesting point, well illustrated in the table, is a tendency for the increases in imports to be largest during this period in the higher-income developing countries. This was mainly due to the rapid expansion there of intensive livestock rearing enterprises. Provisional figures for 1983/84 suggest a further expansion in the total imports of developing countries to some 108 m. tons, including 63 m. tons of wheat, 35 m. tons of coarse grains and 10 m. tons of rice.

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* FAO Production Yearbook 1983, Table 105.

** The figures cover developed countries in those continents, but their contribution to the totals is too small to invalidate the comparison.

*** Published in August 1983.

TABLE 1

GRAIN IMPORTS BY DEVELOPING COUNTRIES

COUNTRY GROUPING*	IMPORTS IN 1972/73 (JULY/JUNE)					IMPORTS IN 1982/83 (JULY/JUNE)					INCREASE 1972/73-1982/83	
	Wheat	Coarse Grains	Rice	Total		Wheat	Coarse Grains	Rice	Total		Total grains	
				Volume	Value US $ billion**				Volume	Value US $ billion**	Volume	Value
	m. tons					m. tons					%	
DEVELOPING COUNTRIES												
Low-income	6.1	1.1	1.0	8.2	0.7	8.7	0.8	2.0	11.4	2.9	+40	+326
Lower-middle income	7.1	1.4	2.2	10.8	1.0	17.2	5.1	2.5	24.8	5.8	+130	+505
Upper-middle income	9.4	5.1	1.6	16.2	1.3	12.5	19.0	1.3	32.8	6.5	+102	+411
High income oil exporters	0.7	0.2	0.4	1.3	0.1	1.7	2.6	0.8	5.2	1.1	+289	+842
Sub-total	23.3	7.9	5.2	36.4	3.1	40.0	27.5	6.7	74.2	16.3	+104	+436
Centrally-planned developing countries	7.1	1.1	0.2	8.4	0.6	14.8	3.3	0.4	18.6	4.1	+121	+534
Total Developing Countries	30.4	9.0	5.4	44.8	3.7	54.9	30.8	7.1	92.8	20.3	+107	+453
TOTAL WORLD TRADE	67.6	57.8	8.0	133.4	10.0	96.1	86.4	11.8	194.3	42.0	+46	+320
DEVELOPING COUNTRIES' SHARE (%)	45	16	68	34	37	57	36	60	48	48		

* On the basis of 1982 incomes (GNP per capita) the Groupings were as follows: low-income - below $400; lower-middle income - $400-$1,650; upper-middle income - above $1,650. The high income oil exporters were above $6,000. Centrally-planned developing countries (China, Mongolia, Vietnam, Korea Dem. Rep. and Cuba have not been included in these groupings but are shown as a separate group.

** Approximate estimates.

The scale of the mounting pressure on developing countries' port facilities is vividly illustrated by comparing the numbers whose grain imports reached or exceeded certain levels in particular years. Thus, in 1960, only four developing countries imported as much as 1 m. tons of grain, two of them reaching 2 m. tons. In 1970, the numbers were 6 and 2 respectively, and by 1980 they had increased to 20 and 12. In 1984, no fewer than 23 developing countries are estimated to have each imported over 1 m. tons of grain, while 12 imported 2 m. tons or more.

In addition to the enormous increases in their grain production and imports, in many countries agricultural and industrial development has generated considerable flows of other bulky goods - such as minerals, fuels and fertilizers - passing through their ports and competing for space on their transport systems. The wonder is, perhaps, not that logistical problems have arisen, but that most countries have been able, somehow or another, to accommodate such huge increases in traffic.

The Council's study on the long-term grain outlook, already referred to, suggested that total grain consumption in developing countries might almost double between 1980 and the year 2000. While there seemed good prospects for susbtantial increases in production in some countries, the total gap to be filled with imports would inevitably continue to widen for some time to come. The fastest growth in imports might be in the lower income countries, which are less able to make the investments necessary to promote higher crop yields. But, bearing in mind their financial plight, the increased imports required by many of these countries to maintain or improve their food supplies would only be achieved with outside assistance, in the form of credits or food aid.

3. The importance of urbanization

Urbanization has already been mentioned with reference to grain consumption trends in many developing countries. It also has a major effect on the logistics of grain movement.

The growth of towns and cities in developing countries has been remarkable. Between 1950 and 1980 the proportion of people in less developed regions* who lived in urban areas nearly doubled to 30%, and it may exceed 43% in the year 2000. In some regions the process has been markedly faster. In middle Africa*, for example, town dwellers represented 15% of the total population in 1950 and 34% in 1980. The urban proportion there may rise to 52% by the end of the century. In some countries urban growth has been explosive. The case of Mexico City, which grew from under 3 m. in 1950 to 15 m. in 1980, and may exceed 30 m. by the year 2000, is exceptional only because it is the largest. Many other cities have experienced similar or even faster rates of growth.

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* As defined by the United Nations in its "Patterns of Urban and Rural Population Growth" (1980).

In many developing countries agriculture was until recently mainly based on subsistence farming, and this is still true of some of them. Before there were large towns, any grain that a producer had surplus to his requirements might be marketed, but was unlikely to move more than a few kilometres to the nearest village or small town. Grain traffic, consequently, made no extensive demands on a country's infrastructure. The only exception might be when emergency supplies needed to be distributed as a result, for example, of drought: this usually proved extremely difficult.

Urbanization has changed all this, for three main reasons. First, the growth of cities has often far outpaced the ability of their immediate hinterlands to supply the food they require. Either the marketing or procurement networks have to be extended, or much of the grain imported. Because of the underdeveloped state of internal transportation, grain movement over long distances, if feasible at all, is likely to be expensive. Imported grain will often be as cheap or cheaper than domestic produce, especially in the port areas. Marketing is therefore discouraged.

Second, the change of lifestyles of people who migrate to the cities often involves a switch from traditional foods - which may take a long time to prepare - to convenience foods, above all wheat products, which can be purchased ready-made at local shops. Such products may not be available locally, and must, therefore, be imported. For similar reasons, in some of the more economically advanced countries, intensive livestock rearing units, which are situated close to the urban areas, may partly or wholly rely on imported feedgrains.

The third main consequence of urbanization is that the authorities of developing countries are frequently obliged, for social and political reasons, to subsidize prices of foodstuffs to urban consumers. This, again, tends to result in greater demand for imported, as opposed to domestically produced, foods.

When a country's demand for grain has to be satisfied to a greater or lesser extent by imports, the size and location of the ports comes into play as an important factor. If the ports are themselves located in or close to the main urban areas, the problem of internal transportation is relatively limited. Difficulties multiply when, as in several countries mentioned in this study, the grain to supply the towns has to move several hundred, or even over a thousand, kilometres over bad roads or inadequate railways. This is true, too, of some normally self-sufficient countries, like India, where certain centres of population are in deficit areas, far away from the main regions of grain production.

III. OCEAN TRANSPORT AND FREIGHT RATES

Import planning

Most importing countries try to phase their grain purchases, or arrange receivals of food aid, so that vessels can arrive and discharge at their ports in an orderly manner, with no bunching. This does not necessarily mean a steady flow of imports throughout the year. Some countries' import statistics show marked seasonal variations because at certain times of the year unloading is likely to be hampered by bad weather (e.g. heavy ocean swells or monsoon rains). Imports may also have to be reduced at harvest time because fewer lorries and waggons are available at the quays. The latter problem can be alleviated if there are adequate storage facilities both in the production areas and at the ports.

The intended smooth flow of grain imports may not, however, be achieved for a number of reasons, some outside the importing countries' immediate control. It may be, for example, that the foreign exchange necessary to finance a purchase is not available when a country would like to buy the grain. It must then make its purchases irrespective of the convenience or otherwise of the timing. Lengthy negotiations over credit can also disrupt import schedules.

There may also be occasional delays and difficulties in the loading ports of the exporting countries. Loading can be delayed by bad weather, strikes, congestion, or inland transportation difficulties. If, because of lack of equipment at its own ports, the importing country needs to charter vessels of a certain limited size, or with special equipment, delays may occur in finding the appropriate vessel.

Loading ports

Nearly all grain exports originate from developed countries: notably Australia, Canada, the European Economic Community and the United States. Argentina, China and Thailand are at present the only developing countries with a substantial grain export trade. Port conditions and grain handling in exporting countries were surveyed in detail in IWC Secretariat Paper No. 11 ("Problems in grain handling and transportation"), published in February 1980. This was after a period of rapidly expanding grain trade raised questions as to the ability of some countries to move large quantities of grain smoothly in export positions.

Over the five years since that Paper was prepared, exporting countries have handled even larger volumes of grain, apparently without undue difficulty. This is mainly because of their new investments in railways and port improvements. The finance was forthcoming because prospects seemed good for a continued expansion of trade. It should also be noted that the economic recession experienced by most industrialized countries from 1979 has reduced the volume of other bulk commodities, such as coal and iron ore, being moved, leaving more room for grains.

Most of the main grain ports in the exporting countries are equipped to load large vessels rapidly. Standard rates* applicable to many US and Canadian ports are at least 4,000-5,000 tons of grain a day. In practice, some ports may load for sustained periods at nearly 1,000 tons an hour. Difficulties can occur, however, in the event of strikes, or because of delays in bringing grain from the hinterland (this caused problems in 1984 with barley shipments from the west coast of Canada). In the US Gulf, the origin of about 40% of world grain exports, loading has from time to time been held up when barge traffic is hampered by fog, floods or ice.

Vessel types and sizes

Parallel with the great increase in international grain trade, there have been fundamental and far-reaching changes in the vessels used to carry it. In the late 1940s most grain was carried in Liberty ships - cargo vessels of some 10,000 tons. When carrying grain, such vessels had to be equipped with wooden partitions to prevent the cargo from shifting and, furthermore, some of the grain had to be bagged and placed on top to give greater stability.

Oil tankers, which could carry bulk grain with little fitting out, came into use in the grain trade in the 1950s, following the development of new cleaning techniques. They were subsequently employed extensively for this purpose, especially when oil freight rates were low. In the 1960s, encouraged by the success of transporting grain in tankers, owners began to build bulk carriers for dry commodities. These were cheaper to operate, because they required much less cleaning between trips with different loads. In 1965, some 25% of total grain shipments were in special bulk vessels. By 1970 the share was 62% and, in 1978, 89%, by which time they had almost completely displaced tankers. The use of general cargo vessels to carry grain is now minimal in terms of the overall tonnage, although still important on certain routes. It fell from nearly 40% in 1970 to 8% in 1980.

The size of grain-carrying vessels has also increased dramatically. As recently as 1970, almost 90% of grain exports were carried in 40,000 tonners or smaller, and less than 1% in vessels of over 60,000 tons. By 1980, half of the exports were being carried in vessels larger than 40,000 tons, and nearly 10% in 100,000 tonners or larger. These trends seem likely to continue. As well as being much more economical to operate, large vessels are also, proportionately, cheaper to build. For example, on the basis of 1983 construction costs, a 120,000 ton bulk carrier cost only twice as much to build as one of 30,000 tons. The lower capital and running costs per ton of grain carried are normally reflected in freight rates which, for a given route, are often much lower when a large vessel is used than for small ones.

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* As quoted in charter parties (see definitions).

But these benefits are not available to many developing countries because of the limited capacities of their ports. A survey carried out in the mid-1970s* found that, of the 46 ports round the world which were then capable of discharging grain from ships of 35,000 tons or larger, only 4 were in developing countries. While certain improvements have been made since then, there are still very few developing countries able to accept large vessels of 5,000 tons or over (see the following section, starting on page 13, on "maximum size of vessels").

As well as the size of the ship which is used for grain, the amount of special unloading equipment it carries may also have an effect on freight rates. Sophisticated machinery, such as cranes, vacuvators and grabs, involves greater capital and running costs. Developing countries which, having no such equipment at their own ports, have to import their grain in specially equipped vessels, may, therefore, be required to pay a premium above the normal freight rate.

TABLE 2

OCEAN FREIGHT RATES FOR DIFFERENT SIZES OF VESSELS

(as estimated or current at end-May 1985)

US$ per metric ton

Route	Vessel size ('000 tons)					
	14-25	20-30	25-40	30-50	over 40	over 50
Argentina to Iran	-	41.00	-	30.50 a/	-	-
Australia (East Coast) to Korea (Rep. of)	-	-	16.00	-	-	10.30
Canada (N. Pacific) to China	-	19.50	-	14.75 b/	-	-
US (Gulf) to Bangladesh	-	-	27.75 c/	-	25.25	-
US (Gulf) to East Africa	39.00	-	29.00	-	-	-
US (Gulf) to Egypt (Alexandria)	-	24.50	-	17.00	-	14.00 d/
US (Gulf) to Morocco (Casablanca)	16.00 e/	-	-	13.00 f/	-	9.25 g/
US (Gulf) to Pakistan (Karachi)	-	29.40	-	26.50	-	24.50

a/ 30-40,000 tons
b/ over 30,000 tons
c/ 20-40,000 tons
d/ Vessels of this size have to lighten outside the ports.
e/ 12-25,000 tons
f/ 25-50,000 tons
g/ Nominal

N.B. The rates shown in this table are quotations, and their inclusion does not necessarily imply that fixtures were made on that particular route at that time.

* Quoted in the "Review of the World Wheat Situation, 1976/77", published by the International Wheat Council in 1978.

The difference vessel size can make to freight rates on particular routes is illustrated in Table 2, which is based on information collected by the Secretariat for the Council's Advisory Sub-Committee on Market Conditions. The rates were those quoted at the end of May 1985 for vessels ready to load in three or four weeks' time: they do not necessarily imply that fixtures were made on those routes.

Considerable savings in freight charges could be made by countries which improved their ports so as to take larger vessels. Consideration of current freight rates prevailing on major routes suggests that unit costs fall by at least 5-10% for each 10,000-ton increase in the size of vessel chartered. If this rough rule of thumb were applied to the hypothetical case of a developing country importing 1 m. tons of grain a year in 20,000-ton vessels at an average freight cost of $25 a ton, its annual freight bill of $25 m. might therefore fall by between about $3.5 m. and $6.8 m. if it were able to accept 50,000-tonners.

Some developing countries are obliged because of shortage of storage or finance to import their grain in small cargoes. Those less than 10,000 tons are not sufficiently large for bulk shipment and have to be carried on liners* at much greater cost. For example, a rate of $60 a ton was recently quoted for a typical liner shipment (4,000-7,000 tons) from US Gulf to east Mediterranean ports. On the same route, a bulk grain vessel of 20-25,000 tons could have been chartered for between $14.50 and $18.00 a ton (free out). As another example, 4,700 tons of wheat flour in bags was booked for shipment in September 1984 between US Gulf and Hodeida (Yemen Arab Republic) at the rate of $66.50 a ton.

It should be noted that many developing countries, both large and small, have been building up their own fleets. While the aim is usually to carry a larger proportion of their export commodities under the national flag, the vessels may often be used to bring grain back to the home country. The grain freight rates already quoted do not necessarily apply to these shipments. In any case, payment for such services will not (directly) involve foreign currency. The economic advantages of larger vessels over small ones are, however, still relevant.

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* See defintions.

IV. PORTS OF DISCHARGE

Maximum size of vessels

Of the sixty-seven countries detailed in this survey, seven are landlocked. One of the others (Iraq) has at present to obtain its grain overland through neighbouring countries because of hostilities in the area of its port. In the remaining 59 countries, some 164 ports have been identified which import grain. From the information obtained, it would seem that only 12 of these ports (in 8 countries) can receive grain vessels of 50,000 tons or more alongside, while at least 46 ports in 29 countries are limited to 20,000 tonners or less. The usual cargo size is often considerably smaller than the theoretical maximum that could be handled: in a surprising number of cases it is 15,000 tons or even less. On the other hand, several countes import grain in large vessels, which anchor in the harbour area or, in some cases, in the open sea, and discharge into lighters.

Deepening the access to some ports is made difficult because of their location. Some are situated behind sandbars, or some distance up rivers. Silting can be a problem, and regular dredging may be required if the capacity of the ports is not to fall. Ports where dredging is vital include Douala (Cameroon), Matadi (Zaire), Calcutta (India) and Chittagong (Bangladesh).

An important limiting factor in many ports may be the availability of berths. Unless there is a bulk grain discharging facility, vessels may have to wait their turn, among ships carrying other goods, at the general cargo berths. This can lead to substantial demurrage payments.

Methods of grain discharge

At one time, grain was always bagged before transportation and shipment. The much faster rates of loading and unloading, and the reduced need for labour, led to the installation of bulk handling systems in many exporting and some importing countries by the 1960s. The process was accelerated after the introduction of large bulk carriers. Most grain is now shipped in bulk, exceptions being rice, wheat flour and such quantities of grain that have to be bagged and laid on top of bulk cargoes to prevent them from shifting*.

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* This practice is not required with modern bulk carriers unless, for any reason, they are not carrying a full cargo.

As an example of the slower loading of bagged grain, a cargo of some 50,000 tons of bagged barley destined for Saudi Arabia recently took 2 weeks to load in Belgium, working 2 shifts a day. Loading over a million 50 kg bags in such a time was regarded as a considerable achievement. But the same amount of bulk grain could have been loaded at Antwerp in four days, on the basis of 1,000 tons an hour with double shifts. Even with modern bagging equipment the work is labour intensive, and the cost of bags must also be taken into account. At the end of 1983 a standard 50 kg jute bag (weighing 770 gm) cost between 40 and 50 US cents, and the price of jute has subsequently risen because of short supplies.

Developing countries have been slower to install bulk discharge facilities, partly because of their cost and partly also because, in many countries, the grain must still be bagged for onward movement from the ports. But the practically universal use of bulk vessels in the grain trade put ports without suckers, vacuvators or grabs at a considerable disadvantage, and most now have some such equipment.

At least 101 of the 164 ports whose details are set out in the Appendix Tables can now provide bulk discharge. The equipment might, of course, be available at only one quay, and possibly only one vessel can be dealt with at a time so that, even at these ports, some cargoes may have to be bagged before discharge. In about half of these ports, grain can be discharged direct into silos or flour mills (often by systems of belt conveyors). In others, it may be loaded straight onto lorries or rail waggons, while in a few the grain is discharged straight onto the quays and bagged there. At least 25 ports still discharge some or all of their grain cargoes in bags, the bagging often being done by local labour in the ships' holds. In 24 ports lighters or barges are known to be used to take grain cargoes ashore.

Some of these methods, as well as being slow, are prone to result in losses or waste. Discharge via lighters, for example, may be impossible in rough seas, and there can be appreciable spillage in heavy swells. Grain which is piled in bulk onto quays can easily become contaminated, and there may be losses due to wind and rain. Rough handling can split grain bags.

Even where bulk unloading systems are installed, grain is not necessarily discharged very rapidly. Only 28 of the ports had berths with rated discharge of over 2,000 tons a day. This compares with, for example, well over 1,000 tons per hour at several ports in Western Europe. Many had daily rates not exceeding 1,000 tons, and sometimes as low as 500 tons. Those rates apply to normal working: it may be possible to improve on them in particular cases by, for example, working three shifts a day rather than two. It should also be noted that these low discharge rates are not necssarily a reflection of poor or inadequate equipment. Very often the offtake capacity of the access roads and railways is the limiting factor.

The difference vessel size can make to freight rates on particular routes is illustrated in Table 2, which is based on information collected by the Secretariat for the Council's Advisory Sub-Committee on Market Conditions. The rates were those quoted at the end of May 1985 for vessels ready to load in three or four weeks' time: they do not necessarily imply that fixtures were made on those routes.

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* See defintions.

But these benefits are not available to many developing countries because of the limited capacities of their ports. A survey carried out in the mid-1970s* found that, of the 46 ports round the world which were then capable of discharging grain from ships of 35,000 tons or larger, only 4 were in developing countries. While certain improvements have been made since then, there are still very few developing countries able to accept large vessels of 5,000 tons or over (see the following section, starting on page 13, on "maximum size of vessels").

As well as the size of the ship which is used for grain, the amount of special unloading equipment it carries may also have an effect on freight rates. Sophisticated machinery, such as cranes, vacuvators and grabs, involves greater capital and running costs. Developing countries which, having no such equipment at their own ports, have to import their grain in specially equipped vessels, may, therefore, be required to pay a premium above the normal freight rate.

TABLE 2

OCEAN FREIGHT RATES FOR DIFFERENT SIZES OF VESSELS

(as estimated or current at end-May 1985)

US$ per metric ton

Route	Vessel size ('000 tons)					
	14-25	20-30	25-40	30-50	over 40	over 50
Argentina to Iran	-	41.00	-	30.50[a/]	-	-
Australia (East Coast) to Korea (Rep. of)	-	-	16.00	-	-	10.30
Canada (N. Pacific) to China	-	19.50	-	14.75[b/]	-	-
US (Gulf) to Bangladesh	-	-	27.75[c/]	-	25.25	-
US (Gulf) to East Africa	39.00	-	29.00	-	-	-
US (Gulf) to Egypt (Alexandria)	-	24.50	-	17.00	-	14.00[d/]
US (Gulf) to Morocco (Casablanca)	16.00[e/]	-	-	13.00[f/]	-	9.25[g/]
US (Gulf) to Pakistan (Karachi)	-	29.40	-	26.50	-	24.50

a/ 30-40,000 tons
b/ over 30,000 tons
c/ 20-40,000 tons
d/ Vessels of this size have to lighten outside the ports.
e/ 12-25,000 tons
f/ 25-50,000 tons
g/ Nominal

N.B. The rates shown in this table are quotations, and their inclusion does not necessarily imply that fixtures were made on that particular route at that time.

* Quoted in the "Review of the World Wheat Situation, 1976/77", published by the International Wheat Council in 1978.

The unloading capacity of the port of destination is taken into account when determining freight rates, as time spent at the berth can reduce the number of round trips a vessel can make. Countries with slow discharge rates may therefore incur higher freight charges than their better equipped neighbours. While the savings which could be achieved from improving discharge facilities are likely to be considerable, it is not possible to formulate general rules as a number of other factors, which vary with each individual port, must be taken into account in the calculations.

Speeding grain discharge does not necessarily involve very heavy capital expenditures. Reliable unloading equipment can be obtained relatively cheaply. Small mechanical or pneumatic suckers can be positioned on the ships and connected (for example) to bagging hoppers on the quayside. Such versatile equipment has the advantage of dealing with a wide variety of vessel types. Machinery can be obtained which discharges grain from vessels, and also fills and empties storage bins, lorries and railway waggons. Automatic bagging units are available which can bag grain at the rate of 50 tons per hour. These units may, moreover, be used for other bulk commodities with similar flow characteristics, e.g. fertilizers. Of course, it must be recognized that such equipment needs a power supply, and, if driven by oil, may be expensive to run.

Methods of grain handling in developed countries are continuously evolving under the pressure to cut labour costs. Even if such costs are of less concern to developing countries, some of the new techniques being introduced in exporting countries will inevitably affect them. Among these are the containerization of cargoes (some 5 m. tons a year of bulk cargoes are now carried in containers, and this total is expected to grow rapidly), and the use of large (1-2 ton capacity) polymer bags, known as flexible intermediate bulk containers. The use of containers cuts down on handling, speeds up loading and unloading, considerably reduces grain damage and spillage, and provides a secure form of medium-term storage. High capacity continuous ship unloaders (using bucket elevators or, better still, inclined belts) can also lead to greater efficiency and speed. But it should once again be stressed that it is pointless, and wasteful of resources, to improve the rate of unloading at a port without ensuring that the roads and railways have the capacity to remove grain at a comparable rate.

Spillage and waste

Considerable amounts of grain can be lost, or spoiled, at an unloading port during grain discharge and bagging. It may be spilled, contaminated, infested, or deteriorate through exposure to the elements. At Manila, in the Philippines, where grain has to be discharged into lighters in the open sea, up to 4% of the amount of grain imported is said to be lost through spillage. As nearly a million tons of grain are unloaded at that port each year, the loss could amount to several million dollars. Comparable details are not available for most developing countries, but on the assumption that the rate of spillage and other unloading losses averaged, say, 1% overall, the value of grain thus lost would be about $200 m. at current cif prices. If it were possible to attain the efficiency of most developed countries, where grain losses during unloading are usually less than 0.5%, very considerable savings could be made.

Port congestion

The volume of seaborne cargoes unloaded in developing countries soared during the 1970s. It increased from 453 m. tons in 1970 to 938 m. tons in 1980. Of this total, dry cargo unloadings rose from 194 m. tons to 479 m. tons. The amount of dry cargo loaded in developing countries also increased, although at a slower pace - from 373 m. to 552 m. tons. This expansion in trade led at times to severe congestion. Conditions were, perhaps, at their worst in the mid-1970s, when waiting times for access to several ports in western Asia and West Africa exceeded 100 days. It has been estimated that the costs of these delays, per ton of cargo held up, in many cases exceeded the latter's market value.

Apart from the sheer increase in the amount to be handled, contributory causes of congestion include bunching of shipments, unduly slow discharge rates, strikes, and bad weather. As already noted, the discharge rates may reflect the limited offtake capacity of the country's transportation systems rather than shortcomings in the port installations. To some extent the problem becomes self-perpetuating, as shipowners are often reluctant to allow their better vessels to be held up. The older ships they send instead may be slower to unload (because of, e.g. smaller hatches) and more prone to breakdown. It should be noted that while port congestion can seriously affect imports, by delaying supplies and adding to costs, it may have even more far-reaching consequences for exports, as it can result in the permanent loss of markets.

In general, the level of port congestion has subsided since the peak reached in the mid-1970s. Figures quoted by UNCTAD on the average waiting time of general cargo vessels entering 60 ports (both in developed and developing countries) show a decline from nearly 40 days in 1976 to only 4 days in 1981. But the UNCTAD report noted that the problem could potentially recur when world trade recovered from its current depressed conditions.

Recent examples of delays to grain shipments quoted in Lloyd's List since June 1984 include Safi (Morocco) 12 days, Chittagong (Bangladesh) 21 days and Casablanca (Morocco) 10 days at silos. It was reported elsewhere that the average layover time for grain ships in Chinese ports was 8.2 days in 1979; 7.7 days in 1980 and again 7.7 days in 1981.

Demurrage

Demurrage is compensation paid by charterers to vessels' owners when the former retain a vessel for longer than the period laid down in the charter party (i.e. the formal agreement between them). The charter party will normally take into account the rated loading and discharge capacities of the ports specified. It is, therefore, undue delays rather than slow unloading methods which incur such penalties. The converse of demurrage is despatch, which the charterers may earn by unexpectedly rapid turnaround.

Demurrage rates are negotiable and vary: in the case of 25,000-ton bulk carriers, for example, the rate was recently estimated at US$4,500-$5,000 a day. For larger ships the rate increases: for 35,000-tonners they were from $6,500-$7,000. These payments, which are usually in cash and involve hard currency, can represent a considerable financial burden for developing countries. A hypothetical example illustrates this. A country importing 2 m. tons of grain a year in 25,000-tonners would have to pay an extra US$2 m. if the average demurrage time was 5 days.

The information obtained on port conditions in developing countries shows that vessels have been delayed for many different reasons, e.g.

(i) diversion of vessels to secondary ports with lower discharge rates because of congestion at the intended ports (Morocco, Tunisia).

(ii) bad weather, including rains which make it necessary to close hatches (Madagascar, Mauritania) and heavy ocean swells which force vessels to leave the wharfs (Mauritania). (But where bad weather can be expected at a port of discharge, the charter party will usually take this into account, and demurrage would not be payable for a specified number of days' delay due to that cause.)

(iii) lack of, or breakdowns in, stevedoring equipment (e.g. grabs, vacuvators, tractors), or shortages of bags where these are used (Indonesia, Philippines).

(iv) labour problems, and coordination difficulties between stevedores and transport operators (Brazil, Egypt, Turkey).

(v) shortcomings in the local transport systems, including insufficient numbers of lorries, railway waggons, barges and lighters (Bangladesh, Cameroon, Ghana, India, Mauritania, the Philippines, Tanzania and Zaire). This problem may occur seasonally, when lorries or waggons are busy moving the domestic harvest (Ecuador, Tunisia).

(vi) delays in removing grain from the wharfs or port storage facilities because of heavy local road traffic, or slow turnround of vehicles (Algeria, Cameroon, El Salvador, Israel and Zaire).

Storage facilities

Storage facilities were not specifically referred to in the Council's mandate and have not been investigated in detail. Secretariat Paper No. 13 ("National Stockholding Policies"), issued in August 1983, included details of stockholding policies and practices in many developing countries. The study noted that, because of the heavy costs of stockholding, importing countries were generally reluctant to carry grain stocks in excess of their barest working requirements, especially when low-priced supplies were plentiful on world markets. A case could be made for increased stockholding in developing countries to cushion them against any recurrence of market shortages or high prices, but few were able to afford to build more silos or fill them with grain, and would therefore have to seek international financial and technical assistance. Loans are available from the World Bank and other international financial organizations for this purpose. A number of developing countries (including Bangladesh, Brazil, Egypt, Tunisia and Turkey) are currently building silos with the help of such loans.

The best site for a country's main grain stores may not necessarily be at the port - this will depend on a number of factors, including the degree of congestion there and the relative location of the main centres of consumption. But some storage capacity at the ports is desirable to help even out the flow of supplies, and a number of countries have placed their flour mills there, with great advantage from the point of view of reducing handling.

In most developing countries port storage facilities are regarded as inadequate in respect both of capacity and type. Very often the grain is put into warehouses, sheds or bins. When these are full, it has to be dumped in the open, either in bags or sometimes in bulk, and covered by tarpaulins.

The condition of grain kept for any length of time in the open, or in unventilated stores, may seriously deteriorate due to overheating, attacks by insects, rodents and micro-organisms, or contamination with dust. Some experts believe that losses through inadequate storage in developing countries may account for 5-10% of total grain supplies. On the basis of their annual grain production of around 400 m. tons and total imports of 100 m. tons, this would mean that at least 25 m. tons of grain - equal to half of their annual wheat imports - could be lost each year through this cause.

There are other expedients which may ease the storage problems, at least in the short term, at lower cost. For example, surplus tankers and bulk carriers can (in the present state of the ocean freight market) be obtained relatively cheaply and converted to provide floating discharge and storage facilities. Moored in a sheltered part of a port, they can be used as a dispatch centre, whence small coasters or barges take supplies at reduced cost to other, minor, ports, thus both easing port congestion and reducing the burden on the roads and railways. Floating facilities can also be used to allow large bulk carriers to lighten before discharging the rest of their cargoes directly into the shore-based facilities. An example is to be found at Port Said, where a tanker, which can store up to 20,000 tons of grain, is equipped with 12 pneumatic elevators to discharge bulk grain from vessels of up to 60,000 tons at a rate of 2,500 tons a day. There is another floating facility at Jubail in Saudi Arabia.

Apart from questions of securing against disruptions in supply, the aim of efficient grain management will normally be to reduce the need for storage as far as possible. Stored grain inevitably loses quality over time, even in purpose-built facilities. Silos are costly to build and maintain. Grain in store represents tied-up capital, which could be earning money elsewhere. The apparent need for storage at the ports in many countries could well be reduced if the inland transportation system serving them were made more reliable and efficient. That is the subject of the next section.

V. INTERNAL TRANSPORTATION

The problems for developing countries associated with seaborne grain trade have attracted a great deal of attention, but less emphasis has been put, at least until recently, on the difficulties attending the final stage of the movement of grain within those countries. This is no doubt because comparatively little information has been available about the capacities and conditions of their roads, railways and waterways. Yet, overall, the amount of grain which moves over these transport systems is enormous. A third of the population of Africa is urban, as is a quarter of the population of South Asia. All the grain needs of those people must be brought to them, either from the ports or from the hinterland. Even in rural areas not all families are self-sufficient in basic foods and grain moves to and from local markets. Processing of grain adds to the amount of transportation. Wheat, for example, may be moving in one direction to a mill, and back again in the form of flour.

Distance is a major factor. Many countries are very large, and grain must be carried, at great expense, over hundreds of kilometres to reach the centres of consumption. Zaire, some of whose largest towns are 1,500 km distant from its only port, is an extreme example. But a journey of 15 km involves the same timely processes of loading and unloading, so transportation can be a major problem even in those countries where the ports are close to the main urban areas.

Information compiled by the Secretariat for this paper suggests that deficiencies in developing countries' transport systems lie behind many of their grain handling problems. Even where resources are scarce, as in the majority of these countries, there is a strong case for giving high priority to investment in roads, railways and waterways. Improvements would not only facilitate the handling of imports and the distribution of domestic harvests, but also assist the flow of export products and, indeed, generally benefit their economies. Large new projects are not necessarily required: very often the first step should be to prevent further deterioration of existing equipment and facilities.

It should be noted, too, that difficulties of access to rural areas often hinder the development of agricultural production. If producers are to be encouraged to increase their output beyond mere self-sufficiency, they need to be able to take their crops to markets, and not have to spend too much time doing so. Higher yields will often require the application of fertilzers. If these cannot reach the farmers, or take too long on the journey and arrive after the optimal application dates, no significant increase in output is likely to be achieved. Unfortunately, this problem of access is not easily solved. Linking enough productive areas with the marketing system to make much difference to a country's agricultural economy will require an extensive network of feeder roads. Although these rural roads need not all be surfaced, farmers will not be able to participate fully in the marketing system if they cannot rely on using them for most of the year. In the case of motor transport, this also implies an uninterrupted supply of petrol or diesel fuel, and setting up local garages and repair facilities.

Transportation difficulties are frequently encountered as soon as the grain is unloaded at a developing country's port. In many countries the mills or storage centres are outside the port area, and even if the distance is only a few kilometres, lorries carrying the grain may be held up by congestion in the roads and streets. These difficulties may be compounded by poor management and lack of coordination. Examples of delays caused by road congestion near the ports have been found in Algeria*, Bangladesh, Cameroon and the Philippines.

Too few lorries and railway waggons at the quayside (especially when the local harvest is also being moved) are often a cause of delays in unloading. Vehicles may also be slow to discharge and return to the quayside, for various reasons. Examples of such problems have been noted in Brazil, Cameroon, El Salvador, Ghana, Kenya, Mozambique, Nigeria, Somalia, Tunisia and Zaire.

When grain cargoes are discharged in bags, they are commonly moved away to the local storage area on flat trailers towed by agricultural tractors. Insufficient numbers of these vehicles and slow loading and unloading cause delays in, for example, Madagascar and Senegal.

Roads

Rural tracks which sufficed for traditional transport have often proved wholly inadequate for heavy motor vehicles. They may be completely impassable after heavy rains, and large areas served only by earth tracks in countries such as Cameroon, Mozambique and Zambia are cut off for months during the rainy season. There are, generally, few bridges in developing countries. This is a particular source of difficulty for freight transport, necessitating either ferries (which may be inoperable when river levels are low) or lengthy detours. This problem is most acute in countries with many waterways (such as Bangladesh) but can also arise in some like Chad, where the major grain supply routes have to cross a single large river.

In some countries, such as Guatemala, Ethiopia, Kenya and Mozambique, large areas are not served by motor roads at all. If there is a local food shortage, people have to travel, sometimes long distances, to distribution centres. Because of the lack of roads, it is possible for a country to have a grain surplus in one region while there are severe shortages in others. Recent examples are Ethiopia, Zaire and Vietnam. As already noted, inadequate rural road networks are a major factor contributing to the failure of many developing countries to increase their food production in step with requirements.

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* It is reported that new roads have recently been constructed in Algiers which will ease the problem there.

Although most developing countries have instituted road-building programmes, in many of them the proportion of roads with hard tops is still only 10-20%. Among those best served with all-weather roads are the countries of North Africa, where about 60% are paved and macadamized, and India, where the proportion is 54%. But, unless asphalted roads are constructed to the highest standards, the effects of hot weather and heavy traffic can lead to a rapid deterioration as the surface becomes rutted and crumbles. It has been estimated that in West Africa the cheaper form of asphalt road (thickness 15/20 cm.) needs to be resurfaced every six years. The cost of such resurfacing is about US$9,000 per kilometre. In Togo, to take a typical example, 250 km of its total asphalted road network of 1,500 km should, accordingly, be resurfaced annually, at a cost of $2.25 m. But the whole Togolese budget for roads (construction as well as maintenance) amounts only to some $1.1 m.

Poor roads affect the condition of vehicles using them, resulting in a high rate of breakdowns and increased fuel consumption. The latter is an important consideration as fuel is often scarce, very expensive, and has to be paid for in foreign currency. Lorries, of which there are in any case too few in most developing countries, are kept off the road for long periods because of the shortage of spare parts. Another factor contributing to the problem of spares is that, in many countries, the lorry fleets are made up of a variety of makes of vehicles purchased from, or supplied under development aid programmes by, several countries. Parts are often not interchangeable and spares rarely available to cover the whole range of makes. In many countries there is also a scarcity of skilled mechanics to make effective repairs.

Railways

Railways are well suited for carrying large quantities of goods such as grains over long distances and, under certain conditions, may be a considerably cheaper way to move grain than lorries. Although most developing countries have railways, many of their systems suffer from neglect and lack of investment. In many of them, tracks and rolling stock have deteriorated, and carrying capacities have fallen. Problems include the expense of obtaining equipment and rolling stock; the difficulties of maintaining them to a good standard; the fact that existing lines may not connect the wharfs, silos and mills, so that more handling is necessary as loads are taken on and off road vehicles; and the vulnerability of tracks to floods and landslips as well as, in some countries, to guerilla attacks. Tracks tend to be single (causing congestion in the event of breakdowns, or if traffic is heavy) and some countries' networks include systems of different gauges, necessitating transfer of cargoes. Management problems and lack of skilled manpower compound the inefficiency of railways in many developing countries.

There are signs of renewed interest in the potential of railways in developing countries, partly, perhaps, because of the increases in fuel prices in the last few years which greatly raised the cost of road transport. Several have plans to build new lines, some of them linking with the existing systems of neighbouring countries. But railway construction, often involving heavy earthworks, tunnels and viaducts, tends to be very expensive. When governments seek to economize, such large projects, which do not promise a quick financial return, tend to be deferred.

Waterways and coastal shipping

Some countries, like China, Senegal, Sudan and Vietnam, are endowed with considerable lengths of navigable waterways, while in others, such as Tanzania and Mozambique, centres of population are separated by large lakes. Until recently, the possibilities offered by waterways for freight transportation were often neglected, and quays and vessels were allowed to run down. Dredging was not carried out and many waterways became too shallow to be used. Some countries are, however, beginning to recognize that although slow, waterways offer the means for the cheap movement of considerable loads. Often, cargoes can be unloaded directly onto barges from ocean-going vessels: this is particularly convenient when, as in Egypt, silos or mills are sited next to the rivers. In some countries (for example, Bangladesh and Zaire) rivers are used in conjunction with their fragmented railway networks to form an integrated system.

Countries with long coastlines can often make considerable savings in foreign exchange by developing one or two ports to handle large vessels, and using small ships to carry the grain to minor ports up and down the coast. Countries developing their coastal shipping include Algeria, Brazil, China, Indonesia and Tunisia.

Security

Problems of security affect the transport of grain in a number of developing countries. One aspect of this is pilferage, especially from temporary stores and lorries. Railways and roads are also often targets for terrorist activity, and their use for military purposes may interrupt or even prevent altogether the normal traffic of goods, even of necessities such as grain.

VI. LANDLOCKED COUNTRIES

Several of the developing countries covered in this survey are landlocked. One (Burkina Faso, formerly Upper Volta) depends on a single country as its outlet to the sea. The other six (Chad, Mali, Niger, Zambia, Zimbabwe and Bolivia) are able to use the ports of two or more other countries. For various reasons, certain countries which are not physically landlocked may also use a neighbouring country's transport systems to handle some of their foreign trade. This is the case, for example, in Zaire, where the sea coast in the far west is remote from the industrial areas in the south-east, and in Iraq, where hostilities are continuing in the area of its principal port (Basrah).

Even when relations between a landlocked country and its neighbour are friendly - and this is not always the case - conflicts of interest are likely to occur. The country with the port may not give high priority to dealing with its neighbour's grain imports, especially if the harbour is congested with its own trade. Delays and wastage there, and up to the border of the landlocked country, can be considerable.

Another problem faced by landlocked countries is the likelihood of delays at the frontier for customs and administrative reasons. These can seriously reduce the rate of flow of grain imports. Railway waggons and road vehicles are likely to be involved in unproductive waiting times. Disputes may arise, too, as to the use to which a country is putting its neighbour's rolling stock.

Perhaps the biggest disadvantage suffered by landlocked countries is the additional expense incurred in getting their supplies. The eventual cost of grain to their border can be twice, or even three times, its fob price. Some examples are given in Table 3.

LANDLOCKED COUNTRIES - GRAIN IMPORT MEANS AND COSTS

Landlocked country	Neighbouring country and ports of import	Mode of transportation	Estimated cost of land transport, including bagging (US$)	Estimated average transit time ex-vessel to destination (days)	Monthly food offtake (tons)
Chad	Cameroon - Douala	Rail/road	130-200	25-45	30,000
	Nigeria - Lagos, Apepa	Road	170-220	6-13	30,000
Mali	Ivory Coast - Abidjan	Bamako by road or Timbuctu by rail/road	80 165	10 21	16,000
	Senegal - Dakar	Rail	50-60	7-10	6,500
Niger	Benin - Cotonou	Rail/road	75	15	15,000
	Nigeria - Lagos, Apepa	Road	150-165	5-8	30,000
Burkina Faso (Upper Volta)	Ivory Coast - Abidjan	Rail	60-80	7-10	10,000
Zambia	Mozambique - Beira Nacola, Maputo	N/A	N/A	N/A	N/A
	Tanzania - Dar es Salaam	Rail	95	10	30,000
Zimbabwe	Mozambique - Beira, Mputo	Rail	32-40	10-16	8,000
	South Africa - Durban, Port Elizabeth	Rail	62	10-14	100,000

N/A Not available

N.B. No information is available about delays and costs of grain delivered to Bolivia, which has access to the sea at Matarani (Peru), Antofagasta (Chile) and Arica (Chile), among other ports.

VII. SUMMARY AND CONCLUSIONS

Most developing countries have experienced a very rapid increase in their grain imports in recent years. Despite continuous improvements, especially in their ports, the volume of imports and domestic grain that has to be distributed to their consumers has put their handling and transportation facilities under tremendous strain. Congestion is commonly experienced, resulting both in delays and increased costs. Delays make import planning difficult and may, in the case of some of the least developed countries, lead to shortages of vital foodstuffs. The costs are increased because of higher than necessary freight rates, demurrage charges, and spillage and waste.

Despite efforts on the part of many developing countries to improve agricultural productivity, import needs seem likely to go on increasing in most of them for some time to come. Recent work by the Secretariat* suggested that the grain imports of low-income developing countries could almost triple between 1980 and 2000, and that those of other developing countries might also increase considerably. Given the mounting financial difficulties of many such countries, their prospects of being able to afford the investments necessary to stop the logistical situation deteriorating further are not good. Unless action is taken quickly, an increasing number may be quite unable to handle the imports they desparately need to sustain their rapidly growing populations.

The survey carried out by the Secretariat into the conditions experienced in 67 developing countries has highlighted difficulties which may occur at all stages of the import process, from the purchase of grain in the exporting country to its delivery to the final user. It has also shown the diversity of conditions encountered - no two countries are the same, and generalities can be misleading. Nevertheless, certain points seem to come up again and again.

For example, many developing countries obtain their grain in small shipments, which involve high freight rates, or on liner terms, which are even more expensive. But the use of larger vessels might involve heavy expenditure on the deepening of access channels and berths. Lighters tend to be an unsatisfactory way of dealing with the problem because of spillage and low rates of discharge. The situation could be relieved in some cases by using old tankers or bulk carriers as floating elevators. Investment in quite simple equipment would speed unloading at the ports and result in a quicker turnround of vessels, and therefore lower freight rates. Some countries still require grain to be bagged for storage or onward transportation from the ports. If grain could be discharged in bulk, further savings might accrue, even if bagging had to take place onshore.

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* Secretariat Paper No. 14 - "Long-term grain outlook".

Port congestion is a major cause of heavy demurrage payments, which developing countries can ill afford. It stems both from an inability to plan imports - because of, for example, lengthy negotiations over finance - and, more particularly, deficiencies in the local transport systems. Difficulties in that respect include insufficient lorries and rail waggons, shortages of spare parts and skilled mechanics, inadequate road networks, and management and coordination problems. Investment here could reap considerable dividends both in respect of the movement of grain in the country and its general economic development. Because land is often scarce in port areas, purpose-built grain terminals may not be economic unless they can be utilized constantly. But if grain is discharged at general cargo berths there is all the more reason for the operation to be completed as rapidly as possible.

Many developing countries lack proper grain storage facilities. Overall capacity is usually too small to cope with the needs arising from the volume of supplies, whether domestic or imported, and much of the storage facilities that do exist are seriously inadequate. Wastage in stored grain is considerable. But modern silos are expensive to build and cost a lot to run. The need for additional storage capacity might be reduced to some extent if grain handling at the ports, and, in particular, the transport of grain, were efficient and smooth running. This is not to deny, however, that many developing countries urgently require improvements in their inland storage capacity, especially if their domestic production expands to make them more self-reliant.

Difficulties of internal transportation are encountered in the majority of developing countries. In many, roads have poor surfaces, leading to breakdowns of grain-carrying vehicles. Earth surfaces may be rapidly washed away in heavy rains, and the roads may be impassable for months during the wet season. River crossings are a particular source of difficulty. The absence of feeder roads in rural areas often inhibits local production because of marketing difficulties.

Railways are an ideal way of transporting bulk commodities but they are expensive to construct and maintain. Nevertheless their benefits increase considerably as national systems are extended and begin to link up with one another. Differences in gauge, however, sometimes cause problems. More use could probably be made of inland waterways and coastal shipping for the distribution of grain in many countries.

Some of the difficulties experienced with various aspects of grain handling and transportation, including problems of coordination between the various activities, result from a lack of training of the people involved. Programmes of education and training are required to give both workers and management the skills necessary for the smooth and economic running of a complex grain handling and distribution system.

The investments needed to enable developing countries to handle their grain supplies more effectively may often be very large. Others may be comparatively small, yet rewarding in terms of the resulting savings. But few developing countries are able to contemplate long-term projects without assistance. Much of the finance will necessarily have to be provided by developed countries or international financing institutions. Some indications of what finance might be available are set out in Part 2 of this report. This survey did not go into the question of costs, which would require detailed on-the-spot investigations in each country. But the details provided may nevertheless help potential sponsors to see how their assistance could be used to the best advantage. Without such assistance, the expected growth in international grain trade could be imperilled, to the detriment of producers and consumers alike.

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PART 2 - FINANCING FACILITIES

I. INTRODUCTION

A principal objective of the Council in initiating the study of grain handling and transportation in developing countries was to provide evidence of the needs of those countries for assistance to upgrade their installations, taking into account the prospective increase in grain import requirements. During discussions on the scope and methods of the study, it was suggested that it should also cover the sources, both bilateral and multilateral, of finance which might be available to developing countries to improve their handling and transportation systems.

The Secretariat accordingly wrote to potential donor countries seeking information on any credit facilities they might make available, whether from official or private sources, for improvement in port facilities and associated equipment, and modernization or restoration of transportation networks and the construction of new import silos and/or improvements in existing ones, for example.

The replies that have been received are summarized in the following pages. In addition to the details from 17 donor countries, information is included on the financing facilities of the World Bank and the FAO Food Security Assistance Scheme. The contents of this section are as follows:

II. FACILITIES AVAILABLE FROM DONOR COUNTRIES

AUSTRALIA

Australia has no official financing facilities for grain infrastructure projects in developing countries, but such facilities may be available through commercial channels.

AUSTRIA

The Federal Ministry of Agriculture and Forestry does not grant any credits to the developing countries. The Federal Chancellory allows credits for various projects in developing countries (grain stocks, means of transport, telecommunications, etc.), however under the condition that Austrian commodities are purchased.

BELGIUM

The rules governing the supply of capital equipment and services to developing countries by Belgium also apply, in general, to the grain handling and transportation sector.

Finance for developing countries can be arranged either through commercial credits extended by the banking sector, or with credits from public funds at reduced interest rates, or without interest, for repayment over 30 years including a 10-year grace period. Such finance can also be made through direct contributions by the Administration Générale de la Cooperation au Développement (AGCD) within the framework of development aid. Funding can, of course, comprise a combination of any of these elements.

No African country has so far requested funds for grain handling or transportation projects through commercial or public credits. But a grain unloading installation at Bombay, supplied by a Belgium company in 1973, was financed under a state-to-state loan extended by Belgium in 1972.

A number of projects (listed below) have been financed by the AGCD, all of them as gifts. It should be noted that it is sometimes difficult to differentiate actions which specifically relate to grain transportation, handling and stockholding from more general development projects in the agricultural sector, as the latter tend to be integrated projects (e.g. the construction of a silo as an element of the development of an agricultural cooperative.

The target share of agricultural projects is 17% of all aid extended under the Belgian development cooperation policy.

SUMMARY OF COOPERATION PROJECTS APPROVED BY THE AGCD

Country	Project	Years	Amount (million Belgian francs)
ZAIRE:	Refurbishing mill at Luabo	1982	0.4
	Construction and equipping of mill at Nyakariba	1982	2.2
	Tractor and trailers for Balele	1981	1.4
	Construction of warehouse for stockholding, and supply of vehicles at Sambua	1984	2.6
	Construction of agricultural centre at Bominenge	1981	0.4
	Improvement of farmers' diets at Kingunge	1982, 1984	1.3
	Harvest machinery at Sambua	1981	1.1
HAITI:	Construction of silo at Carca-la-Source	1983	0.8
	Construction of silo	1981	0.9
	Construction of silo	1983	1.4
	Construction of silo at Carvajal	1981	0.8
RWANDA:	Rural leadership at Byumba	1981-85	108.7
	Food production at Mudasomwa	1981-85	34.0
	Two grain mills at Bugarama	1982	0.3
FAO:	Training course	1982	1.6
	Food security programme (part)	1982	6.0
	Study on grain stockholding for the African Regional Fund	1981	4.0
	Accelerated training of cooperative staff	1982	5.0
ECUADOR:	Stock management training	1982-84	20.0
ZIMBABWE:	Equipment for development of Tribal Trust Lands	1981	13.0
TUNISIA:	Improved crop protection	1981-85	136.7
	Trilateral action on land reform	1984-85	105.0

CANADA

Financial facilities or assistance can be provided by two government agencies: (i) the Canadian International Development Agency, and (ii) the Export Development Corporation.

The Canadian International Development Agency has provided significant levels of assistance to numerous developing countries to assist in the ability of these countries to handle increased grain imports. At present, CIDA is involved in active grain storage projects in at least six countries: Algeria, Bangladesh, Belize, Brazil, Egypt and Pakistan to the extent of about Can.$84 m. (see Annex). In addition CIDA has financed numerous projects in the area of infrastructure which contribute indirectly to grain importing capacities (port projects, railways, internal transport).

CIDA's policy is to make funding available to eligible developing countries on generous concessional terms: grants, loans at 0% interest, 10 years' grace and 50 years to repay, or loans at 3% interest, 7 years' grace and 30 years to repay. The programme operates on a responsive basis: that is, if projects are found to be economically viable and in areas of Canadian industrial competence, Canada will consider requests from eligible developing country governments for financing. While 80% of CIDA assistance is targeted to countries defined by the UN as less developed, some CIDA projects are undertaken in higher income developing countries.

The Export Development Corporation provides medium and long-term financing in order that Canadian exporters, who are competitive in terms of price, quality, delivery and follow-up service, are also effectively competitive in terms of the availability of financial services. EDC does not become involved when financing under 2 years is required. Financing of less than 2 years is done by the commercial banks. EDC offers four financing services that can assist an exporter to compete on equal footing with exporters in other countries: loans, multiple disbursement agreement loans, allocations under lines of credit, and note purchase.

Every situation is different, but typical applications of these export financing services are those that involve sales of Canadian goods as well as engineering and consulting studies and services.

EDC generally arranges financing of up to 85% of the contract value of the export transaction. When competitive circumstances warrant, financing for a portion of local costs incurred by the buyer may also be arranged. The term of repayment by the foreign buyer is related to economic factors such as the useful life of the product and the cash flow of the project. In the case of services, the repayment period depends on the nature of the services and the possibilities for follow-on Canadian procurement. The characteristics of the borrower, the nature of the foreign market, and other factors also influence the makeup of the related financial package. EDC's export financing services may be provided for export transactions carried out by any person or organization carrying on business in Canada.

EDC seeks the active involvement of banks and other financial institutions in supporting Canadian exports; bank participation is encouarged wherever possible. Such instances include the financing of downpayments, interest during construction, local cost financing, as well as direct participation in the financing of the Canadian goods and services being exported. This bank involvement may take the form of co-lending, where both EDC and the banks are jointly involved in the loan negotiation; participation, where EDC invites a bank into a loan that has already been negotiated; and parallel lending, where both EDC and the bank make separate loan agreements with the foreign borrower in connection with a single transaction.

Export financing support is available for services and studies. EDC recognizes four types of services:

1. Engineering and Consulting Studies

These studies are those export activities where a foreign client retains a Canadian engineering or consulting organization to study and report on a specific subject. The study usually requires technical input from a single discipline and involves professional work in Canada and abroad.

2. Engineering and Consulting Services

These services are those export activities where a foreign client retains a Canadian engineering or consulting organization to carry out professional services which require one or more professionals with or without support equipment to be stationed abroad for an extended period of time.

3. Feasibility studies

These studies are those export activities where a foreign client retains a Canadian engineering or consulting organization to carry out a multi-disciplinary study of the technical, commercial, economic and financial feasibility of a proposed project or investment opportunity.

4. Engineering/Procurement Construction Management Services for EPCM Projects

EPCM projects are those export activities where a foreign client retains a Canadian consulting engineering organization to assume the responsibility for the tasks of engineering, procurement, construction and project management, training, start-up and sometimes operation of an industrial, commercial, educational or infrastructure type of project.

While these facilities are available through EDC they have not been utilized to any great extent for the activities covered in the study.

Annex

Country	Project name	CIDA contribution (Can.$)
Algeria	Concrete silos	$44.1 m.
Bangladesh	Food grain storage	$ 7.1 m.
Bangladesh	Food grain storage II	$ 6.5 m.
Belize	Grain storage facilities	$ 2.6 m.
Brazil	Grain handling and storage (study)	$ 0.15 m.
Egypt	Grain silos	$24.0 m.
Pakistan	Food grain handling and storage (masterplan)	$ 0.6 m.

DENMARK

Denmark does not provide any credit facilities specifically aimed at investments in grain handling in developing countries. The Danish Government does, however, provide tied financial aid to a number of developing countries. This development aid covers a wide spectrum of projects and activities aimed at improving the level of development in recipient countries.

Main principles governing Danish bilateral assistance

These guidelines for Danish bilateral assistance are not directly applicable to development assistance channelled through **multilateral** organizations but are, however, the point of departure for Denmark's position in the governing bodies of multilateral organizations regarding their programmes, as well as the allocation of financial means in support of the implementation of such programmes. The main principles for bilateral assistance will also be applied in the selection of individual multilateral projects.

Under the Danish International Development Cooperation Act, the objectives of Denmark's governmental assistance to developing countries are to support their efforts to achieve economic growth in order to contribute towards ensuring their social progress and political independence in accordance with the United Nations Charter.

Within the overall framework of Denmark's development assistance policy, the purposes for which the assistance provided by Denmark shall be used are determined in a close dialogue with the developing countries concerned in order to ensure that it is appropriately adjusted to the recipient countries' own development plans and becomes as effective as possible. Danish assistance activities are implemented in response to requests received from governments of developing countries or through non-governmental organizations (with the understanding of the government of the recipient countries).

As a main rule it is sought to attain the objectives of Danish assistance through support of activities which are designed: (i) to provide income-earning opportunities for the poorest population groups in order that they are enabled to satisfy their basic needs for private consumer goods (food, housing, clothing, etc.); (ii) to provide public services (drinking water, health, education, etc.), and (iii) to generate in the modern sector the necessary foundation for enduring improvement of the standard of living of the poorest population groups (industry, physical infrastructure and the like).

Whereas the untied Danish grant assistance activities as a main rule are designed to improve directly the conditions of the poorest population groups, the tied financial assistance often pursues this objective indirectly, by providing conditions (in the form of production facilities and physical infrastructure) for ensuring lasting and self-sustaining alleviation of poverty.

Types of Danish assistance

(i) Untied grant assistance

Untied grant assistance provided by Denmark will notably cover:

(a) supply of equipment and services, etc. for production purposes and for social and physical infrastructure;

(b) supply of commodities;

(c) assignment of technical assistance personnel: granting of scholarships for studies or training in Denmark;

(d) financing of building and construction, notably of local costs;

(e) in special cases, time-limited grants in aid of current expenditure;

(f) grants in aid of credit schemes, etc.

(ii) Financial assistance

Danish financial assistance is in principle tied to procurements from Denmark and is provided in the form of grants or loans to governments of developing countries. It is endeavoured to make tied financial assistance account for 25% of total Danish assistance.

Tied grant assistance is provided to developing countries which are classified by the United Nations as belonging to the group of least developed countries (LLDC).

Loan assistance is extended to developing countries outside the LLDC group whose (present) per capita GNP is below US$1,090. This limit is regulated in step with the limit which the World Bank sets for the loans extended by itself.

All Danish Government loans are interest-free, and no fees are charged. In addition, two different sets of terms apply:

(a) Loans to countries whose per capita GNP at present is below the limit of US$400, which is also subject to changes of the World Bank limits. Maturity 35 years with a grace period of 10 years.

(b) Loans to countries whose per capita GNP lies in the interval between the lower limit (at present US$400) and the upper limit (at present US$1,090). Maturity 25 years, including a grace period of 7 years.

The grant element of the two types of loan is 86% and 76%, respectively.

Danish financial assistance is in principle tied to procurement in Denmark of capital goods, services and other goods with a development effect but some modifications to this general principle do, however, exist.

Government loans can be combined with commercial financing, in so-called mixed credits.

Examples of recent projects

(i) Bangladesh

With the objective of improving Food Security Stock in the most vulnerable parts of Bangladesh, the Government of Denmark has financed the construction of 14 godowns, each with a capacity of 1,000 tons, for the storage of bagged grains. These godowns are part of a total programme of 100 godowns, financed, inter alia, by the Asian Development Bank and EEC.

Danish grant	Dkr. 17.5 m.

Denmark has also been requested to finance the rehabilitation of 18 local food grain storage depots in the Noakhali, Feni and Lakshmipur districts. The estimated financial requirement is approximately Dkr. 20 m.

In the Noakhali district the folllowing constructions were financed in the period 1978-84 under the Noakhali Integrated Rural Development Project:

3 godowns, each 200 ton capacity, each taka 200,000	taka 600,000
8 godowns, each 125 ton capacity, each taka 130,000	taka 1,040,000
	taka 1,640,000
Equivalent in Danish kroner	656,000

In the period 1984-90 the following constructions are planned under Noakhali phase II:

10 godowns, each 500 ton capacity
2 godowns, each 200 ton capacity

Total value taka 14.1 m., equivalent in Danish kroner	5,600,000

DANIDA has in 1981 delivered two self-propelled barges to Bangladesh Inland Water Transport Corporation (BIWTC) under a Danish State Loan and Grant Assistance. Total value Dkr. 27.4 m.

The barges are utilized for transport of food grain between Chittagong port and inland river ports.

(ii) Mozambique

Since 1977 the Nordic countries have assisted the development of the agricultural sector in Mozambique through the so-called Mozambique Nordic Agricultural Programme (MONAP).

The programme comprises a number of elements, one of which is the Agricultural Marketing Organization, AGRICOM.

AGRICOM is the only marketing channel in many areas and is being developed to serve the majority of the country's 1.8 m. peasant families.

The support to AGRICOM includes the establishment of godowns for grain and agricultural products, provision of various kinds of vehicles and service facilities for these, including foreign experts, handling and storage facilities in the godowns, provision of certain supplies like bags, insecticides, etc.

The Nordic support for AGRICOM so far amounts to approximately US$8 m., of which the Danish contribution is 24.47%.

Schemes to facilitate private transfers

Three schemes are made available by independent institutions to encourage and facilitate private transfers to developing countries. The details of these are as follows:

(i) The Credit Guarantee Scheme

Within an overall ceiling of Dkr. 30 bn. (US$3.3 bn.), official guarantees can be extended for export credits to the developing countries. The gross amount of guarantees extended by the end of 1983 was Dkr. 10.3 bn. ($1.1 bn.). It is a condition for obtaining a guarantee that the supplies in question are found to be of importance to the development of the importing country. DANIDA's role in the administration of the scheme is more or less limited to making this assessment.

(ii) The Investment Guarantee Scheme

Within an overall ceiling of Dkr. 500 m. ($54.7 m.) Danish companies can obtain guarantees against political risks for their private direct investments in developing countries. Only those investment projects that have been approved by the host country and are considered likely to promote its economic development can be covered by this scheme. By the end of 1983 the total amount of outstanding guarantees was Dkr. 206 m. ($22.5 m.).

(iii) The Industrialization Fund for Developing Countries, IFU

IFU is a non-profit self-governing institution with the main aim of encouraging Danish direct investments in developing countries in order to further their economic development. Support from IFU may take the form of share susbcription, short-term loans for feasibility studies or other pre-investment activities. IFU engages in activities on a joint venture basis with local and Danish investors.

Since the main purpose is to initiate economic activity, IFU normally withdraws from investments after 6 to 10 years. By the end of 1983 IFU had been a party to the establishment of 75 direct investments in developing countries by subscription of shares in a total amount of Dkr. 278 m. ($30 m.) and by the extension of loans in the amount of Dkr. 223 m. ($24 m.). The total amount invested in these joint ventures was approximately Dkr. 6.6 bn. ($722 m.).

Since 1977 it has been possible in the Danish assistance programme to combined officially guaranteed private export credits with development loans. The main purpose of the scheme has been to accommodate the wishes of recipient countries for financing the import of Danish goods in excess of what could have been covered by a development loan. Projects financed under such associated financing schemes must in principle satisfy the same criteria as projects financed exclusively under official development loans.

Information on the extent to which the above mentioned schemes have in practice been used to facilitate investments in grain handling is not available.

FINLAND

Neither the Finnish Government nor any other Finnish organization at present offers financing facilities for the improvement of grain importing and handling installations and related infrastructure. Finland donates grain mostly as humanitarian aid within the framework of its governmental development aid programmes, and so do also some private organizations.

FRANCE

France has no preferential financing programme designed to help developing countries improve their grain storage facilities. Neither public agencies nor private organizations have any special credit procedures to that end. The only way in which assistance could be given for financing these facilities (as also capital goods and civil engineering projects) is under the agreed export credit policy.

GERMANY (FED. REP.)

The Federal Government supports, through credits, facilities for the storage and release of grain within the framework of its financial cooperation with developing countries. The granting and handling of loans are effected on behalf and in coordination with the Federal Government through the Kreditanstalt für Wiederaufbau (KfW), Palmengartenstrasse 6-9, 6000 Frankfurt/Main 1.

According to the development policy guidelines of the Federal Republic of Germany, support is only given to such measures serving the domestic production and marketing of grain and aiming at strengthening the self-sufficiency of developing countries.

No support is given to facilitates in connection with grain imports of developing countries.

No information is at present available about financing facilities through private institutions, organizations, or banks.

ITALY

Law No. 38, dealing with cooperation with developing countries in order to improve their capacity to stock, treat and market cereals, and the related infrastructures, provides for the granting of privileged financial credit. Up to now, assistance by the Department of Development Corporation of the Italian Ministry of Foreign Affairs has been in the form of financing of specific projects in the framework of programmes of bilateral and multilateral cooperation.

The more significant interventions already carried out or underway at the **bilateral** level are listed below.

(i) Ethiopia

Work will begin shortly on the construction of warehouses (total capacity 50,000 tons) for the storage of foodstuffs (essentially cereals) in the port of Assab. The handling capacity of the port will be increased by the supply of means for the transport of imported foodstuffs to the warehouses. The total cost, inclusive of the building of the warehouses and the supply of transport, will be about lire 5 bn.

(ii) Burkina Faso (formerly Upper Volta)

The pluriannual programme of integral rural development being carried out by the Department of Centre-East foresees the creation of around 150 points for the stocking of cereals for village communities, with a total cost of about lire 12 bn.

(iii) Niger

The pluriannual programme of rural development at present underway in the Ader Doutchi Maggia (Keità Valley) allows for the support of existing cooperative infrastructures by providing storage warehouses and cereals banks, the simplification and relaunching of agricultural credit and marketing systems at a total cost of about lire 2 bn.

(iv) Senegal

The pluriannual programme of integral rural development soon to be implemented in the Department of Sedhiou, and the regional assistance in the Casamance, involve, among other things, the construction and upkeep of rural roads linking areas with a high cereal yield potential, for a total cost of about lire 2 bn., and also the creation of infrastructures for storage, marketing and initial transformation of cereals, for a cost of about lire 1 bn.

At the **multilateral** level Italy has contributed to the FAO programme for the prevention of post-harvest losses with the financing of projects pertaining to stocks, transport and storage of cereals in Guinea ($798,000), Burma ($1,387,000), the Philippines ($816,000), the Dominican Republic ($672,000), Egypt ($864,000), and Jordan ($249,000), for a total cost of $4,786,000.

There is no evidence that **private institutions** and organizations, such as Italian banks, offer credit facilities to developing countries for the stocking and marketing of cereals or for the provision of related infrastructures.

JAPAN

The Japanese Government has no specific financing facilities to help developing countries to improve their grain importing or handling installations and related infrastructures. However, if the governments of developing countries were to request Japan for such assistance as a project of economic aid, it would accept such a request after extensive examination of its feasibility, necessity and other requirements.

As regards private entities, banks, for example, may finance such projects under their own independent judgment on a commercial basis.

KINGDOM OF THE NETHERLANDS

The only official organization actively involved in the financing of grain importing and handling installations in developing countries is the Government Agency for Development Aid, a directorate-general of the Ministry of Foreign Affairs.

Of the total amount of money allocated by this agency for projects related to food production, food security and food aid, almost 30% or Dfl. 75 m. have been or are to be used up to 1987 for improvement of grain marketing facilities.

About half of these projects are related to the improvement of imports: viz.: Ethiopia (establishment of facilities for bulk handling), Cape Verde (silo), Mozambique (silo), Tanzania (harbour facilities).

All projects are combined with technical assistance. Priority allocation of funds could be a limitation when considering requests by developing countries for this sort of assistance.

A "Mixed Credit Fund", under the supervision of the Ministries of Economic, Foreign and Financial Affairs could, in principle, also finance grain handling installations, provided that it concerned capital goods to be provided by a Dutch private company to the government of a developing country, and that the project was relevant from the development point of view. So far, however, no use has been made of this facility for grain handling installations.

NORWAY

Norwegian financing for improving grain handling and transportation facilities in developing countries can be provided in a multitude of contexts and under several budgetary headings in Norway's development assistance budget which in 1985 amounts to Nkr. 5,450 m. The most important categories are as follows:

(i) Bilateral development assistance

The 1985 budget for such assistance amounts to approximately Nkr. 1,700 m., which essentially go to Norway's nine main partners in bilateral development cooperation: Kenya, Tanzania, Zambia, Botswana, Mozambique, Sri Lanka, India, Bangladesh and Pakistan.

Projects concerning infrastructure for grain handling and transportation are eligible for financing under Norway's bilateral development programs, which are established in close cooperation with the authorities of the recipient countries, taking duly into account their development priorities. A recent and particularly relevant example is a grant of Nkr. 65.1 m. to Zimbabwe to meet expenses in storing maize.

(ii) Multilateral finance institutions

Norway is a substantial contributor to multilateral finance institutions such as the World Bank and, in particular, its International Development Association, the Asian and African Regional Development Banks, etc. Infrastructure for grain handling is eligible for finance by these institutions, depending on the priority attached to such projects by the recipient countries. The United Nations Development Programme, to which Norway is a substantial contributor, can provide finance for technical assistance.

(iii) Co-financing with multilateral development institutions

Such co-financing is often used to finance delivery of Norwegian goods and services to a project undertaken by those institutions.

(iv) Mixed credits and credit guarantees

Such credits are usually used to finance delivery of Norwegian goods or services.

(v) Other

Occasionally, Norwegian overseas development assistance is provided to finance projects which fall under none of the above categories, usually in a field which is given particular emphasis or in a field where Norway has special competence, such as maritime transport.

As will be seen from the above, there are no budgetary provisions specifically devoted to grain handling infrastructure, etc. in the Norwegian development aid budget. Such projects may, however, be eligible for financing under a number of budgetary chapters provided they are given the necessary priority by recipient developing countries and form a natural part of the various development cooperation activities of the countries and institutions concerned.

SPAIN

According to official information, Spain has not established lines of credit with any developing countries for the development of grain handling facilities.

SWEDEN

No specific credit facilities are available in Sweden for the export of grain importing and handling installations.

General export credit guarantees and existing concessionary credits can be applied to such equipment, but these facilities are of rather limited scope, concessionary credits being also limited to certain groups of countries and types of projects.

SWITZERLAND

The Swiss Government, through its competent offices, makes financing facilities available to developing countries for projects connected with their grain supplies. According to the Directorate for Development Cooperation, Switzerland is currently participating in the following projects:

(i) Bangladesh

Bilateral Bangladesh-Swiss agricultural project for cereal stockholding facilities in rural areas. Comitment Sfr. 2.5 m.

(ii) Burkina Faso (formerly Upper Volta)

Participation in the FAO programme of assistance to developing countries in Burkina Faso. Commitment Sfr. 1.9 m.

(iii) Mali

Participation in the FAO programme for the constitution and maintenance of security stocks of food cereals. Commitment Sfr. 1.7 m.

Co-financing of a road maintenance project together with the International Development Association (IDA). Commitment Sfr. 18 m.

(iv) Morocco

Financing mechanical equipment for the extension of mills. Commitment Sfr. 3.7 m.

(v) Mozambique

Contribution to the FAO food security programme in Mozambique: construction of storehouses (silos). Commitment Sfr. 4.7 m.

(vi) Pakistan

Co-financing of a cereal stockholding programme by the Government of Pakistan together with IDA. Commitment Sfr. 15 m.

(vii) Tunisia

Financing the extension of a mill. Commitment Sfr. 1.8 m.

(viii) Zimbabwe

Supply of various mechanical equipment for mills. Commitment Sfr. 0.7 m.

(ix) Participation in the FAO special programme for food security in Bangladesh:

(a) Financing of transport facilities and the decentralization of emergency stocks of food cereals. Commitment Sfr. 9.1 m.

(b) Introduction of an information scheme regarding food reserve stocks. Commitment Sfr. 5.5 m.

Private institutions, organizations and banks in Switzerland also offer similar facilities and are financing such projects, but there is no duty of notification to the government on such activities. The Swiss Government may nevertheless support these projects by allowing the Swiss partner an export risk guaranty. This will, however, only be the case for supplies of technical and other equipment of Swiss origin.

Switzerland also makes available a programme of mixed credits to finance development projects in developing countries. These are a combination of government loans (on concessional terms) and private bank resources (on normal commercial terms). Among the mixed credit loans committed, signed or currently under negotiation, the following relate specifically to infrastucture:

Recipient	Loan (m. Sfr.)		Year negotiated
	government loan	total amount	
Tunisia	10.0	30.0	1976
Egypt	15.0	60.0	1979
Senegal	12.0	24.0	1980
Zimbabwe	7.65	19.125	1981
Cameroon	10.0	20.0	1981
Morocco	17.6	55.0	1982
India	40.0	60.0	1983
Egypt	30.0	90.0	1984
West African Development Bank	10.0	20.0	1984
Cameroon	20.0	60.0	1984

UNITED KINGDOM

The Overseas Development Administration (ODA) is responsible for the management of the British aid programme, under which financial assistance (capital aid) is provided to a limited number of developing countries to help with their economic and social development. Capital aid takes mainly the form of grants or soft loans made on a government-to-government basis to finance individual projects or programmes agreed between the governments concerned. This bilateral aid is allocated by country rather than by sector but in principle projects to improve grain importing and handling installations and related infrastructure would be eligible for such aid if they satisfied various criteria. The aid programme operates on a government-to-government basis and proposals for the use of British capital aid available to a developing country are put forward by that government through the appropriate channels.

The principal government institution involved is the Export Credits Guarantee Department (POB 272, Aldermanbury House, Aldermanbury, London EC2P 2EL) whose function is to encourage British exports by making available export credit insurance to British firms engaged in selling overseas and to guarantee repayment to British banks providing finance for export credit. (ECGD is also empowered to insure new British private investment overseas against certain political risks.) The actual finance is provided by a British bank.

The provision of finance from private sources is not a matter with which the ODA is directly concerned. Banking institutions regard these questions as covered by confidentiality.

The financing facilities thus provided are short or medium term. All kinds of business can in principle be considered, including equipment and infrastructure projects. Limits are set both by ECGD ceilings for cover in particular markets and by banks' willingness and ability to provide finance.

UNITED STATES OF AMERICA

In the United States, government and private sector banks and businesses finance grain storage and handling facilities in less developed countries. There are no formal private sector programmes with the explicit purpose of developing grain facilities. Instead, private sector institutions, often in conjunction with the US Government, individually finance such projects either for investment purposes or to facilitate their operational or trading activities. The US Government, on the other hand, does have formal programmes for the improvement of grain storage and handling facilities. Some programmes are aimed specifically at the improvement of grain handling facilities, others are directed at facilitating capital project construction, of which grain facilities may be a part, while others provide technical services and promote foreign investment and trade that may be directed toward such facilities. The programmes involve varying degrees of participation by the government and private sector in both the United States and the recipient countries. While this note does not catalogue all the grain handling projects with which the US Government may be involved through its numerous bilateral foreign assistance programmes, it provides descriptions of the more specific programmes which can be directed toward grain facilities and examples of instituted projects.

GSM-301 Program

The Commodity Credit Corporation Intermediate Credit Export Sales Program for Foreign Market Development Facilities (GSM-301), authorized under the Agriculture Trade Act of 1978, seeks to improve the capability of importing countries to handle agricultural commodities on a long-term basis. The programme calls for the proceeds from the sale of US agricultural commodities in importing countries to be used to finance the improvement of handling, marketing, processing, storage, or distribution facilities for agricultural commodities. Credit is extended by the US Government at commercially equivalent rates to the importing country for the purchase of US agricultural commodities. Repayment is made in US dollars. Credit terms are extended for between three to ten years. The credit cannot be used to encourage credit competition, or for the purpose of foreign aid or debt rescheduling.

Only one project has been approved under the programme. In September 1980, an agreement was entered into with Ashdod Silos Limited for the construction of a grain storage and handling facility at Ashdod, Israel, at an estimated cost of $20.6 m. Since October 1980, due primarily to budgetary considerations, no funds have been made available under GSM-301 to carry out additional projects.

Overseas Private Investment Corporation

The Overseas Private Investment Corporation (OPIC), also operating under the auspices of the IDCA, began operations in 1971. It is the key US Government agency for encouraging mutually beneficial US business investment in less developed countries. The agency's mandate is to "mobilize and facilitate the participation of United States private capital and skills in the economic and social development of less developed, friendly countries and areas". To do this, OPIC provides qualified US investors with insurance against certain political risks, loan guarantees, direct loans to small businesses and cooperatives, and a variety of pre-investment and investment-encouragement programmes. All are designed to reduce the perceived stumbling blocks and risks associated with overseas investment. OPIC is organized as a corporation and is structured to be responsive to private business. As a self-sustaining agency, OPIC has received no public funds beyond its original start-up appropriation. OPIC programmes are currently available for new business enterprises or expansions in approximately 100 less developed countries or areas. Assistance is available for all projects, including grain storage and handling facilities, as long as they are financially sound, promise social and economic benefits to the host country, and have no adverse effect on US employment or the economy.

OPIC has provided insurance guarantees and/or financing to US companies involved in establishing grain storage and handling facilities overseas. For example, OPIC granted insurance and loans to the Seaboard Allied Milling Company in 1967 for the construction of flour milling facilities in Sierra Leone, Nigeria and Liberia.

Export-Import Bank

The Export-Import Bank (Eximbank) is an indepedent agency of the US Government whose primary function is to aid in financing exports of US goods and services. The Eximbank is not in the position to directly finance overseas grain facilities. Rather, it has programmes to facilitate the sale of US goods abroad, such as grain terminals or vacuum dischargers, that may be put to such uses. These programmes take the form of direct lending to importers or the issuance of credit guarantees and insurance, so that US exporters and private banks can extend appropriate financing without taking undue risks. In addition, the Eximbank has a programme to finance the costs involved in the preparation by US firms of engineering and planning and feasibility studies on large capital projects.

Title I/III, PL-480 Program

In all Title I/III agreements of the PL-480 Program, there are "self-help" provisions that specify projects directed toward development efforts within the recipient country. The emphasis of the provisions is on rural and agricultural development projects, among which grain facilities may be included. The Agency for International Development (AID) is the lead agency in the design, review and approval of the development projects undertaken. In addition, there is a provision under Title I/III of the PL-480 Program which gives the Department of Agriculture the authority to enter into sales agreements with a private trade entity, rather than a government agency, in the recipient country. These agreements specify uses to which the commodity sales proceeds will be put, among which can be the construction of grain terminals and handling facilities. During the late 1950s through the 1960s, this provision enabled the construction of numerous grain handling facilities, including an unloading facility at Inchon, South Korea, in-country wheat collection and distribution facilities in Bolivia, and the improvement of two harbour facilities in Spain. However, this provision has not been used since the early 1970s, primarily because government-to-government bilateral agreements under Title I are considered more vital than agreements with private entities.

Trade and Development Program

The Trade and Development Program (TDP), operating under the auspices of the US International Development Cooperation Agency (IDCA, the agency within the State Department coordinating economic development relations between the US and less developed countries), finances feasibility and planning services by US firms for major capital intensive projects in less developed countries, especially those classified as "middle and upper-income". In financing such services, TDP assists the developing country governments with the design, engineering and construction of these projects by providing US engineers, planners and technicians. In addition, TDP will cost-share with US investors planning services for investor projects.

During the fiscal years 1981-1983, the programme approved 149 projects in 58 countries, accounting for $18.4 m. in programme funds. Studies in the transportation sector have emphasized ports, airports, and railroad and surface road improvement projects. Studies in this sector accounted for 14 projects and $1.9 m. of the TDP budget over the past three years. Examples include the feasibility studies for the construction of a food storage facility in Venezuela, port improvement in Kenya, and road and port improvement in Gabon.

III. FINANCE FROM INTERNATIONAL INSTITUTIONS

Two organizations (the World Bank and FAO) have provided the Council with details of schemes through which financial assistance might, under certain circumstances, be provided to help developing countries improve their port and other grain handling facilities (including grain storage). The explanations are reproduced in the following pages. It should be noted that in the case of the World Bank the information dates from 1980.

Details are not known of any arrangements that other international institutions might have to provide such finance, although it is possible that (e.g.) Regional Development Banks might do so. After an earlier enquiry, the International Monetary Fund said that it did not make such finance available.

1. The World Bank

(The following explanation is reproduced from a document circulated to the Council at its Ninetieth Session in June 1980.)

The World Bank Group's overall task is to provide technical and financial resources to stimulate soundly-based economic growth through project lending to member countries. No less important is its commitment to protect the resources entrusted to it by the countries who subscribe capital and by those who buy Bank Bonds. To this end the Bank insists that its projects be economically viable, technically feasible and managerially sound. To obtain approval by Bank management, each project is expected to yield a rate of return at least equal to average returns from other investments in that country. Active involvement by Bank staff, consisting of a competent, internationally respected group of professionals, helps promote high standards. There are close to 5,000 staff members in all. Needless to add, though, the business of economic development is such that there is often a gulf between expectations and actual results. The Bank has had its share of disappointments. However, ex post evaluations of work in agriculture have shown that on average the return to Bank projects is satisfactory - 12% or better - in the great majority of cases.

The high standards demanded of Bank-supported projects extend through the implementation period. The Bank requires that procurement of most goods and services take place through international competitive bidding, so ensuring both high quality and low price. Loan disbursements are made only on receipt by the Bank of proper documentation. Regular visits to projects by Bank staff are a normal part of the implementation. At present the Bank Group has under supervision some 2,000 projects in about 75 countries, with outstanding loan value of US$40 bn. (and annual disbursements of around US$5 bn.).

The Bank's organizational structure has evolved since it was established immediately after World War II. It now includes three distinct legal entities, each with separate assets, liabilities and capitalization. These are:

The International Bank for Reconstruction and Development

This entity, subsequently referred to as IBRD, obtains its funds from capital subscriptions of member governments and borrowings on the money markets. Development loans from IBRD resources are for around 18 years with a 5-year grace period and are made at commercial interest rates, reflecting the full cost of the Bank's borrowings.

On the credit side, World Bank Bonds are rated AAA are are held by investors in over 90 countries. In its 30-year history, the Bank has never failed to meet a debt obligation and has consistently made profits. On the debit side, roughly 8% of total commercial debt obligations of developing countries are owed to the IBRD, and no debt has been repudiated. Its role in assuring stable financial markets will probably become increasingly important, given the acute balance-of-payment difficulties of oil-importing developing countries and the need to recycle petrodollars. To this end it has recently been agreed that the Bank would double its capital from US$40 bn. to US$80 bn. There are now 134* member countries of the IBRD. The People's Republic of China became its newest member on 15th May 1980.

The International Development Association

The International Development Association was created in 1960 because it was apparent that the costs of servicing external debts were becoming very burdensome to the poorest countries - a new low cost means of transferring resources was needed. IDA, as it is commonly known, serves this purpose, for it obtains its funds largely from **grants** from the richer member countries and from profits from the IBRD. These grants have to be approved by congresses and parliaments. IDA has 121* members.

There have been five three-year tranches of IDA - the first in 1960 was US$1 bn. The sixth, which has just been negotiated*, is US$12 bn. Project credits from IDA are provided only to poorer countries, primarily in Africa and Asia, generally those with GNP per capita of less than US$320 (1977 prices) with India being the largest recipient. Lending terms for these credits are non-commercial, a repayment period of up to 50 years, no interest charges, but with a marginal service charge of three quarters of one per cent per annum. The IBRD and IDA are administered by the same personnel in the Bank and projects meet the same criteria.

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* As at June 1980.

The International Finance Corporation

This entity was created in 1956 to foster the growth of the private sector. IFC obtains funds largely from member country subscriptions, but, occasionally, from the IBRD itself, and has 109 members. The IFC collaborates with the private sector in directing resources, both domestic and foreign, into productive investment in member countries. IFC, though, is very much a junior partner. In 1979 IBRD loaned US$6.989 bn., IDA US$3.022 bn. and IFC US$425 m. - a total commitment of around US$10 bn.

Policy for all three entities is broadly decided by the Bank's Executive Directors, who are resident in Washington and meet weekly. They operate with a Charter, which is sufficiently flexible to adjust operations to the realities of a changing world. Each project, appraised by the Bank staff, must be approved by the Board before the loan request is granted. Voting by the Executive Directors is weighted in accord with member countries' capital subscriptions. The US is the principal stockholder with roughly 22% of the vote, followed by the major industrialized donors (Germany, France, UK and Japan). All countries though are represented at the Board and their voices carry considerable weight.

The World Bank gives high priority to lending for increasing agricultural production. This was not always the case. In the early years it shared the commonly-held view that the path of development depended primarily on industrial growth and in the development of heavy industry, power and massive transport systems. Agriculture was seen as a residual activity where, in the main, it was believed that there was enough land and labour in the tropics so that indigenous populations could readily produce the food and fibre they needed. Capital was not considered important, except for the development of export-oriented plantation economies.

In the ensuing years it learnt, along with many others, that agricultural development is often the key to economic progress. Its analysis has shown that developing countries will have to make increasingly more productive use of their own resources to generate needed food and fibres rather than to look to surpluses from North America. Furthermore, with the world's population growing so rapidly - doubling over the past 25 years - now growing by around 2.8% a year - there was a need to accelerate food production. At the same time the increased rural population has led to growing pressure on the land.

At about the time the Bank began to recognize that agricultural development was essential for balanced growth, it became clear that future increases in output would have to come from an increase in productivity rather than an expansion of area. This in turn called for substantial increases in investment in the rural sector. More recently the Bank has led the way in drawing attention to the fact that the rural poor including small farmers and agricultural labourers have gained little from economic growth. It concluded that focusing on helping to increase production - without worrying about who benefits from it - was not necessarily contributing to broad-based development.

As a response to its changed perceptions, the share of Bank lending for agriculture has risen from about 10% in the mid-1960s to 21% of the total in 1970-74 to 33% in 1975-79. In the past five years, lending for agriculture has increased threefold, totalling US$11.6 bn. Since each dollar invested by the Bank is supplemented by local investment, the total value of Bank projects in the last five years exceeds US$26 bn. According to available information, lending represents around 50% of all external aid for agriculture and projects account for around 15-20% of total public investment in agriculture in the developing world.

At the same time, as pointed out, the Bank has shifted much of its emphasis within agriculture to deal with the problems of low incomes and poverty in the rural areas. To this end an increasing number of the Bank's projects are intended to help smallholders and other less privileged groups. Helping smallholders has involved helping farmers increase output of traditional crops and introducing new crops. The increased output of traditional crops has come largely from the more effective use of improved seeds, fertilizer and water in systems which have helped over 10 m. farmers throughout the developing world increase their output of rice, wheat, corn, cassava, etc.

Overall, about three quarters of Bank-induced incremental production is expected to be food. Other projects have involved changing the traditional product mix with farmers shifting from subsistence production to growing high unit value crops. These crops, grown on smallholder schemes in countries as diverse as Brazil, Indonesia, Kenya, Senegal, Malaysia and Tunisia have involved the production of sugar, tea, vegetables, rubber and cotton.

2. FAO

(The following explanation was provided in February 1985.)

FAO Food Security Assistance Scheme

The Food Security Assistance Scheme (FSAS) was established by the Director-General of FAO in 1978 as a special action programme. It has the following responsibilities:

(i) to help developing countries, on request, to formulate national food security policies and action plans in line with the International Undertaking on World Food Security;

(ii) to help identify and prepare projects to carry out these national food security policies;

(iii) to mobilize external resources to fund identified projects; and

(iv) to facilitate the coordination of multilateral and bilateral aid to food security.

The assistance provided under the Scheme is available to any developing country, but as FAO resources are limited, priority is given to low-income, food deficit countries subject to food shortages, either because of crop fluctuations or recurrent natural calamities. Special attention is devoted to the least developed and landlocked countries as well as island developing economies.

In carrying out this assistance, FAO staff evaluate the food security requirements in relation to the overall development priorities of the country concerned. A well-designed food security programme aims to raise the level of agricultural production, to stabilize the distribution of foodstuffs and to ease access for the consumers.

An important item for which governments request assistance under the Scheme is the strengthening of national or regional food reserves, one of the major elements of the International Undertaking. To be available for emergencies, such reserves must be managed under precise rules which include provision for replenishment, if possible with locally purchased grain; they must be large enough to provide time in which to arrange and receive external food supplies; and storage costs must be minimized. Such emergency reserves serve a purpose distinct from that of price stabilization stocks or normal working stocks. Their creation in developing countries usually requires construction of storage facilities and either imported or local grain for initial stocking.

It is often necessary to develop the other required food security infrastructure, such as improving inland transportation including trucks and boats, strengthening national marketing institutions, establishing early warning systems against crop failure, and training national personnel in areas such as grain storage, marketing and stock management.

Resources for project implementation are mobilized in a variety of ways, particularly by trust fund pledges through FAO's Government Cooperative Programme from various countries (Belgium, Denmark, Italy, Japan, Netherlands, Norway and Switzerland). Trust fund contributions since the Scheme's inception up to 31 December 1984 total US$56.8 m. Ninety-three FAS projects totalling US$66.8 m. have been completed, are in operation or approved by the Director-General. The Scheme also acts as an intermediary with bilateral aid agencies and the EEC; multilateral institutions other than FAO, particularly the World Food Programme; and with regional banks.

PART 3 - CONDITIONS IN INDIVIDUAL DEVELOPING COUNTRIES

INTRODUCTION

This part of the study sets out details of grain handling and transportation in 67 developing countries, arranged alphabetically within four regional groups (Africa, Latin America and the Caribbean, Asia and Europe). Each country's section comprises notes on: firstly, its general grains situation (including, where possible, pointers to future developments in production, consumption and trade); secondly, its grain-importing ports and their facilities; and, thirdly, its transport systems and the extent to which grain has to move over them. It concludes with a brief overall assessment of the difficulties which are presently being encountered. There is also a table (see note below) showing trends in grain production and trade in the country and also its recent and projected population growth. Further details of the grain handling ports are set out in the Appendix at the end of this Secretariat Paper.

Note on the tables

In addition to the general notes given at the beginning of this report, the following may assist in interpreting the tables which are included in this section.

For **production,** the figures relate to the year in which the bulk of the harvest takes place.

Imports of wheat and coarse grains are for the July-June season starting in the calendar years shown: thus, the figures under "1983" relate to imports in the period July 1983-June 1984. Imports of rice, which are given on a milled basis, are for the calendar year shown. With the exception of wheat flour, which is shown in wheat equivalent, grain products are excluded from the figures.

The figures for **food aid** refer to shipments of grain provided under the Food Aid Convention (July-June years). These data are only available since 1980. The figures, which are on a grain equivalent basis, include certain grain products, and the grain components of mixtures of grain and non-grain items. In certain cases, therefore, the figure of food aid for a particular country may appear to be larger than its total imports.

Past **population** figures are derived from UN sources: future projections are as quoted by the World Bank in its "World Development Report 1984".

AFRICA

ALGERIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1,303	1,158	1,000	1,000
	rice (paddy)	2	1	1	1
	coarse grains	530	645	530	425
	TOTAL	1,835	1,804	1,531	1,426
IMPORTS:	- wheat	1,388	1,763	2,064	2,365
	rice (milled)	7	17	18	20
	coarse grains	111	435	817	685
	TOTAL	1,506	2,215	2,899	3,070
	- of which, food aid	n.a.	n.a.	3	7
EXPORTS:	- TOTAL	2	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
13.8	18.7	20.5	39	3.1	3.7

GENERAL GRAIN SITUATION

One of the largest countries in Africa, much of Algeria is desert, arable land only accounting for 3% of the total area. Little surface water is available for irrigation, and soil erosion is a serious problem. Grain is grown under difficult conditions, and yields are low. Production of durum wheat and barley, the chief cereals, has hardly increased over the last fifteen years. The government aims to achieve 80% food self-sufficiency by the year 2000 compared with 30% in 1980. Among moves to reinvigorate agriculture, it has relaxed price controls, and is encouraging small-scale private farmers by supplying loans, equipment and other assistance.

Grain consumption is increasing rapidly, due to population growth, which averaged over 3% in the 1970s, and to changes in diets following rising incomes. The population, nearly half of which is now classified "urban", is heavily concentrated along the coastal strip. Imports of grain (particularly wheat) have soared, from an average of 1.3 m. tons in the mid-1970s to over 3.0 m. tons in 1983/84. The figures at the head of the section to some extent understate the position because they exclude semolina, imported in large quantities from the European Economic Community. Whether grain imports will continue their rapid rise will depend on how quickly the new measures succeed in boosting production. In the short term, a continued high level of imports must be expected, if only because of accelerating population growth: it seems likely that the present 21 m. will almost double by the year 2000.

PORTS FOR GRAIN (see Appendix)

Most grain is imported through the ports of Algiers, Annaba, Oran and Skikda. The usual cargo size is only 15,000 tons. Grain is normally discharged in bulk, using ship's gear, although portable pneumatic equipment is available at some berths. The grain is discharged directly into lorries or railway waggons: in some cases suckers can be used to place it in port silos. The prevailing low rate of discharge (only 500 tons/day) results in comparatively high freight rates, and long berth occupancy. New equipment is being installed to increase grain discharge rates. Transport of grain from the quay to the storage areas is often hindered by road congestion, resulting in delays in unloading vessels and demurrage payments.

Although all the main grain ports have silos (holding in total about 100,000 tons), their storage capacity and that of the country generally is regarded as inadequate. New port silos are planned in Oran and elsewhere, and existing ones are to be modernized.

GRAIN TRANSPORTATION

Although Algeria is a very large country, most of its population and its arable land are contained within a relatively compact coastal strip. Several of the largest cities (e.g. Algiers) are directly served by ports. Comparatively little of the imported grain has to move long distances overland, and marketing of domestic produce is also mostly a matter of short hauls.

Road transport is increasing in importance. The system is fairly extensive in the north, where surfaces are generally adequate. There is a serious shortage of lorries and also of spare parts.

The **rail** system is extensive (3,700 km) but is mainly single track, and also suffers from being divided between three different gauges. Because of the potentially lower cost of moving bulk goods by rail, considerable investments are planned, involving a doubling of the freight capacity.

Coastal shipping is not well developed.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The low rate of grain discharge results in high freight rates. Some steps are being taken to deal with this, but unless transport facilities are also improved, delays and congestion will still occur, especially if imports were to increase any further. The major problems affecting the inland movement of grain are traffic congestion near the ports, insufficient numbers of lorries, difficulties in effecting repairs, and a shortage of spare parts.

ANGOLA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	11	11	10	10
	rice (paddy)	29	21	20	22
	coarse grains	504	405	300	325
	TOTAL	544	437	330	357
IMPORTS:	- wheat	79	111	169	160
	rice (milled)	4	22	32	47
	coarse grains	16	73	119	82
	TOTAL	99	206	320	289
	- of which, food aid	n.a.	n.a.	45	63
EXPORTS:	- TOTAL	55	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.6	7.7	8.3	13	3.2	2.7

GENERAL GRAIN SITUATION

Only about 3% of this very large country is cultivated, mainly by subsistence farmers. Much other land, especially in the north, could, it is believed, produce crops if the necessary investments were made. Cassava is the main food crop, and the chief grain is white maize. The falling trend in grain production in recent years has been attributed to civil unrest, marketing difficulties and drought. The government plans to increase output and marketing of food crops, especially cassava, maize and rice.

Population growth is over 3% a year and grain consumption is rising rapidly. Wheat, nearly all of which has to be imported, has increased fastest. But acute shortages of basic foods - and high prices - have been reported in urban areas where 40% of the country's population now lives. Serious malnutrition is widespread. Difficulties have been exacerbated by the influx of a large number of refugees from neighbouring countries.

Grain imports are now running at around 300,000 tons a year (half of them wheat), compared with 100,000 tons in the early 1970s. Further increases must be considered likely, at least in the short-term future.

PORTS FOR GRAIN (see Appendix)

Most grain is landed at Lobito and Luanda, although some is brought ashore at Cabinda, in the extreme north. Discharge rates at all three ports are low, mainly because of limited take-off capacity. At Luanda, for example, there are two elevators each capable of discharging grain at 250 tons per hour, but the port's average rate is only 500 tons per day. Luanda (the country's largest city), in particular, suffers from congestion. Bulk discharge is possible at Lobito, but at Cabinda grain is usually brought ashore in lighters. Port storage capacity totals 40,000 tons at Lobito (where there is a silo), and there is limited warehouse space at the other ports. Lack of storage capacity adds to the logistical difficulties of importing grain. Several port improvement projects are in hand or under consideration, including new berths at Luanda and berths for ocean-going vessels at Cabinda.

GRAIN TRANSPORTATION

Most grain imported by Angola is destined for Luanda itself and the urban areas in the neighbourhood of the other ports. It is very difficult for supplies to reach those parts of the country seriously affected by drought. Inadequate roads hinder marketing and therefore make it difficult to increase domestic production.

Road: The network is being developed as a matter of priority to open up the country. Some bridges blown up during the independence struggles of the 1970s have still to be replaced, and civil conflict continues to hamper traffic in some areas. There is a severe shortage of lorries, and a lack of spare parts.

Rail: Lobito and Luanda both have rail connections. Lobito is connected to the Benguela railway which runs east across the whole width of the country into Zaire. The system is extensively used for the minerals exported by Zaire and Zambia as well as Angola. Civil conflict frequently interrupts rail movements.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Difficulties in assuring grain supplies have been attributed to civil unrest, lack of proper marketing facilities and incentives, and deficiencies in the transportation system: in particular, a shortage of vehicles and spare parts. While grain discharge rates at the ports are low, this is a reflection of their storage facilities and the capacity of the transportation system. Some international assistance (e.g. from EEC, Sweden and Germany Dem. Rep.) is being provided to improve internal transportation of grain. In the longer term, better roads will be needed, especially in the north of Angola, if domestic production is to increase.

BENIN

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	10	11	9	15
	coarse grains	314	335	344	320
	TOTAL	324	346	353	335
IMPORTS:	- wheat	15	38	58	49
	rice (milled)	3	18	38	20
	coarse grains	-	7	21	5
	TOTAL	18	63	117	74
	- of which, food aid	n.a.	n.a.	14	4
EXPORTS:	- TOTAL	2	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.7	3.4	3.7	7	2.3	3.3

GENERAL GRAIN SITUATION

Benin is one of the smallest African countries. Soils are mostly poor, except close to the coast, where there is considered to be a good potential for increased production of food crops (rice and maize), using irrigation and modern production techniques. The staple food is cassava (manioc) and the chief grain crops are white maize and sorghum, in which the country is usually self-sufficient. The government is encouraging rice production, in view of the recent increases in imports. Wheat consumption also appears to be rising quite rapidly, especially in the towns. Benin, in common with neighbouring countries, suffered from drought in the early 1980s but, following a better crop in 1984, no longer needs emergency food assistance. Total grain imports were negligible in the early 1970s but reached 117,000 tons in 1982/83. The population may double by the year 2000 and, with further urbanization, wheat import needs will probably continue to increase.

PORTS FOR GRAIN (see Appendix)

Cotonou, the sole port for importing cereals into Benin, handles a great deal of merchandise, including some transit trade of neighbouring countries (for example, Niger). The port is well sheltered but vessels sometimes have to anchor offshore because of tornadoes, to which the locality is subject. The usual cargo size for cereals is 12,000 tons. Wheat is discharged by vacuvators. Other grains are unloaded in bags, and vessels have to use their own gear as there are no cranes on the quays. Grain is moved away from the port both by rail and road. The amount of grain handled does not appear to cause any great problems for Cotonou: indeed, it was recently reported that half of the port was not being used. More than 13,000 tons of grain can be stored in silos at the port. Work is in progress to enlarge its capacity to 2 m. tons (of all goods), including two new general cargo berths.

GRAIN TRANSPORTATION

Cotonou is by far the largest town in Benin (population 1.1 m. in 1980), and most of the country's population live nearby. Except for transit trade, therefore, most grain imported into Benin has only a short distance to travel. Domestic grain marketing is hindered by poor roads.

Roads. Improvements are required. Some rural localities are not accessible all the year round, and farmers cannot always market their produce. A number of major road construction schemes are underway, with assistance from the World Bank, including feeder roads for marketing agricultural products. There is no shortage of lorries.

Railways. A line extends more than 400 km northwards from Cotonou to Parakou. This is used for the transit trade of Niger, to the considerable financial benefit of Benin: indeed, in the late 1970s such trade made up 60% of its traffic. The railway needs to be modernized to cope with the increasing volume of traffic. Its present offtake rate for grains is not more than 10,000 tons a month. A further extension to Niamey in Niger is planned for completion in 1988. There is no shortage of railway waggons at present.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The main problem relating to the import of grain is the slow rate of discharge for bulk cargoes (500 tons/day). Installation of automatic suckers on the quay at Cotonou would facilitate the unloading of grain vessels, and more storage space is desirable there. Improvements in hand and projected in the roads and railways should cope with any increases in the internal movement of grain.

BURKINA FASO

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	36	28	44	47
	coarse grains	1,020	1,112	1,167	971
	TOTAL	1,056	1,140	1,211	1,008
IMPORTS:	- wheat	24	34	28	28
	rice (milled)	5	16	32	30
	coarse grains	18	17	4	3
	TOTAL	47	67	64	61
	- of which, food aid	n.a.	n.a.	45	55
EXPORTS:	- TOTAL	3	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.4	6.2	6.6	10	1.3	2.4

GENERAL GRAIN SITUATION

In Burkina Faso (previously known as Upper Volta), agricultural production is almost entirely on a subsistence basis. Technology used is rudimentary and productivity is extremely low. Expansion is difficult because of the unfavourable climate, inadequate water supplies, and poor, heavily eroded, soils. While there is some potential for increased irrigation, it would be very costly to develop. The principal grain crops are sorghum and millet, and small amounts of (yellow) maize and rice are also produced.

Population growth has not been rapid by the standards of most African countries, averaging only 1.3% a year in the 1970s. Until the last few years, food consumption levels were maintained with minimal imports of wheat and rice - around 50,000 tons a year. But, following severe drought, import requirements in 1984/85 soared to 300,000 tons, about two thirds of which will have to be covered by food aid. Such an enormous amount will stretch, to the very limit, the capacity of the ports, roads and railways leading to Burkina Faso.

It is expected that population growth will accelerate, and may average 2.4% for the rest of the century. In view of the limited production expectations, imports seem likely to continue at a high level even after the present emergency has ended.

GRAIN TRANSPORTATION

A landlocked country, Burkina Faso obtains its grain imports by two main routes: via Abidjan (Ivory Coast) and Lomé (Togo). The usual transit time by rail from Abidjan to Bobo Dioulasso (approximately 650 km) is 7 days and to the railhead at Ouagadougou, a further 300 km, is 10 days. The offtake rate is about 6,000-10,000 tons a month, and the costs per ton of this rail movement are estimated at US$60 and US$80 respectively. From Togo the connection is by road. The time taken from Lomé to Ouagadougou (about 800 km) is 7 days, the offtake rate 6,000 tons a month, and the cost about US$65 a ton. A further alternative is from Cotonou in Benin, but the offtake is limited to 2,000 tons a month.

Within Burkina Faso the **road** system is very poorly developed, less than 10% of the total 17,000 km being tarred. Many areas are entirely cut off during the rainy season. The network is inadequate to support the growth of agricultural markets. Maintenance is a major problem which the authorities believe can only be solved by external financing. The condition of the main highway from Ouagadougou to Dori, in the north-east of the country, is particularly bad. Improvements, including an all-weather road to Niger, are in progress, some with foreign assistance. There are too few lorries to meet the country's grain transport needs, and there is a shortage of spare parts for them.

There is one (narrow gauge) **railway** line, linking Ouagadougou with the other main town of Bobo Dioulasso and carrying on from there to the Ivory Coast and the port of Abidjan. It carries 70-80% of Burkina Faso's international trade. The line is said to be overloaded and the locomotives and waggons are deteriorating through lack of maintenance. Investment is required to modernize the permanent way and rolling stock.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The grain handling problems in Burkina Faso mainly stem from its very poor communications and the high cost of obtaining grain over extensive rail or road routes. Poor transportation also hinders the country's agricultural development. There is a shortage of vehicles, which suffer from lack of maintenance and repairs. Grain storage capacity is inadequate. Considerable investments in the transport system will be required to cope with the expected increase in grain consumption needs.

CAMEROON

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	T	1	T	1
	rice (paddy)	14	44	73	32
	coarse grains	692	838	843	760
	TOTAL	706	883	916	793
IMPORTS:	- wheat	70	124	147	170
	rice (milled)	13	19	17	51
	coarse grains	-	1	4	7
	TOTAL	83	144	168	228
	- of which, food aid	n.a.	n.a.	5	1
EXPORTS:	- TOTAL	-	3	12	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
6.8	8.5	9.2	17	2.3	3.5

GENERAL GRAIN SITUATION

The climate of Cameroon ranges from equatorial with very heavy rainfall in the south and centre, to hot and dry in the north. Conditions in much of the country are generally favourable to agriculture, although production is sometimes reduced by drought. The main food crops are white maize, millet, cassava and yams. Farming is non-intensive, and yields are low. Grain output is increasing only slowly, except for rice which, however, remains a small proportion of the total. Attempts to cultivate wheat have proved disappointing.

Since the early 1970s grain demand has outpaced domestic supplies. Wheat and rice consumption have been increasing particularly rapidly, mainly as a result, it may be assumed, of the growth in the urban population, which averaged 8% a year in the 1970s. Douala and Yaoundé, the chief cities, both approximately doubled their size during that decade.

Imports of wheat and rice, which averaged 83,000 tons in the early 1970s, had increased to over 220,000 tons in 1983/84. Population growth is projected at 3.5% up to the year 2000, but the government plans to stem the rural exodus to the towns. Unless there is a considerable expansion in domestic grain production, imports are likely to go on increasing. Projections by the Ministry of Commerce and Industry suggest that grain imports by Cameroon could rise by 50% between 1983 and 2000. Oil revenues have placed the country in a relatively favourable financial position, and virtually all of its grain imports are made on commercial terms.

PORTS FOR GRAIN (see Appendix)

Cameroon has several ports on its relatively short coastline, but Douala handles most of its trade and practically all of its grain imports. It also deals with some transit trade to neighbouring countries (e.g. Chad). Douala is situated 24 km up a shallow river channel, which has to be dredged continuously. The largest vessel that can be accommodated is 14,000 tons, but average cargo sizes are 7,000 tons for rice and only 1-2,000 tons for wheat and flour. Wheat may be discharged by suckers onto lorries at a normal rate of 600 tons/day, or 1,680 tons working round the clock. Other grains are usually received in bags, which are discharged at 750 tons a day. The port is sometimes congested, vessels are delayed, and demurrage payments incurred, because of the time taken to load the lorries. Sometimes the grain has to be dumped on the quays. Poor handling methods and lack of security lead to serious losses. Another difficulty is the great variability of import volumes from year to year and even from month to month. There is almost no grain storage capacity at the port, and very little inland.

A major port extension scheme, designed eventually to raise its general cargo capacity to 6 m. tons, is being carried out. It is planned to include a 12,000 ton silo. There are also to be more mills, permitting wheat (which is easier to handle) to be imported instead of flour. The access channel will have to be deepened to at least 12 metres.

GRAIN TRANSPORTATION

Imported grain - wheat and rice - is mainly consumed in the urban areas, particularly Douala itself and Yaoundé, which is located about 200 km east of the port. Even in this corridor, transport conditions have, at least until recently, been unsatisfactory and the network is inadequate in the rest of the country, hindering agricultural marketing.

Roads. Only about 5% of the network is bitumenized. Much of the rest becomes unusable by vehicles during the rainy season. Grain losses due to spillage from lorries are sometimes a problem. An all-weather highway between Douala and Yaoundé was to have been completed in 1984. More lorries are needed. Costs of transporting grain by road are particularly high.

Railways. Douala and Yaoundé are linked by rail: this line is being improved with international assistance. The system is growing as the various phases of the Transcameroon Railway are completed. But its total length is still under 1,200 km.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Because of silting, the river giving access to Douala requires continuous dredging, and the channel is too shallow to allow any but small vessels into the port. Deepening is urgently required. It now takes up to 38 hours to discharge a vessel carrying 1,200 tons of wheat: with suckers this could be reduced to 4 hours. Storage capacity is inadequate - the construction of an elevator at Douala would greatly assist matters as would the installation of high-capacity bulk handling equipment. The railway system is too small, and most roads are impassable for part of the year. This hinders not only the distribution of imported grain but the marketing of domestic production, with a deleterious effect on agricultural development. There are too few railway waggons and lorries, and the use of lorries to transport grain in the port area is inefficient, with very slow turnrounds. Grain is lost through spillage due to poor handling at the ports and inadequate roads and lorries.

CHAD

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	3	5	5	5
	rice (paddy)	35	36	30	25
	coarse grains	492	593	470	470
	TOTAL	530	634	505	500
IMPORTS:	- wheat	11	13	18	31
	rice (milled)	-	3	5	4
	coarse grains	11	-	34	30
	TOTAL	22	16	57	65
	- of which, food aid	n.a.	n.a.	28	43
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
3.6	4.5	4.8	7	2.1	2.5

GENERAL GRAIN SITUATION

Chad is a large but thinly populated country (3 persons on average per square km) in the heart of Africa. It is among the poorest and least-developed countries of the world. The northern part is desert: in the south the climate is tropical. Less than a quarter of the land area is suitable for crops. Subsistence farming predominates. The main food crops are sorghum and millet, although some rice and a little wheat are grown. Like its neighbours, the country has been subject to severe drought in recent years. The situation deteriorated considerably in 1984.

Population growth (2.1% in the 1970s) is not particularly rapid compared with other African countries, but this is because of high mortality rates. The recent drought is said to have cost many lives. Urbanization has not proceeded far and little wheat is consumed. Before the drought, grain imports were usually small, averaging about 20,000 tons in the 1970s. They rose to 65,000 tons in 1983/84, two thirds of which was food aid. Import requirements in 1984/85 have been estimated by FAO at a minimum of 330,000 tons, but it is by no means certain that such an amount, even if made available by food aid donors, could reach the areas where it is needed. The difficulties of Chad are compounded by civil war and massive migrations of refugees. Imports are likely to remain at comparatively high levels in future because of the accelerating rate of population growth (projected at 2.5% a year up to the end of the century).

GRAIN TRANSPORTATION

Chad is a landlocked country. Its south-western border is about 800 km from the sea at Douala (in Cameroon) and the sparsely inhabited northern regions are about the same distance from the Mediterranean. These are the nearest approaches to the coast. The capital of Chad, N'Djamena, is about 1,100 km in a direct line from the Gulf of Guinea, and some eastern regions lie 2,000 km or more from the nearest ocean.

There are no **railways** in Chad, although the Nigerian system approaches to within 200 km of N'Djamena. In Cameroon, the line from Douala now reaches N'Gaoundere, whence it is 400 km by road to the border with Chad at Bongor. A proposed extension of the Transcameroon railway into Chad has been indefinitely postponed. Parts of the Chari/Logone river system are navigable during the wet season when they provide an alternative means of transport to the roads, which are then often impassable. There are very few **roads**, and those are mostly unsurfaced. Particular difficulties occur at river crossings where ferries are unable to operate when water levels are low. One ferry over the Chari River, a particular bottleneck in the past, is being replaced by a causeway, and the crossing will be supplemented by a bridge if funds are available. There is a shortage of vehicles and also of spare parts, although some lorries and a repair workshop are being provided under international assistance.

Chad also suffers from the deficiencies of the transport systems of neighbouring countries which handle its grain imports. These either come via Apapa (western Nigeria) or Douala (Cameroon). Costs are very high, and transhipments subject to long delays. The Nigerian route (which is mostly by rail) is the more efficient, with a maximum monthly offtake rate of 18,000 tons, but is not always available because of border closures. Offtake on the Douala route is much slower (5,000 tons a month). Wheat delivered at N'Djamena takes 6 days under normal circumstances to arrive from Apapa at a cost of US$170 a ton; and 25 days (at $130 a ton) from Douala. To Abeche, in the east of Chad, the times taken extend respectively to 13 and 45 days, and the costs to $200 and $220 a ton.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Poor transport systems in the country and its neighbours make importing grain into Chad a difficult and very costly operation. Storage facilities are insufficient. The country's internal distribution capacity is very limited, there being virtually no good roads. Grain needed to alleviate the present drought is unable to reach the affected populations. The difficulties are compounded by civil unrest and fuel shortages.

EGYPT

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1,846	1,844	2,017	1,996
	rice (paddy)	2,349	2,351	2,441	2,440
	coarse grains	3,594	3,917	4,064	4,225
	TOTAL	7,789	8,112	8,522	8,691
IMPORTS:	- wheat	3,451	5,620	6,188	7,331
	rice (milled)	-	-	-	-
	coarse grains	284	818	1,297	1,563
	TOTAL	3,735	6,438	7,485	8,894
	- of which, food aid	n.a.	n.a.	1,671	1,740
EXPORTS:	- TOTAL	241	131	23	21

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
33.3	42.3	45.9	63	2.4	2.0

GENERAL GRAIN SITUATION

About 97% of the country is desert. The remainder, along the Nile Valley, is intensively devoted to agriculture. Under the 1982-87 Plan, some 260,000 ha. is to be reclaimed from the desert, but agricultural land is being lost because of the growth of towns and, in some areas, because of waterlogging and increased salinity. The main cereals produced are maize, rice and wheat. Yields are generally high, but output is only increasing slowly. Stagnation in wheat production has been attributed to low producer prices.

The population, 46 m. in 1983, is growing at more than 1 m. a year. Over 40% is urban, major cities being Cairo (population of the whole conurbation about 8 m.) and Alexandria (about 3 m.). Rising incomes have resulted in growing consumption of wheat and rice for food and maize for animal feed. Wheat products are heavily subsidized by the government. The country is becoming increasingly dependent on imported wheat and maize, and is now only just self-sufficient in rice, once an important export crop. Total grain imports approached 9 m. tons in 1983/84, having more than doubled over the last decade. In view of the country's limited grain production possibilities and continuing population growth, imports seem likely to go on increasing for some time to come.

PORTS FOR GRAIN (see Appendix)

Alexandria is the principal grain port, handling over 3 m. tons in 1983. Port Said and Safaga (on the Red Sea) each imported over 1 m. tons, and El Adabiya, a new port at the head of the Gulf of Suez, unloaded nearly half a million tons. It may be noted that the extra costs incurred by passage through the Suez Canal mean that freight rates to the Gulf of Suez and Red Sea ports, at least from North America or Europe, are usually US$4-$5 a ton higher than the rates to Alexandria.

Draught restrictions at the quays mean that, in general, larger vessels have to discharge into lighters offshore. At Port Said, a 20,000 ton tanker is tied to the quay and used as a floating silo and transhipment facility. Deeper water on its offshore side allows 60,000 ton vessels to dock and offload grain in bulk - it may be delivered to the quay at 400 tons an hour. At all ports wheat is normally discharged using small portable vacuvators. Unless the grain is to be taken directly into port silos (or at Alexandria is put into barges for delivery to the silos at Cairo), it is bagged before transportation. Other grains are bagged in vessel's holds before discharge. Bags are moved using ship's gear and stevedore hooks. Torn and crushed bags often result in loss of grain. Typical discharge rates are 1,500-3,000 tons per day for wheat and 1,000-1,500 tons per day for maize (corn). Flour, received in bags, is offloaded at about 200 tons/hour.

The very large quantities of grain imported by Egypt inevitably result, from time to time, in port congestion. It may occur, for example, if ship arrivals are not evenly spaced (difficult to arrange because of the variety of sources), if vessels arrive which are not suited for quick discharging, or if vessels are too large to tie up at the ports and need to be lightened in the roads. Delays are sometimes also caused by the import of grain in unnecessarily small vessels (e.g. 10,000 tons).

In 1982 the International Development Agency granted Egypt a loan of US$132 million to improve its port facilities. Part of this is being used to build a new port at El Dikheila, west of Alexandria. Money is also being spent on modernizing the port of Alexandria and financing a dredging programme there. At the same port a new grain silo of 100,000 tons is to be built. Vessels of up to 40,000 dwt will be able to unload at 13,000 tons a day. At Safaga, a new silo of 100,000 tons will have a throughput of 1 m. tons a year. Vessels of 70,000 tons will be able to unload at 1,200 tons per hour into the silo. A silo of 100,000 tons is also to be constructed at Damietta as part of the new port complex. Vessels of up to 80,000 tons dwt will be able to berth there. New quays suitable for large bulk carriers are also to be built at El Adabiya.

GRAIN TRANSPORTATION

Nearly all the grain imported by Egypt is used in the relatively small area bounded by Cairo, Alexandria, Port Said and Suez. Nowhere in this area is far from one of the main ocean ports, and Cairo itself, while not on the coast, is at the centre of an excellent communications sytem, comprising road, rail and waterway. While the towns and cities further up the Nile are less accessible to grain imports, their needs can be served by the port of Safaga on the Red Sea which, as noted, is being comprehensively improved and expanded.

Roads. Three quarters of the grain leaving the ports moves by road. The network is well developed. Good roads connect Alexandria with Cairo, the canal towns and Upper Egypt. There are too few lorries; local production of goods vehicles is to be expanded.

There is also an extensive **railway** network, amounting to over 4,000 km, about 20% of which is double track. It serves mainly the Nile Valley and Delta, and the Mediterranean coast. Modernization is needed and many new locomotives are required. A rail connection is planned between the Red Sea port of Safaga and Qena, on the Nile. This would considerably assist the movement of grain to Upper Egypt.

Waterways. Navigable waterways exceed 3,000 km, the Nile accounting for about half of this. Grain barges from Alexandria can reach Cairo, where there is a 58,000 ton silo. Another silo, of 100,000 tons, is being built in north Cairo. The Nile and some large canals are navigable by barges of 420 tons, while the Ismailia Canal (linking the Suez Canal with Cairo) can accommodate barges of 200-300 tons. There are plans to widen the Ismailia Canal. River transport is being expanded to relieve the load on the roads and railways. A port has been built on Lake Nasser to link the Egyptian railway terminus at Aswan with the Sudanese system at Wadi Halfa, some 400 km up the Lake.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Egypt's ports are being considerably enlarged and modernized, and a major programme of silo construction is underway, both at the ports and inland. Nevertheless, further improvements will be needed to keep abreast of the volume of imports, which is expected to go on increasing. Facilities for large vessels to unload directly into silos, and for the transportation of grains in bulk rather than bags, would speed transit and reduce handling costs and waste. Problems causing current concern include insufficient grain storage capacity in the country as a whole and shortage and poor maintenance of road vehicles.

ETHIOPIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	642	511	550	400
	rice (paddy)	-	-	-	-
	coarse grains	4,512	4,383	5,801	4,095
	TOTAL	5,154	4,894	6,351	4,495
IMPORTS:	- wheat	7	227	267	171
	rice (milled)	1	2	7	25
	coarse grains	3	12	8	22
	TOTAL	11	241	282	218
	- of which, food aid	n.a.	n.a.	267	171
EXPORTS:	- TOTAL	2	1	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
24.6	31.1	33.7	57	2.3	3.1

GENERAL GRAIN SITUATION

Ethiopia is a large, mountainous country: much of the central region is above 3,000 metres. Average rainfall is high in the south, low in the north, and variable everywhere. The principal agricultural activity is subsistence grazing on the extensive grasslands. Until recently the country had greater livestock resources than any other in Africa, but the drought has caused great losses.

The area suitable for crops is limited to land around the 2,000 metre contour and, even there, some is too steeply sloping to be cultivated. The main grain is teff, a variety of millet used to make bread. Maize, barley, wheat and sorghum are also grown. Yields are low, even when there is adequate rainfall, because of soil degredation due to overcropping and the limited access of many farmers to agricultural inputs such as fertilizers. Grain production stagnated during the 1970s and has recently fallen sharply because of drought and civil disorder.

The country used to be self-sufficient in grain, but has recently become a large importer. Consumption in the towns was encouraged by low official prices. Total imports (mainly of wheat) were only about 10,000 tons a year in the early 1970s, but rose to 282,000 tons in 1982. These figures are dwarfed by the extent of the latest food disaster. Imports exceeded 400,000 tons in 1984, and in January 1985 FAO estimated requirements for the new year at no less than 1.7 m. tons, including 1.0 m. tons of wheat. At that stage, some 585,000 tons of assistance had been pledged by the international community. Food supplies reaching the affected regions have not been sufficient to avert a food disaster with many people - perhaps ultimately to be counted in millions - dying of starvation.

PORTS FOR GRAIN (see Appendix)

Grain is unloaded at Massawa and Assab. Discharge is usually (but not invariably) in bulk, with bagging undertaken either in the docks or at internal storage depots. Facilities at both ports were overwhelmed early in the present food emergency by the great quantities of grain and other foods they were called upon to handle. Subsequently, however, government efforts, and international help, enabled discharge rates at Assab to be trebled to 4,000 tons a day and delays were reduced, although vessels were reported to be waiting for up to eight days at the beginning of March. While offtake from the port averages 1,800 tons a day, as much as 4,000 tons has been moved in a day. Offtake rates are erratic because of a shortage of trucks. It was reported that, at one time, as many as 120 lorries left the port daily destined for a distribution centre over 700 km south. Discharge and offtake rates at Massawa are lower. Grain is also imported by Ethiopia, although only in relatively small quantities, through the port of Djibouti (in the country of that name) which is linked to Addis Ababa by rail.

GRAIN TRANSPORTATION

Grain movement in Ethiopia is very difficult because of the country's physical features. The most heavily populated areas tend to be on the high ground, in the centre of the country. To reach there from the coast involves climbing a mountain wall of over 2,000 metres and then proceeding over very rugged terrain. The distance from the port of Assab to the capital, Addis Ababa, is more than 600 km in a direct line, and it is considerably further from Massawa.

The drought has affected the subsistence farmers worst. They are particularly remote: it is estimated that about three quarters of the farms are more than half a day's walking distance from the nearest road - which, in all probability, is only a rough track. As demonstrated in the present emergency, the only effective way to bring relief to such people is by air.

There are two **rail** lines: one links the capital, Addis Ababa, with the port of Djibouti, a distance of some 700 km. A short line in the north runs from Massawa to the city of Asmera and thence on into Sudan. Both lines have periodically been put out of action by fighting and each requires considerable expenditure on the track and rolling stock, the latter being mostly old and worn out.

Roads are generally poor, and some, particularly in Eritrea (along the Red Sea coast) have been closed for long periods because of military activities. Large areas have no practicable roads at all. There is a serious shortage of vehicles. It was reported that at one stage in early 1985 almost one third of the privately-owned vehicles and half of the government vehicles were off the road because of a shortage of spare parts, particularly tyres. Over 90 trucks from Germany F.R. were due to be delivered to Ethiopia in March 1985.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Poor communications have greatly contributed to Ethiopia's food disaster. Rural areas are cut off. Increased agricultural production - the only effective remedy to the recurring famines affecting the country - will only come about if farmers have access to fertilizers and other inputs, and are able to market their grain. An extensive rural road construction programme will be required before this can happen. At the best of times the rail system was inadequate: it is now often dislocated by fighting as well.

Although all population projections must be subject to considerable doubt in present circumstances, there still seems a likelihood that Ethiopia's numbers will nearly double by the year 2000. In the long term, therefore, it seems likely that the country will continue to import substantial quantities of grain. Further investment will be required in the ports of Massawa and Assab, which have very limited facilities for bulk grain handling or storage.

GHANA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	64	67	70	70
	coarse grains	632	549	471	410
	TOTAL	696	616	541	480
IMPORTS:	- wheat	113	123	35	116
	rice (milled)	29	33	40	50
	coarse grains	3	61	61	79
	TOTAL	145	217	136	245
	- of which, food aid	n.a.	n.a.	51	62
EXPORTS:	- TOTAL	3	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
8.6	11.5	12.7	24	3.0	3.9

GENERAL GRAIN SITUATION

Two thirds of the cultivated land is still devoted to cocoa despite recent poor returns. Rice is produced on some state farms, but most of the country's maize and sorghum are grown as subsistence crops. Grain production appears to have been declining: in the early 1980s conditions were particularly difficult because of drought. Total output, which had been around 700,000 tons in the early 1970s, fell to less than 500,000 tons in 1983. Shortcomings in the distribution system may have contributed to this disappointing performance.

The country has a large urban population (about 5 m.), resulting in increasing demand for wheat, which is not locally grown, and for rice. Population growth and rising incomes led to a rapid increase in grain imports until a shortage of foreign exchange restrained them in the mid-1970s. A series of poor crops then gave rise to the development of a very serious food situation, only partly relieved by aid. While better weather led to some improvements in 1984 - the country has been able to export some maize - the further outlook is unpromising, not least because of the very high population growth rate expected up to the end of the century (projected at 3.9% a year). Numbers have recently been increased by refugees fleeing famine in Burkina Faso, Niger and Chad.

PORTS FOR GRAIN (see Appendix)

About 90% of grain imports are handled through the port of Tema, which is situated about 30 km from the nation's capital, Accra. The rest comes through Takoradi. Tema can handle cargo freighters of up to 40,000 tons, but the usual grain cargo size is 26,500 tons. Vessel's gear is used for bagged cargoes, otherwise wheat and maize are discharged in bulk by suckers into elevators and lorries. Discharge rates average only around 400 tons a day. The seasonal nature of the flow of imports, inadequate handling and lighterage equipment, and a shortage of efficient lorries sometimes results in congestion. The berths require dredging. As well as the difficulties already mentioned, there is a shortage of spare parts for essential maintenance and a lack of skilled manpower. It has been reported that the port's capacity has fallen to less than a quarter of its original level. A rehabilitation project, with WFP help, was begun in 1984.

Storage at the ports, and in the country generally, is inadequate. A substantial amount of the surplus maize produced in 1984 is said to have rotted in warehouses: the government has instituted an emergency storage scheme to prevent further losses. The United Kingdom has granted Ghana credit of £2.5 m. to install 44 grain silos.

GRAIN TRANSPORTATION

Most of the wheat and rice imported by Ghana is required in the cities. These are either on the coast, or, as in the case of Kumasi (about 170 km inland), reasonably accessible to it. Given the compact shape of Ghana, and the nature of the terrain, few rural areas can be considered really remote.

Roads. The network is fairly extensive, although there are insufficient access roads in rural areas - a contributory factor in the disappointing marketing of the good 1984 crop. Road maintenance poses problems. There is a shortage of lorries to move grain and, in particular, of tyres and spare parts.

Railways. The rail network extends for nearly 1,000 km, but is confined to the southern third of the country. Its main use is the movement of bulk export traffic (e.g. manganese and bauxite). Both main ports are linked by rail to the capital, Accra, and to the inland city of Kumasi. The system has deteriorated in recent years. There was, in particular, a decline in the availability of locomotives and rolling stock. It is hoped to rehabilitate it with World Bank assistance.

Waterways. Lake Volta, which extends nearly 400 km northwards from the Akosombo Dam (100 km north-east of Accra), and has many branches, would appear to offer a useful means of access to the centre and north of the country. But ferry boat and other waterborne transport has been made difficult by equipment failures and low water levels.

SUMMARY OF GRAIN HANDING AND TRANSPORTATION PROBLEMS

At present, the main limitation on grain imports by Ghana seems to be its financial position. Should this improve, imports of wheat and rice would probably increase, putting severe strains on the handling capacity of the ports. The slow unloading rate would be helped by the provision of more suckers. Much of the existing equipment needs repair. Berths also require dredging. There are considerable problems in the transport sector. Roads and rail tracks need costly maintenance, there is a serious shortage of lorries and spare parts, and also of equipment to assist handling and loading, such as forklift trucks. Grain storage facilities are inadequate. More warehouses are required and improvements needed in the ventilation and fumigation of existing ones. There is a shortage of skilled manpower in certain key sectors.

IVORY COAST

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	398	493	400	398
	coarse grains	167	330	375	392
	TOTAL	565	823	775	790
IMPORTS:	- wheat	113	179	180	232
	rice (milled)	62	185	357	359
	coarse grains	3	73	8	6
	TOTAL/	178	437	545	597
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	3	2	7	7

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.6	8.3	9.3	17	4.0	3.7

GENERAL GRAIN SITUATION

Much of the country has an equatorial climate, with high rainfall. Increasing production of profitable export crops (e.g. cocoa and coffee) has made the Ivory Coast one of the most prosperous countries in sub-Saharan Africa, although collapsing world market prices of these commodities seriously reduced economic growth in the early 1980s. It is self-sufficient in its staple foods (yams and cassava) but grain output has not kept pace with demand. Rice production, which is largely rain-fed, is inhibited because of low prices and an inadequate marketing structure. Grain consumption has been growing exceptionally rapidly, practically doubling in the last ten years. This is attributable, in large part, to one of the highest population growth rates in the world (over 4% a year in the 1970s). Birth rates are high and numbers have been boosted by many immigrants. The urban proportion of the population, more than 40%, is among the highest in Africa, and urban populations are still growing at the exceptional rate of over 8% a year.

Imports of wheat, only about 100,000 tons in the early 1970s, reached 232,000 tons in 1983/84. Rice, in which the country used to be nearly self-sufficient, has also been imported on a rapidly increasing scale. Total grain imports in 1983/84 were around 600,000 tons, but may be lower in 1984/85 because of better domestic crops and an economic austerity programme. The authorities have embarked on a programme to increase rice production, involving irrigation and the use of better varieties. Even if this proves successful, wheat imports will still be needed, as the population is projected to rise to 17 m. in the year 2000 compared with 9.3 m. in 1983.

PORTS FOR GRAIN (see Appendix)

Almost all grain is imported through the port of Abidjan, which also handles trade of Mali, Burkina Faso (to which it is linked by rail) and parts of Ghana. The port is situated on a lagoon, access to the sea being by the Vridi Canal (9.8 metres deep). There are many quays, and one berth is equipped with elevators and belt conveyors for bulk discharge of grains. Grain has to be bagged before removal from the port area.

GRAIN TRANSPORTATION

Abidjan - whose population was nearly 700,000 in 1980 and is increasing rapidly - and its surrounding area, is the main centre of consumption of imported grain. As the port handles very large quantities of other bulk commodities (it has a total annual throughput of some 8 m. tons), there is considerable potential for congestion and delays.

Roads. The southern part of the country is reasonably well served, but not so the north. Great improvements to the system have been made since the 1950s and road traffic is heavy. Less than 10% of the network is bitumenized, however and, given the rainy climate, maintenance problems can be considerable.

Railways. There is one line, which runs northwards from Abidjan through the length of the country and into Burkina Faso, terminating at Ouagadougou. It is single track and said to be overloaded. There are plans to double the track and to build several more lines.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The very rapid increase in the grain imports of the Ivory Coast appears to have been accommodated without a great deal of difficulty so far, although storage facilities are inadequate. The volume of grain handled at Abidjan seems likely to go on increasing, however, risking serious congestion. While deepening of the Vridi Canal, if practicable, would enable larger vessels to reach the quays, little would be gained unless the offtake rates from the port could also be increased. Planned improvements on the Abidjan-Ouagadougou railway will certainly help in this respect.

KENYA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	158	185	225	250
	rice (paddy)	34	40	43	28
	coarse grains	1,955	2,288	2,629	2,368
	TOTAL	2,147	2,513	2,897	2,646
IMPORTS:	- wheat	55	81	156	122
	rice (milled)	3	5	42	45
	coarse grains	1	83	94	4
	TOTAL	59	169	292	171
	- of which, food aid	n.a.	n.a.	169	110
EXPORTS:	- TOTAL	94	35	10	124

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
11.3	16.7	18.8	40	4.0	4.4

GENERAL GRAIN SITUATION

Kenya benefits from a varied climate and a diversified agriculture. Cropland is limited, however, by lack of rainfall, and irrigation will be necessary to extend it. Food crops occupy three quarters of the cultivated area, and in some years the country was a net exporter of wheat and of white maize. Recently, however, the effects of rapid population growth (over 4%) and increasing urbanization, together with a series of droughts, led to shortages of both grains. This occurred at a time when the country was also suffering serious foreign exchange difficulties. Imports reached 292,000 tons in 1982/83 and, while lower in 1983/84, are expected to climb sharply in 1984/85 as a result of serious drought. The latest estimate (April 1985) is that imports may reach 950,000 tons. Efforts are being made to increase wheat and maize yields, but the import gap may still grow as the population is expected to double to 40 m. by the end of the century.

PORTS FOR GRAIN (see Appendix)

Grain is imported through the port of Mombasa, the largest in East Africa, which also serves Uganda, Rwanda, Burundi, and parts of Zaire. The port has a number of deep-water berths, some completed recently, but the usual size of grain vessels is only 20,000 tons. Grain is mainly unloaded in bulk by grabs and suckers. About three quarters of it is taken by lorries to godowns, the rest being bagged for rail delivery. About 1% of the grain handled in Mombasa is lost through spillage. Bagged grain (e.g. maize) is moved by slings. There is no shortage of electric cranes. While the official rate of grain discharge is 1,500 tons a day, the effective rate, when all berths are occupied, is 3,200 tons, and rates of 4,000 tons or more have often been reached. Offtake from the port is currently about 4,500 tons a day, roughly half by rail and half by road. Even though imports are usually seasonal, being mainly concentrated in the period August-November, no serious logistical problems have occurred. The exceptional volume to be moved through the port in 1984/85 may put the facilities under strain but offtake from the port is likely to remain the limiting factor.

Grain is stored at Mombasa in godowns with a capacity of 100,000 tons. Construction of silos and other bulk handling facilities would be desirable. A scheme to extend the port, including new grain berths and a flour mill, will only be implemented if foreign capital is available.

GRAIN TRANSPORTATION

The capital city, Nairobi (1980 population: 1.3 m.) is situated on a high plateau, some 600 km from the coast. Other important cities and towns are still further inland. Many parts of rural Kenya, especially the north, are very remote. Imported and domestic grain alike must therefore be moved over long distances. The normal mode of grain transportation is in bags. Losses through excessive handling and pilferage are major problems. Transport difficulties are compounded by a lack of storage facilities in both consuming and producing areas.

Roads. The network is inadequate, and only 3% is surfaced with bitumen. The isolation of many villages makes the marketing of their agricultural produce extremely difficult. Investments are being made in road construction (including a link with Sudan) and other improvements. There is a shortage of lorries and a scarcity of spare parts. Running costs are high because of rough roads and the high cost of diesel fuel. Donor governments and international organizations have recently provided a number of additional trucks for food distribution.

Railways. There are several lines, linking Nairobi with the sea at Mombasa and with Uganda and Tanzania. There are too few locomotives but more are on order. There is also a shortage of waggons.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The port of Mombasa appears to be able to handle even the large volumes of grain required as a result of the recent drought. If imports were to go on rising in the longer term, however (and this is not unlikely, given the very large population increases expected up to the end of the century), further enlargement would be desirable. In particular, the installation of bulk handling facilities would make grain easier to handle and cut down losses. There are serious deficiencies in the transport system, more road vehicles, rail waggons and locomotives being required, as well as the necessary spare parts. Again, movement in bulk, rather than bags, would reduce losses and might be more efficient. More storage capacity is required in producing and consuming areas as well as in the ports.

LIBYAN ARAB JAMAHIRIYA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	133	110	115	150
	rice (paddy)	-	-	-	-
	coarse grains	167	126	75	75
	TOTAL	300	236	190	225
IMPORTS:	- wheat	336	444	452	584
	rice (milled)	29	45	63	54
	coarse grains	67	115	243	160
	TOTAL	432	604	758	798
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	-	-	2	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.0	3.0	3.4	7	4.1	4.3

GENERAL GRAIN SITUATION

The country is nearly all desert, arable land accounting for barely 1% of the total area. Soils are sandy and infertile even in the cultivated strip along the coast. The staple food is wheat, most of which has to be imported, but barley, grown locally, is also an important food for part of the population. Because of the natural conditions, yields remain very low, although irrigation projects are underway, and fertilizer use is also being encouraged.

Oil wealth enables the Libyan Arab Jamahiriya to provide its people with an adequate diet. Grain consumption has increased rapidly, having doubled in the 10 years to 1983/84, when imports, principally of wheat, reached almost 800,000 tons. The country has one of the highest rates of population growth in the world, exceeding 4% a year. The population, 3.4 m. in 1983, is projected to double by the year 2000.

PORTS FOR GRAIN (see Appendix)

There are many ports, two of which (Tripoli and Benghazi) are of international importance. At both ports large grain vessels need to discharge into lighters in the roads. This is only possible in the summer at Benghazi, where the anchorage is exposed. Cargoes of grain are usually received bagged, and discharged at the rate of 750 to 1,000 tons a day.

Both ports have suffered severe congestion in recent years as a result of the large and increasing volume of imports. Large-scale expansion programmes, which will permit bulk unloading, may be postponed because of the recent decline in oil revenues. Storage space is not regarded as sufficient. A 30,000 ton silo complex with pneumatic unloaders is under construction in Tripoli.

GRAIN TRANSPORTATION

Although the Libyan Arab Jamahiriya is a very large country, the population is concentrated along a narrow coastal strip. Nearly 60% is urban, Tripoli alone accounting for one third of the country's total population. Internal transportation of grain does not therefore appear to constitute much of a problem.

Roads. Considerable improvements have been made to the road system, which links the main towns and principal oases. Over half of the roads are asphalted.

Rail. There are no operating railways in the Libyan Arab Jamahiriya, but a line to the Tunisian border is planned.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The chief difficulties at present identified are in the storage sector, where facilities are inadequate. If, as seems likely, the country's grain imports, already approaching 1 m. tons, continue rapidly to expand, the lack of bulk handling facilities and the difficulties associated with discharge into lighters may become more prominent constraints. Improvements planned, or in hand, should, however, enable the country adequately to cope with its future grain needs.

MADAGASCAR

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	T	T	T	T
	rice (paddy)	1,887	2,122	1,967	2,147
	coarse grains	123	128	115	117
	TOTAL	2,010	2,250	2,082	2,264
IMPORTS:	- wheat	42	64	37	29
	rice (milled)	58	119	354	219
	coarse grains	-	1	-	-
	TOTAL	100	184	391	248
	- of which, food aid	n.a.	n.a.	73	69
EXPORTS:	- TOTAL	11	4	1	1

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
6.7	8.7	9.4	16	2.6	3.2

GENERAL GRAIN SITUATION

Madagascar comprises one large mountainous island approximately 1,600 km long and 500 km broad, together with some small islands nearby. Some of the valleys are very fertile, especially in the sub-tropical north where rainfall is plentiful, but the south of the country is arid. Rice is the principal grain crop, occupying half of the country's cultivated area, and some maize is also grown. Grain production has been increasing slowly, reaching nearly 2.3 m. tons in 1983. There is a shortage of insecticides and fertilizers, and producers are discouraged from expanding their plantings because of low prices.

The staple foods are rice and cassava. Little wheat is consumed. Grain consumption, encouraged by price subsidies, has been increasing faster than production, and imports, particularly of rice, have grown rapidly, reaching nearly 400,000 tons in 1982/83. Population growth, projected to increase to 3.2% a year up to the year 2000, seems likely to continue to outstrip production in the medium-term future.

PORTS FOR GRAIN (see Appendix)

There are a number of ports, but Tamatave (also known as Taomasina) handles most of the overseas trade. Grain is received in bagged cargoes discharged at an average rate of only 600 tons a day. Large vessels discharge into lighters. Work is often delayed by rain (the east coast of the island is permanently subject to a wet south-easterly wind). The port suffers from overcrowding because of a lack of storage space and equipment. A new silo is being built with the assistance of a World Bank loan.

GRAIN TRANSPORTATION

Tananarive, the country's capital (1980 population, 625,000) is situated in the interior of the island, nearly 1,500 metres high and 250 km from Tamatave. Other important towns have similar inland situations. Both imported and domestic grain have therefore to be transported over quite long distances. The normal mode of transport is in bags. Communications generally are difficult because of the very rugged terrain and wet climate.

Roads. Only 2,100 km (5% of the total) are paved, and no more than 6,300 km are usable throughout the year. Conditions have tended to deteriorate in recent years as a result of Madagascar's serious economic difficulties. Efforts are being made to improve the road system, which is quite inadequate for the country's needs. Loans from Western Europe are being used to purchase lorries and spare parts.

Rail. Tananarive is linked to the port of Tamatave and there are some other lines totalling, in all, about 900 km. All lines need improvement in roadbed and track, and there is a shortage of modern rolling stock. The government is giving priority to the improvement of its rail system.

Sea. Because of the difficulties of land transport, some imported food is shipped in coastal vessels from Tamatave to other parts of the island.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Madagascar suffers severe problems in all aspects of its grain handling and transport. Discharge at the port of Tamatave is slow, and often interrupted: there is insufficient storage space there, and in the country generally, and the transportation system is wholly inadequate both as regards its extent and equipment. Increased grain imports are likely during the next few years, making the situation even more critical.

MALI

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	3	2	2	2
	rice (paddy)	155	176	145	122
	coarse grains	731	978	836	756
	TOTAL	889	1,156	983	880
IMPORTS:	- wheat	30	32	43	33
	rice (milled)	22	23	71	80
	coarse grains	63	12	33	36
	TOTAL	115	67	147	149
	- of which, food aid	n.a.	n.a.	68	72
EXPORTS:	- TOTAL	-	5	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.7	7.0	7.5	12	2.1	2.8

GENERAL GRAIN SITUATION

The northern half of Mali is desert. The south is less dry on average but is prone to periodic droughts. Nomadic grazing is the country's main agricultural activity. Arable land accounts for less than 2% of the total area. Substantial tracts of cropland are irrigated from surface water supplies and cannot produce when rains fail. The principal grain crop is millet, which is occasionally exported. Attempts have been made to grow more rice through the development of irrigation systems, but output has not kept pace with demand. Hardly any wheat is grown and only a very small amount consumed. Self-sufficiency has been hard to attain because of a series of severe droughts and the high price of fuel.

The total 1984 grain crop is put at only 750,000 tons, compred with the late-1970s average of over 1.1 m. Imports in 1982/83 and 1983/84 were around 150,000 tons but it has been estimated that as much as 550,000 tons will be required in 1984/85. There seems little prospect of such an amount reaching Mali.

GRAIN TRANSPORTATION

A landlocked country, Mali's grain imports can take three principal routes to the capital, Bamako. They can move from Dakar (Senegal) by rail; from Abidjan (Ivory Coast) and from Conakry (Guinea) by rail and road. Each of these routes involve distances of at least 1,300 km; the average transit time is 10 days. Transport costs vary from US$50 to US$165 a ton, depending on the route. But Bamako is in the most easily accessible, western, part of Mali. The town of Gao, where the effects of the drought are being felt particularly severely, is about 1,000 km further east. The port of Lomé (in Togo) can be used to bring grain to this area but the distance is over 1,500 km. Costs of transporting grain to the remoter parts of Mali are very high.

Congestion at Dakar in 1984 led to diversion of some shipments to Abidjan, but lack of trucking capacity on this route has caused further delays. Maximum offtake rates per month are, at present, Abidjan 16,000 tons, Dakar 6,500 tons, and Lomé 6,000 tons.

Roads. There are only about 1,700 km of hard-top and 2,350 km of all-weather dirt roads in Mali. The rest of the network consists of tracks, unusable for long periods during the rainy season. Difficulties occur at river crossings: the limited capacity of the ferry at Gao, for example, being a major bottleneck. The expense of maintaining the roads is considerable, and their condition, generally, is deteriorating. Assistance is now being provided from a number of sources to improve roads and provide better maintenance.

Rail. The system is small (about 645 km) and in need of improvement. The existing line runs from Bamako to Dakar in Senegal. It is planned to build a new line linking Bamako with Guinea.

Waterways. Goods can be carried on navigable sections of the Senegal and Niger Rivers when water levels permit.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Grain importing will always be very expensive for Mali, because of its landlocked position. The transport system is inadequate to cope with the volume of imports (although the proposed line into Guinea will no doubt assist matters) and the isolation of many parts of the country hinders attempts to increase domestic output. Although investments are being made to improve both the rail and the road systems, the country will require much more assistance to overcome its grain handling and transportation difficulties.

MAURITANIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	2	5	15	14
	coarse grains	44	42	44	24
	TOTAL	46	47	59	38
IMPORTS:	- wheat	18	63	90	182
	rice (milled)	31	50	75	59
	coarse grains	68	45	10	12
	TOTAL	117	158	175	253
	- of which, food aid	n.a.	n.a.	63	103
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
1.3	1.6	1.8	3	2.7	2.6

GENERAL GRAIN SITUATION

Mauritania is a large and very sparsely populated country. Two thirds of it is desert (the western end of the Sahara). The rest is a mixture of dunes and steppe vegetation. The desert has been advancing southwards, displacing the nomadic populations whose grazing land has disappeared. Rainfall is rare, except in the south, where it is unevenly distributed during the summer months. There is some irrigation potential in the Senegal River valley (which forms Mauritania's southern border) but development could involve large dams and be very costly. Japan has recently provided aid to Mauritania to purchase some irrigation equipment. Millet is the principal grain crop, but production is under 50,000 tons. It fell to only 24,000 tons in 1983 as a result of drought. In that year Mauritania's grain self-sufficiency ratio was only 13%.

Population growth averages about 2.7% a year and urban growth is extremely fast - over 8% a year since 1970. The economy, which is largely based on the export of iron ore, grew rapidly in the 1970s, but has slowed recently because of falling iron ore prices. With growing prosperity has come a quickly rising demand for wheat and rice, practically all of which has to be imported. Total grain imports, around 100,000 tons in the early 1970s, increased to 175,000 tons in 1982/83 and, after drought, rose to 250,000 tons in 1983/84. The drought has continued, and requirements in 1984/85 are expected to stay at about the same level.

PORTS FOR GRAIN (see Appendix)

Most of the country's grain imports are landed at Dakar in Senegal and then conveyed overland to Mauritania. Its own principal ports, which handle only small amounts of grain, are Nouadhibou, which mainly serves as an export outlet for iron ore, and Nouakchott, which is also the capital city. At the latter, the usual cargo size is 3,000 tons and vessels discharge offshore onto lighters at a rate of 400 tons a day. The port is on an exposed coast with no natural shelter. Discharge is affected by bad weather (when vessels move away from the shore), heavy ocean swells, and occasional rainstorms during the summer.

GRAIN TRANSPORTATION

Nouakchott, a city of some 200,000 people (in 1980) and Nouadhibou, which is smaller, are the main towns in Mauritania. These, and the settlements along the Senegal River valley, are the principal centres of grain consumption. Although the amounts to be handled are not at all large, it must add appreciably to the cost of imported grain to bring it overland from Dakar (the distance from Dakar to Nouakchott is about 500 km).

There is one **railway** line, in the north-west, used to transport iron ore to Nouadhibou. The **road** linking Nouakchott northwards with the iron ore workings and southwards to the border with Senegal has been improved. A new highway is being built from the capital to Nema, more than 1,000 km away in the eastern part of the country. Elsewhere, the transport system is poor and underdeveloped. There is an adequate fleet of lorries to move grain within the country. **Barges** can be used to transport goods on the Senegal River.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The exposed situation of the principal port makes handling difficult: a problem which will not easily be overcome, and Mauritania may therefore have to continue to rely on Dakar to handle most of its grain imports. Communication links with the hinterland are poor.

MAURITIUS

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	1	-	-	-
	coarse grains	1	1	1	1
	TOTAL	2	1	1	1
IMPORTS:	- wheat	69	75	75	86
	rice (milled)	73	79	78	72
	coarse grains	2	11	13	17
	TOTAL	144	165	166	175
	- of which, food aid	n.a.	n.a.	11	19
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
0.8	0.9	1.0	1	1.4	n.a.

GENERAL GRAIN SITUATION

A mountainous island, total area just under 2,000 sq. km, Mauritius* supports very little grain production. Its economy is almost entirely based on sugar cane. Recent falls in the price of sugar have caused serious financial difficulties. The population of about 1 million is now growing at the moderate rate of 1.4% a year, and grain import demand is increasing at much the same pace. Total imports, mainly of wheat flour and rice, reached 175,000 tons in 1983. Because of the economic situation, the government has reduced subsidies on the consumption of rice and wheat flour: it is not yet possible to judge whether this will affect imports.

PORTS FOR GRAIN (see Appendix)

Port Louis can handle vessels up to 33,000 tons, but grain cargoes are normally of 10-12,000 tons. Grain vessels arrive, on average, every eight weeks. Some come directly from the exporting country, but more often cargoes are transhipped in Durban. Grains are discharged in bags by slings at the rate of 350-400 tons a day, but flour may be discharged in bulk, at 1,000 tons a day. Rice is unloaded into lighters, and flour put into lorries. Low productivity is a problem. Storage space is limited - 50,000 tons for the whole country.

The government is contemplating a grain complex to handle the likely expansion in requirements up to the year 2000. It would include bulk unloading facilities for wheat (which would then be processed in a local flour mill) and a conveyor belt system for rice.

GRAIN TRANSPORTATION

Grain is bagged for inland transportation. Distances moved are short: the island is only about 50 km from coast to coast. The quantities to be handled are relatively small, and, provided cargoes arrive on schedule, internal transportation poses few difficulties.

The **road** system is good, considering the hilly terrain, and is mostly paved.

The one **railway** line is solely devoted to the carriage of sugar cane.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The facilities for grain handling at Port Louis cannot adequately cope with present flows. Productivity is low and storage space insufficient. These difficulties should be overcome when the planned Grain Complex Project is completed. Internal transportation does not give rise to any serious problems.

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* The nation also includes the small island of Rodriguez, some 500 km east.

MOROCCO

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1,914	1,533	2,183	1,970
	rice (paddy)	17	21	4	6
	coarse grains	2,640	2,103	2,740	1,610
	TOTAL	4,571	3,657	4,927	3,586
IMPORTS:	- wheat	989	1,858	1,388	2,330
	rice (milled)	-	2	-	36
	coarse grains	56	162	314	139
	TOTAL	1,045	2,022	1,702	2,505
	- of which, food aid	n.a.	n.a.	132	448
EXPORTS:	- TOTAL	21	18	18	6

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
15.3	20.1	22.1	31	2.7	2.5

GENERAL GRAIN SITUATION

Most of southern Morocco is too arid to support crops, and in the north cultivation is limited to the belt of land between the coast and the ranges of the Atlas Mountains. Soil erosion is a serious problem in some areas. Cereals (principally barley, durum and soft wheat and maize) occupy about 80% of the cultivated area. Output is variable because of recurring droughts, and has not increased over the last fifteen years. In the past, attempts to extend cultivation to the more arid regions have contributed to desertification. A major irrigation programme is in progress. The system of land tenure, and the small, fragmented, nature of the farms, are also partly responsible for the low level of production. Grain requirements, on the other hand, are rising rapidly, due to population growth and a continuing drift to the towns: in the 1970s the urban population grew by 60% to 8.3 m. As a result, imports of grain, particularly of wheat, have risen, from around 1 m. tons in the early 1970s to 2.5 m. in 1983/84. The population is expected to go on increasing fairly rapidly and grain imports are likely also to expand further.

PORTS FOR GRAIN (see Appendix)

Casablanca is the principal grain receiving port, but bulk grain can also be discharged at Agadir, Kenitra, Safi, Tangier (all on the Atlantic seaboard), and the new port of Nador, on the Mediterranean. The volume of goods handled at most of these ports is very large, and they are frequently congested. Most grain arrives in bulk carriers in cargoes of 20-30,000 tons but Kenitra and Nador (at present) can only accommodate smaller vessels. Discharge rates are normally around 2,000 tons/day. The grain is taken directly into silos by vacuvators or is discharged by grabs onto the quay and bagged there. The latter results in wastage and contamination. Storage capacity at Casablanca is 70,000 tons in silos, and at Safi 24,000 tons, but capacity at the port of Tangier is limited. The port facilities at Casablanca and Nador are currently being extended.

GRAIN TRANSPORTATION

The principal city of Morocco, Casablanca (1980 population 2.2 m.), has its own port, but many important urban areas (e.g. Marrakech, Fez) lie some distance inland, and others (including the capital, Rabat), though on the coast, do not accommodate grain vessels. There is therefore a considerable movement of imported, as well as domestic, grain within the country.

Roads. There is an extensive road network, particularly in the north. Over 80% of the total length is paved. Most of the system was built to design standards in advance of current traffic requirements. Certain rural areas (e.g. the Rif highlands) are poorly served, however.

Rail. Railways are an important means of freight traffic in Morocco. About 40% of the system (of nearly 1,800 km) is electrified. Most of the principal ports (except Agadir and Nador) are served by rail. Major extensions are planned, and rolling stock is being renewed and increased. Developments have, however, been slowed because of the country's financial difficulties.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Morocco has had to handle a rapid increase in grain imports in recent years. It has done so without a great deal of difficulty, but a number of improvements will be needed if imports continue to increase. There are insufficient silos, and the discharge of grain onto the quays for bagging results in loss and contamination. Arrangements for grain transportation appear adequate at present, although improvements, particularly in the railways, will be needed as traffic increases.

MOZAMBIQUE

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	7	3	3	5
	rice (paddy)	95	58	50	30
	coarse grains	648	499	430	305
	TOTAL	750	560	483	340
IMPORTS:	- wheat	106	115	118	98
	rice (milled)	5	61	87	110
	coarse grains	29	74	90	60
	TOTAL	140	250	295	268
	- of which, food aid	n.a.	n.a.	113	289
EXPORTS:	- TOTAL	51	124	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
8.1	12.1	13.3	24	4.0	3.4

GENERAL GRAIN SITUATION

Although one third of the country's area is thought to be cultivable, only 5% of the arable land is used for crops. Of this, by far the greater part consists of subsistence farms growing, for example, cassava, but there are also commercial farms producing export crops such as cotton and sugar cane. The main grains produced in Mozambique are millet and sorghum; white maize is also grown in some areas. Grain production has tended to decline in recent years. Output was particularly low in 1982 and 1983 because of drought, and unfavourable conditions continued in 1984. Flood damage has been reported in the south in 1985. Planting has also been affected by a shortage of seeds, and disrupted by civil disorder.

Grain consumption has been rising rapidly, partly because of the very high rate of population growth (4% a year during the 1970s). Wheat, which is produced in only small amounts, has become an important food in urban areas. Grain imports have, as a result, increased, reaching almost 300,000 tons in 1982/83, double the level of the early 1970s. The recent drought has caused serious food shortages in some parts of Mozambique, only partly alleviated by food aid. Cereal import requirements in 1984/85 are estimated at some 620,000 tons.

Government development plans emphasize the need for increased food production, particularly on state farms, and in communal villages. Improved seeds and fertilizer will be made available. Imports, especially of wheat, may well continue at a high level, as population growth to the end of the century is projected to average 3.4%.

PORTS FOR GRAIN (see Appendix)

Each of the country's major ports (Maputo and Beira) also handle much traffic destined for neighbouring countries. Both are potentially fine ports, but have suffered from lack of maintenance. Discharge rates (750 tons a day in bags, 1,000 tons in bulk) are low. Nacala serves the north of Mozambique and is a railhead for Malawi: some grain sent there is transhipped into coasters at Beira. Large-scale international assistance has been made available for the improvement of Mozambique's railways and harbours (e.g. a US$650 m. line of credit from the African Development Bank and the EEC). The development includes a silo of 15,000 tons at Beira.

GRAIN TRANSPORTATION

Most of the population of Mozambique is rural. Maputo (population 750,000 in 1980) is the only large city. While each of the grain-handling ports is served by rail, the lines run westwards into neighbouring countries, and are not well suited for the distribution of goods within Mozambique. Similarly, the north-south road links are inferior to the east-west ones. Rural areas need access roads to market their grain in goods years and to supply needy populations when there is a drought. Because of the extremely difficult transport situation, very little (if any) of the commercially imported maize is at present being distributed outside the cities.

Roads. These are inadequate, especially in northern areas. Less than 20% of the country's road network is paved. There are plans to construct a paved highway extending from the Tanzanian border in the north of the country to the south. Security problems hamper road traffic along the main coast road and in some inland areas as well. There is a shortage of lorries, spare parts, drivers and mechanics.

Railways. The rail system (which extends to over 3,800 km) is most important to Mozambique's economy, as it derives much of its income from charges on goods carried from Zimbabwe, Zambia, Malawi, Swaziland and South Africa to its ports. The system is less well suited to Mozambique's own needs. There is a shortage of transport equipment.

Waterways. Navigable waterways are estimated at 3,750 km. Because of the security situation, some food supplies are sent by small coastal vessels from Beira and Maputo rather than overland.

SUMMARY OF GRAIN HANDLING AND TRANPSORTATION PROBLEMS

Mozambique suffers enormous logistical problems. It has had to handle a rapidly increasing volume of grain, both to cater for its own needs and those of neighbouring countries suffering from drought. Much investment is being directed to improving the ports but their grain handling rates remain poor. Internal transportation is inadequate, north-south communications being particularly bad. The railways, which suffered from guerilla activities in recent years, need rehabilitation. Problems in rail and road transportation are compounded by a lack of skilled manpower. There is insufficient storage capacity. Bulk "on floor" storage, which is cheaper to construct than silos, is required at Maputo and Nacala to accommodate the country's proposed food security reserve.

NIGER

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1	2	2	2
	rice (paddy)	30	31	42	45
	coarse grains	992	1,556	1,660	1,702
	TOTAL	1,023	1,589	1,704	1,749
IMPORTS:	- wheat	6	26	40	14
	rice (milled)	1	31	35	5
	coarse grains	57	21	53	-
	TOTAL	64	78	128	19
	- of which, food aid	n.a.	n.a.	12	11
EXPORTS:	- TOTAL	41	21	30	30

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.0	5.3	5.8	10	2.8	3.3

GENERAL GRAIN SITUATION

Niger is a landlocked country situated on the Sahelian zone of West Africa. The northern half is desert: south of that there is an area of nomadic grazing, and only in the southern fringes - accounting for about 10% of the total area - is there enough rainfall to support crops. Of the 15 m. ha. of cultivable land, only about one fifth is currently being utilized. The main food crops are millet and sorghum. Rice is produced under irrigation, with good yields. Total cereals production was keeping up with demand until the early 1980s, but the country has latterly been affected by prolonged drought, which became particularly severe in 1984.

Niger has a very sparse population, but its rate of growth is rapid - nearly 3% a year. Urban growth is a recent phenomenon. In 1960 only 6% of the population was classed as urban, but by 1981 the proportion had risen to 13%. Wheat was hardly eaten at all until the 1970s, but there has latterly been an increase in consumption of flour, partly because this was supplied as food aid. Malnutrition is still widespread, however. In the 1970s total grain imports were usually under 100,000 tons and Niger regularly exported millet. A recent survey has suggested that because of the worsening drought the cereals shortfall in 1984/85 exceeds half a million tons.

GRAIN TRANSPORTATION

The country's imports of grain (all moved in bags) are probably destined, in the main, for Niamey (the capital) and nearby areas in south and south-west Niger, where it borders Nigeria, Benin and Burkina Faso. Imports usually come by way of Lomé (Togo) or Cotonou (Benin). The cheapest way is via Cotonou, but this also presents the most difficulties. Grain imported through that port moves by rail to Parakou (about 400 km). It is then taken by road to the border with Niger (250 km) and on to Niamey (a further 300 km). The average time taken is 15 days, and the cost ex-vessel for bagged grain is about US$75 per ton. There are diffculties in coordinating transport by this route and delays often result. For customs reasons, shipments must often wait at the borders to form convoys. Importing via Lomé is quicker (6 days on average) but costs more (US$97).

The increased needs of Niger in 1984/85 are far too great for these routes to handle, and some will have to come via Apapa (Nigeria) or Abidjan (Ivory Coast). But the border with Nigeria has been closed by the authorities of that country from time to time to combat smuggling, and grain imported via Abidjan must also pass through Burkina Faso (where it is transhipped from rail to road), a distance of over 1,500 km. The handling capacity of this route is reported to have deteriorated recently.

There are no **railways** in Niger, although it is planned to extend the line from Cotonou to Parakou, in Benin, to Niamey. Until recently, the **road** system was extremely poor. Development of uranium mining in north-eastern Niger stimulated improvements in the 1970s, but, even now, the country has less than 5,000 km of hard-top roads. Funds from bilateral and multilateral sources have been used to improve the roads, and an all-weather route has been opened in the south of the country between Niamey and Zindu. A road is also being constructed between Niamey and Ouagadougou in Burkina Faso, which links with the sea coast at Abidjan. More local roads are needed to open up marketing possibilities in rural areas. The existing lorry fleet is not large enough to cope with the exceptional grain imports resulting from the drought.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Niger suffers the disadvantages of being a remote landlocked country. When heavy imports are necessary, following drought, deliveries are delayed and expenses considerable. The completion of the railway from Parakou (Benin) would greatly help matters, as would the road links which are planned, or in progress. There are adequate grain storage facilities in Niger.

NIGERIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	11	22	30	30
	rice (paddy)	449	809	1,376	1,000
	coarse grains	7,399	8,397	8,935	6,610
	TOTAL	7,859	9,210	10,341	7,640
IMPORTS:	- wheat	419	1,193	1,335	1,650
	rice (milled)	14	487	651	700
	coarse grains	49	162	375	138
	TOTAL	482	1,842	2,361	2,488
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	-	-	6	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
57.2	80.6	89.0	169	3.5	3.5

GENERAL GRAIN SITUATION

One third of the area of this very large country is arable land. The contribution of agriculture to the economy remains important, but has been overshadowed by the development of the oil industry. Subsistence crops include cassava, sorghum and millet (the staple foods of a large part of the rural population), yams, maize, and rice. Some large-scale agricultural development schemes are in hand to use modern techniques to produce rice and wheat. Rice production has increased considerably but that of wheat remains very small. Grains output suffered a sharp setback in 1983 because of severe drought, which also caused livestock and poultry losses. Conditions were better in 1984.

The relative prosperity resulting from the development of the oil industry has led to a fundamental change in food habits. From being of very minor importance in the 1960s, wheat can now be classed as a staple food, at least in the towns, its consumption exceeding 1.6 m. tons in 1983/84. Grains demand has also been boosted by the rapid rate of population growth (some 3.5% a year in the 1970s). Nigeria's population, estimated at 89 m. in 1983, is projected to reach no less than 169 m. by the year 2000. By then, 45 m. may be living in the towns and cities, compared with 14.8 m. in 1980.

Grain imports have soared, reaching nearly 2.5 m. tons in 1983/84, compared with under 500,000 tons ten years earlier. Two thirds of the total consists of wheat. Although a start has been made with the local production of wheat (30,000 tons were grown in 1982), demand is likely to continue to outpace domestic output for some years to come, resulting in a further expansion of imports. Rice demand is also outpacing supply.

PORTS FOR GRAIN (see Appendix)

Nigeria has a number of ports, but most are situated on lagoons or some distance up some of the many rivers and estuaries that break up the coastline. This limits depths, and large vessels must usually discharge into lighters. The huge growth in grain imports since 1970, compounded by the increased volume of other goods required by Nigeria's growing economy, caused very severe port congestion. The position has, however, been considerably eased since 1979 by improvements in Lagos-Apapa and Port Harcourt, and the modernization of Wani, Calabar and Koko. It was reported in 1984 that the ports as a whole were not working to their full capacity, but there was renewed pressure in early 1985 due, inter alia, to the large amounts of food aid required by Niger and Chad and Nigeria's own large fertilizer requirements. Further port improvements are planned.

GRAIN TRANSPORTATION

With the exception of Lagos, most of the largest towns and cities are well inland. Jos, which is the largest (1980 population 2.5 m.), is about 650 km from the coast. Grain imports therefore tend to move over long distances and a good transportation system is also required to move domestically produced grain. In view of the enormous growth foreseen in urban populations up to the year 2000 a considerable expansion of grain transport capacity will be called for.

Road. Road transport has become increasingly important in recent years. The network is extensive and most areas are now reasonably well served. About 30% of the total is paved (mostly bituminous).

Rail. The total system extends to some 3,500 km. Both Lagos and Port Harcourt are linked by rail to the interior of the country. The railways are generally regarded as inefficient and very slow. There was an improvement in 1979-81 when an Indian state-owned firm was granted a contract to manage the system, but the contract has not been renewed. Plans for a major rail rebuilding programme have been shelved because of the recent decline in oil revenues.

Waterways. The navigable length of the Niger and Benue Rivers and other waterways totals 8,575 km. There are plans to improve the River Niger by dredging. Use of the rivers for the transport of imported grain will be limited, however, because they do not in general pass close to the principal urban areas.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The continuing modernization and improvement of the ports should be sufficient to cope with grain imports for some years to come, even if they go on rising at the rate of the 1970s and early 1980s. Storage remains inadequate, however, and the inefficient transport system is a major problem. Rehabilitation of the railways and provision for the bulk transport of grain would be of major assistance in coping with the internal distribution problems which are bound to arise as the country's population goes on increasing.

SENEGAL

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	91	98	105	70
	coarse grains	603	654	662	416
	TOTAL	694	752	767	486
IMPORTS:	- wheat	112	120	138	127
	rice (milled)	166	270	359	360
	coarse grains	34	39	13	87
	TOTAL	312	429	510	574
	- of which, food aid	n.a.	n.a.	84	141
EXPORTS:	- TOTAL	7	12	16	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.4	5.7	6.3	10	2.6	3.1

GENERAL GRAIN SITUATION

A quarter of the land area of Senegal is classed as arable, but desertification is a major problem: the desert is said to have been advancing several kilometres each year. The principal food crop is groundnuts, which occupies half the cultivated area. The chief grain is millet: (yellow) maize and rice are grown on a relatively small scale. Grain yields tend to be low because of the high cost of agricultural inputs and lack of irrigation. There are, however, possibilities for increased irrigation in the valley of the River Senegal, which forms the northern border of the country (with Mauritania). Persistent drought has seriously affected food output in recent years.

Although the country is still predominantly rural (three quarters of the labour force is engaged in agriculture), one third of the population is urban. Urbanization has led to the increased consumption of wheat, which is not an indigenous crop, and rice. Wheat imports are at present limited by the capacity of the mills (9,000 tons a month). Rice imports rose from 160,000 tons in the mid-1970s to 360,000 tons in 1983. To curb further increases the government has raised the price of rice to consumers. There is a limited export trade in wheat flour. The volume of grain imports has gone up steadily to over 570,000 tons in 1983/84 and further increases seem probable.

PORTS FOR GRAIN (see Appendix)

Dakar is the principal port, and the only one handling grain imports. It also deals with much of the trade of Mali and some of Mauritania. Many of the berths can accommodate vessels drawing 10 metres. Grain may be received in bulk, in which case it is discharged by suckers at up to 2,000 tons/day, and bagged before being transported to the areas of consumption. Bagged cargoes are discharged at 1,000 tons a day. The port serves as a bagging centre for neighbouring countries. Poor handling methods sometimes cause great losses. The port is liable to congestion, mainly because of slow movement of goods away from the berths.

GRAIN TRANSPORTATION

Most of the urban areas of Senegal are on the coast in the region of Dakar. Distribution of grain imports does not, therefore, pose a logistical problem except in the immediate vicinity of the port.

The **road** network amounts to 14,700 km, of which just under half is passable throughout the year, and 3,500 km is tarred. There are too few lorries to ensure a smooth and regular removal of grain from the port of Dakar, resulting in congestion there. Road transport is expensive.

The **railway** system is relatively short (under 1,200 km) but includes an important line from Dakar to the border with Mali. Grain movement on that line is reported to be very slow.

Water transport has declined since the closure of the port of Saint-Louis, in the north of the country, to all maritime traffic in 1963. The region of Casamance, separated by The Gambia from northern Senegal, obtains its grain by transhipment from Dakar.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The principal problem is in moving grain away from the port. Lorry operators do not find tariffs for grain sufficiently attractive, compared, for example, with groundnuts. There is also a shortage of storage space, especially in the Port of Dakar: the authorities say they have this matter in hand. The construction of a new container terminal will free some of the port area. Wheat imports are limited by the absorptive capacity of the mills.

SOMALIA, DEMOCRATIC REPUBLIC

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1	1	1	1
	rice (paddy)	2	5	20	8
	coarse grains	238	264	385	235
	TOTAL	241	270	406	244
IMPORTS:	- wheat	47	103	106	114
	rice (milled)	24	58	75	61
	coarse grains	42	53	128	110
	TOTAL	113	214	309	285
	- of which, food aid	n.a.	n.a.	166	162
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.8	4.6	5.3	7	5.2	2.4

GENERAL GRAIN SITUATION

The country has an arid climate. Over 90% consists of open range, providing grazing for large numbers of livestock. Crops are only grown to any extent in the south-west where there are two permanent rivers and some irrigation. The main food crops are millet and maize, combined production of which, in good years, is around 400,000 tons. In droughts (such as that of 1983) it may fall to half that amount. Locusts are a problem.

As much as a third of the country's population is urban, many living in and around the capital (Mogadiscio). There is a secondary centre of population around Berbera, on the north (Gulf of Aden) coast: elsewhere population is very sparse. There has latterly been a considerable influx of refugees from Ethiopia, numbering some 1 m., who live in camps near the border.

Imports of wheat and rice increased threefold during the 1970s, and coarse grains have also been imported in increasing amounts. Total grain imports exceeded 300,000 tons in 1982/83, and are expected to remain close to that level in 1984/85. Development plans envisage a considerable expansion of agricultural production as further use is made of the more fertile lands in the south: if successful, imports may be held back, although the urban demand for wheat and rice may still have to be satisfied by imports.

PORTS FOR GRAIN (see Appendix)

The country has a very long coastline (about 3000 km). Its only large port is Mogadiscio. Usual grain cargoes are 10,000 tons, and are normally discharged in bags at a maximum rate of 500 tons a day. Bulk discharge is only possible using ship's own gear. The port lies on an exposed coast, and suffers from heavy swells. It has limited storage facilities, but expansion is now taking place. Grain can also be landed at Berbera, on the north coast. Discharge rates there are 500 tons a day, and the maximum size of shipments is 5,000 tons. Some of the smaller ports up and down the coast receive grain transhipped into coastal vessels.

GRAIN TRANSPORTATION

Most imported grain is required in and around Mogadiscio and Berbera. When drought affects remote rural areas, their needs are hard to meet because of the lack of roads.

The **road** network amounts to only about 15,000 km in total, of which 15% has a bituminous surface, most of the rest being unimproved earth. Many of the roads are in poor condition. The north-western and central regions have yet to be linked to the main network. There is a serious shortage of vehicles and of spare parts, and maintenance standards are low. Fuel is also in short supply, affecting inland transportation of grain.

There are no **railways.**

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Domestic production has been falling behind requirements, leading to rapidly increasing import needs. The problems have been accentuated by the presence of many refugees. Discharge rates at the ports are very slow and storage capacity limited. Internal transport is quite inadequate: more surfaced roads are needed as are more lorries and spare parts.

SUDAN

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	214	238	140	141
	rice (paddy)	9	8	7	7
	coarse grains	2,128	2,845	2,308	2,183
	TOTAL	2,351	3,091	2,455	2,331
IMPORTS:	- wheat	166	342	429	544
	rice (milled)	6	6	35	10
	coarse grains	-	-	-	-
	TOTAL	172	348	464	554
	- of which, food aid	n.a.	n.a.	320	435
EXPORTS:	- TOTAL	59	151	423	300

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
13.9	18.7	20.4	34	3.0	2.9

GENERAL GRAIN SITUATION

Sudan is the largest country in Africa. It extends about 2000 km from north to south and 1,200 km (at its narrowest) from east to west. The climate ranges from desert in the north to tropical in the south. The Nile, which runs the length of the country, provides water for irrigation, but arable land only accounts for about 5% of the total area. The staple grain is sorghum*, production of which was, until recently, increasing in line with requirements. In most years there was an export surplus. Production of wheat, on the other hand, has not been increasing: irrigated land can more profitably be used for other crops. Severe drought has greatly reduced grain production since 1982. Durra production in 1984 is put at only 1 m. tons, 40% below normal, and the millet crop was also greatly reduced.

Sudan is believed to have considerable agricultural potential, but the regions which could be the most productive, in the south and west, are also the most remote and inaccessible. Adding to the country's problems has been an influx of refugees from Uganda and, particularly, Ethiopia.

Wheat as a food has rapidly gained popularity in the Sudan. Bread consumption has been rising at 10% a year. Imports have, accordingly, increased. In the early 1970s they averaged 160,000 tons, but exceeded 550,000 tons in 1983/84. The government has reduced subsidies on flour, but any effect this might have had on imports has been overwhelmed by the latest drought and the presence of so many refugees seeking food. The reduction in food subsidies sparked civil disturbance in some towns.

The grain consumption deficit in 1984/85 to be covered by food aid is estimated at about 1.4 m. tons, most being needed in the northern part of the country. In view of the rate of population growth (expected to stay above 3% a year for the rest of the century), and the difficulties associated with increased production, a continuing high level of imports seem probable in the years to come.

PORTS FOR GRAIN (see Appendix)

Port Sudan on the Red Sea is the country's grain importing port. It has a number of deep-water berths, one with a grain silo (capacity 30,000 tons) alongside. This berth is capable of handling vessels of 50,000-60,000 tons. Rates of grain discharge can reach 3,000 tons a day, if vacuvators are used in conjunction with the silo elevator. A second elevator, to be installed in 1985, will raise the rate to 4,000-5,000 tons a day. The port has, in the past, suffered from severe congestion but a modernization programme, partly financed by the World Bank and the United Kingdom, started in 1978. This will increase the number of deep-water berths. There is also a plan to increase silo throughput capacity to 700,000 tons.

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* Known locally as "durra".

Because of the distance from Port Sudan to the southern regions of the country (up to 2,500 km), some grain required there is purchased in neighbouring Kenya, or is shipped via Mombasa.

GRAIN TRANSPORTATION

Most of the population of Sudan is concentrated along the Nile valley and in the south-western areas. The capital, Khartoum, had a population in 1980 of 1.6 m., and this was expected to double by 1990. Another large city (Wadi Mediani) lies 150 km south-east of Khartoum. These urban areas have to be supplied with food from either Port Sudan, 700 km to the north, or the productive regions, an equal distance to the south-west.

A major **road** programme in recent years has brought the length of paved roads up to over 2,000 km: an important link recently completed is a highway between Port Sudan and Khartoum. But communications in many areas remain poor and, in the south, roads may become impassable in the rainy season. There is a shortage of lorries. Diesel fuel and petrol are sometimes unobtainable, and lorries have to spend much time queuing for available supplies.

Use of the **railways** for long hauls of commodities such as grain is much cheaper, but the system, although extensive (6,000 km), suffers from lack of investment. The state of the track, which is unballasted, is unsatisfactory, and there is a shortage of rolling stock. Only half of the fleet of mainline locomotives and 60% of the waggons are at present in operation, and it is feared that the situation may deteriorate further. The railways currently carry only 40% of the nation's freight traffic. Only four cargo trains leave Port Sudan for Khartoum each day: at the height of the railway's performance in the 1960s the number was 15.

Assistance is being made available by France and Germany (Fed. Rep.) for reconditioning locomotives and waggons, and the Government of Sudan is devoting a higher proportion of its transport budget to railways. Little money is available, however, for the necessary track improvements.

Waterways are potentially of great importance, as Sudan has over 4,000 km of navigable rivers including, in particular, the Nile, which traverses the whole length of the country from south to north. Until recently their use for the transport of good was minimal, but, since 1981, the Government of Sudan has taken steps to improve the situation and, with assistance from the US and the EEC, has announced a programme of dredging, improvement of quays, and the provision of navigation aids. However, since there is no waterway linking the interior to the Red Sea coast, the role of water in grain transportation is bound to remain of limited importance.

SUMMARY OF GRAIN TRANSPORTATION AND HANDLING PROBLEMS

Most of the problems of grain handling in Sudan derive from the distances involved. The principal cities are situated on the Nile, in the northern part of the country, far distant from both Port Sudan and the productive lands of the south-west. While improvements have been made in Port Sudan, and more are planned, it remains a potential bottleneck, since most of the country's exports and imports have to pass through it. While the road system is being improved, the railways are inadequate and much investment is needed in both track and rolling stock. There is a lack of spare parts. Skilled manpower is in very short supply, partly because of the emigration of many trained people to oil-producing countries in the Gulf.

TANZANIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	64	72	61	58
	rice (paddy)	170	224	418	400
	coarse grains	1,104	1,268	2,322	2,375
	TOTAL	1,338	1,564	2,801	2,833
IMPORTS:	- wheat	50	68	31	78
	rice (milled)	31	55	117	65
	coarse grains	150	94	160	100
	TOTAL	231	217	308	243
	- of which, food aid	n.a.	n.a.	112	98
EXPORTS:	- TOTAL	6	38	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
13.3	17.9	19.7	36	3.0	3.5

GENERAL GRAIN SITUATION

The tropical climate of Tanzania, with abundant rainfall in some areas, favours agriculture, which is the occupation of over 80% of its labour force. The country is self-sufficient in its main food crop, cassava (manioc). The principal cereal is maize, but wheat, rice, millet and sorghum are also produced. Grain output was increasing at a satisfactory rate in the 1970s, but there were serious droughts in 1981 and 1984, and the difficulties facing agriculture have been compounded by a shortage of foreign exchange, limiting the use of fertilizers and other agricultural inputs.

Population growth is rapid (over 3%) and the urban population, though still relatively small (13% of the total in 1982) is growing particularly quickly. There is some evidence of a consequent rise in demand for wheat and rice. The country was moving towards self-sufficiency in the latter 1970s, and some cereals were exported, but imports have recently increased sharply. In 1982/83 they amounted to 308,000 tons, were lower in 1983/84, but may rise to 450,000 tons in 1984/85 after the latest drought.

In the mid-1970s it was decided to establish, with international assistance, an emergency grain reserve of 100,000 tons, involving increased storage at inland points. Contributions up to mid-1981 totalled 77,000 tons, but most of this had by then been disbursed for famine relief.

PORTS FOR GRAIN (see Appendix)

The principal grain ports is Dar-es-Salaam. Grain, which normally comes in 12,000 ton cargoes, is usually discharged in bulk using grabs and vacuvators direct to land-based transport. The optimal rate is 1,000 tons a day, but recent reports suggest it is usually 700-800 tons. The rate for bagged cargoes is 750 tons a day. Larger vessels discharge into lighters. The main problem in handling grain at Dar-es-Salaam is the slow turnround of lorries, and the fact that there is not an even flow of imports. The port handles grain destined for Zambia, Zaire, Rwanda and Burundi. Grain may also be landed at Tanga, a smaller port further up the coast, but there are no deep-water berths there.

GRAIN TRANSPORTATION

Half of Tanzania's urban population live in Dar-es-Salaam, a city of 1.1 m. (in 1980), which is expected to more than double in size by 1990. Population densities are relatively high along the coast, and close to the border with Kenya in the north-east. Grain is also railed across the country to Zambia, Rwanda and Burundi. Considerable amounts of grain have therefore to be transported over quite long distances within Tanzania.

The country is now comparatively well served by **railway** lines, which link Dar-es-Salaam with most other regions except the extreme south. One particularly important line (the "TANZAM" railway) makes direct connection with other countries to the west and south. But rail transport remains slow and is expensive: for example, the transit time from Dar-es-Salaam to Lusaka (Zambia) is about 10 days and costs amount to US$95 a ton. The Government of Tanzania is purchasing new rolling stock and is arranging facilities for staff training. Equipment is obsolete: there is a lack of adequate maintenance facilities, and a shortage of skilled manpower.

A major railway project under consideration would link Musoma, on the east shore of Lake Victoria, with the main northern city of Arusha, which is at present the railhead for Tanga. This would enable the latter port to be used more extensively, and ease congestion at Dar-es-Salaam.

Road transport tends to be difficult because even some of the main routes from Dar-es-Salaam become impassable during the rainy season. The country has 7,500 km of main trunk roads, 2,000 km of them bitumenized. There is an inadequate fleet of vehicles, poor maintenance facilities, and a shortage of fuel and spare parts.

Water transport is important for Tanzania as much of its borders with Uganda, Zaire and Malawi are formed by lakes. Additional vessels commissioned in 1983 for Lake Victoria and Lake Tanganyika have facilitated grain movements in those areas.

The southern coastal areas of Tanzania, which are poorly served by road and have no railways, are reached by coastal shipping. Supplies to the islands of Pemba and Zanzibar, which form a constituent republic within Tanzania, are preferably sent direct, however, because of the food losses, delays and expenses of transhipping cargoes at Dar-es-Salaam.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Dar-es-Salaam is a crowded port, handling not only the trade of Tanzania but considerable quantities of its neighbours' imports and exports as well. There are plans to widen and dredge the entrance channel, which would allow larger vessels to be used. Faster unloading would, however, cause considerable problems unless the turnround rate of lorries were speeded up. Further investments in the railway system are urgently required, and the country needs more all-weather roads.

TUNISIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	816	752	960	600
	rice (paddy)	-	-	-	-
	coarse grains	246	253	372	338
	TOTAL	1,062	1,005	1,332	938
IMPORTS:	- wheat	330	664	628	973
	rice (milled)	2	3	4	5
	coarse grains	57	231	343	225
	TOTAL	389	898	975	1,203
	- of which, food aid	n.a.	n.a.	60	86
EXPORTS:	- TOTAL	11	1	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.1	6.4	6.9	10	2.2	2.3

GENERAL GRAIN SITUATION

The southern half of the country is desert, and practically uninhabited. In the centre, traditional agriculture prevails, with cereals produced by sharecroppers. In the north, where there is more rainfall, agriculture is more intensive and some crops are irrigated. The country is liable both to drought and torrential rainstorms. About 80% of the land is subject to erosion. The only important cereal crops are wheat (mostly durum) and barley. Grains production is very variable in Tunisia, and is not increasing over the long term. The government plans a massive water development programme, involving increased irrigation and flood protection.

Population growth, urbanization and rising incomes have led to much increased demand for both wheat and feed grains. This has mostly had to be satisfied by imports, which rose from about 300,000 tons on average in the early 1970s to almost 1.2 m. tons in 1983/84. Flour and other staple foods are subsidized, and their increased consumption has caused financial difficulties. The government reduced these subsidies in 1984 but then partially restored them, following serious civil disturbances. Even if higher domestic production results from the planned irrigation projects, it seems likely that the demand for grain for food as well as feed will increase rapidly, and that imports by Tunisia will continue to rise.

PORTS FOR GRAIN (see Appendix)

Tunisia is well served with ports, although none can deal with large vessels: the normal size of grain cargoes is 20-25,000 tons. Three quarters of the grain is landed at La Goulette (the port of the city of Tunis) which has mobile pneumatic ship unloaders rated at 300 tons per hour, and a harbour silo (capacity 30,000 tons). Grain is also landed at Bizerte, Gabes, Sfax and Sousse. At these ports the grain has to be bagged in the ships' holds and discharge rates are only 600-800 tons a day. Major port improvements are planned at La Goulette and Sfax, particularly to increase their capacity for containers and trailers.

Total stock capacity at the ports is 50,000 tons, and in the country generally 580,000 tons (including 430,000 in silos). This is regarded as insufficient. A plan to increase it is in hand involving, inter alia, the construction of a new silo of 30,000 tons at Gabes and the enlargement of the 20,000 ton silo at Bizerte to 30,000 tons.

GRAIN TRANSPORTATION

Nearly all of Tunisia's population lives in the northern half of the country, not more than 150 km from one of the grain-importing ports. The largest cities are on the coast. Movement of grain within Tunisia does not therefore pose great logistical problems.

Road transport is well developed. All-weather roads cover practically the whole country. There are, however, too few lorries for grain, and their shortage becomes particularly marked when the domestic harvest needs to be moved.

There is an extensive **rail** network which suffers, however, from being divided between two gauges. All the main ports are served by rail. Substantial modernization work is in hand.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Although Tunisia has many ports, the heavy volume of grains imported in recent years has strained their capacity. The low rate of discharge at many of them is partly due to a lack of modern equipment such as suckers and hoppers. At present, grain arriving at most ports must be bagged in the ships' holds, then moved in slings, to be stored in the open in the port area. There is a shortage of covered storage facilities. Turnround of vehicles and rolling stock carrying grain from the berths to the areas of distribution is often slow. This, in turn, delays vessels and results in heavy demurrage payments.

Although there are good roads and extensive railways, there is a shortage of lorries and railway waggons suitable for bulk grain movement.

ZAIRE

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	2	4	10	10
	rice (paddy)	206	232	251	258
	coarse grains	523	545	738	719
	TOTAL	731	781	999	987
IMPORTS:	- wheat	118	146	169	158
	rice (milled)	28	32	33	33
	coarse grains	147	224	124	51
	TOTAL	293	402	326	242
	- of which, food aid	n.a.	n.a.	91	44
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
21.6	28.3	30.8	54	2.7	3.3

GENERAL GRAIN SITUATION

Although the equatorial climate of Zaire is favourable for agriculture, only about 3% of its vast area (2.2 m. square km) is cultivated. Much of the country is covered by rain forest, with grassy savannahs on the plateaux. The staple food is cassava, in which Zaire is self-sufficient. Grains production (mainly white maize and rice) is very small, averaging about 1 m. tons. The lack of an efficient commercial marketing infrastructure is held to be responsible. One reason for this is the extremely poor road system linking the widely dispersed producer zones and the various consumer marketing centres.

Grain consumption in Zaire is increasing, largely, no doubt, because of the rapid growth of the urban areas. Between 1960 and 1980 the population of Kinshasa, the capital, grew from 0.5 m. to 3.1 m. - it is projected to reach 8.4 m. by the end of the century. The country's population grew at 2.7% a year in the 1970s but the rate is projected to accelerate to 3.3% up to the year 2000.

Imports of wheat, which is only produced in very small quantities in Zaire, have increased, but those of coarse grains have tended to go down. Total grain imports in 1983/84 amounted to 242,000 tons, and a similar quantity is expected to be imported in 1984/85.

PORTS FOR GRAIN (see Appendix)

Zaire is practically landlocked. Its only access to the sea is at the mouth of the Zaire River (Congo) at the extreme western end of the country. The only important port (Matadi) is located some 133 km upstream. The channel is difficult to navigate: at certain seasons the rate of the river's flow is more than 10 knots. While comparatively close (250 km) to the capital of Zaire (Kinshasa), the distance from Matadi to the industrial centres of the south-east is nearly 2,000 km. Supplies can more readily reach those areas through Angola, to which they are linked by rail. The port can only deal with grains which are already bagged. Discharge rates are 750 tons a day.

GRAIN TRANSPORTATION

There are three main centres of population in Zaire: the western end of the country, including Matadi and Kinshasa; the mining districts in the south-east corner, around Lumumbashi, which are 1,500 km distant; and the eastern areas bordering Rwanda and Burundi. The distances over which grain has to be moved to serve the needs of these growing urban areas are very great, but the quantities, up to now, have not been large and the problems therefore limited.

The **road** network is extensive and most of the principal routes are surfaced. But there has been a great deterioration over the past twenty years because of lack of maintenance, and traffic capacity has fallen. It has become difficult to supply the towns with enough food from areas with surpluses.

The **railway** system (8,000 km in all) is complementary to the waterways: lines having been built where rivers are not navigable. There is no continuous rail network, but the southern industrial areas around Lumumbashi are connected by rail to the port of Lobito in Angola and, via Zambia and Zimbabwe, to Beira and Maputo in Mozambique. There is another line linking Matadi with Kinshasa.

Waterways are very extensive, some 14,000 km of the River Zaire and its tributaries being navigable to vessels with shallow draught.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Up to now, very little grain has been grown or consumed in Zaire. Its transportation and handling problems remain potential rather than actual. But there is every likelihood that the rapidly growing towns and cities will require increasing supplies of wheat, rice and maize, which will have to be imported or, if domestic output can be increased, transported within the country. This will expose a number of difficulties in the infrastructure.

The Government of Zaire is giving special attention to rehabilitation of the transport system. This will enable the country to better develop its agricultural potential and limit increases in its imports. Imports of grain will always be difficult and expensive because of the very large distances involved and the difficulties large vessels have in reaching the port of Matadi. Grain handling facilities there will need to be improved and expanded if tonnages increase.

ZAMBIA

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1	8	10	10
	rice (paddy)	1	3	5	10
	coarse grains	939	1,019	760	958
	TOTAL	941	1,030	775	978
IMPORTS:	- wheat	111	109	81	-
	rice (milled)	5	6	7	12
	coarse grains	27	110	180	135
	TOTAL	143	225	268	147
	- of which, food aid	n.a.	n.a.	79	61
EXPORTS:	- TOTAL	30	17	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.3	5.8	6.2	11	3.2	3.6

GENERAL GRAIN SITUATION

Though a large country, with a relatively small population (6 m. in 1983), Zambia is not self-sufficient in food. Soils tend to be poor. There are some large commercial farms but most of the agriculture is carried out on a subsistence basis. Yields are low because of lack of expertise, low investment and unpredictable rainfall. The staple food in most of the country is white maize. Millet and sorghum are also grown. Wheat production is small because the crop requires irrigation. Grain output is variable, partly because of droughts such as that which severely affected the country in 1984.

There is believed to be great agricultural potential and the government launched an ambitious programme in 1980 to attain self-sufficiency in food production. One step was to much increase producer prices for the traditional crops.

The population of Zambia is growing at over 3% a year and grain consumption is increasing rapidly. Because of its financial difficulties, the government removed subsidies on bread at the end of 1984, and prices went up by 90%. The effects on consumption are not yet known.

Imports are usually of wheat, although maize has had to be imported in recent years of drought. There is no clear trend: grain imports reached 268,000 tons in 1982/83 but fell back to only 147,000 in 1983/84. Estimated requirements in 1984/85 are 335,000 tons, much of which will have to be food aid.

GRAIN TRANSPORTATION

The most heavily populated area is the so-called "copper belt" in the centre of the country, and the area immediately to the south of it. The capital, Lusaka, had a population of nearly 800,000 in 1980 but was expected to increase to 1.5 m. by 1990. Zambia is a landlocked country. Most of its grain imports are obtained through the port of Dar-es-Salaam, in Tanzania, which suffers from congestion. The rail journey from there to the Zambia border at Nakonde is over 800 km: the distance thence to Lusaka is a further 1,000 km. Total transit times average 10 days and the cost is US$95 a ton. Wheat imports are handled in bags. The offtake rate by rail from Dar-es-Salaam is 30,000 tons a month. Some grain is also obtained through Beira (Mozambique) whence it can be transported to Zambia by rail or by road, and through various ports in South Africa.

The **road** network is reasonably good. There has been heavy investment in recent years to provide all-weather surfaces on the principal routes, but more work still needs to be done. Shortage of foreign exchange means it is difficult to obtain new vehicles or spare parts.

The **railway** system has also been much improved. The railway to Dar-es-Salaam, already mentioned, was fully opened in 1975. It has, however, been reported that because of its difficult financial position, the Government of Zambia may not be able to continue to support the Tanzania-Zambia railway, and is considering using other, cheaper, routes for its transit trade. There are rail links, via Zimbabwe, with Mozambique and South Africa, and via Zaire with Angola. There are shortages of both waggons and locomotives.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Given the distance of the country from the sea, importing grain into Zambia will inevitably be difficult and expensive. The transport infrastructure within the country is well developed, although there is a shortage of rolling stock. Considerable difficulties are posed by the very small storage capacity: for wheat this amounts only to 23,000 tons. It is planned to build more silos. The country's financial difficulties, which stem in large part from setbacks in the copper industry, mean that it is unable to contemplate most of the necessary improvements without outside help.

ZIMBABWE

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	82	183	213	124
	rice (paddy)	5	4	-	-
	coarse grains	1,611	2,019	1,912	1,212
	TOTAL	1,698	2,206	2,125	1,336
IMPORTS:	- wheat	61	1	29	36
	rice (milled)	5	5	2	24
	coarse grains	22	41	1	60
	TOTAL	88	47	32	120
	- of which, food aid	n.a.	n.a.	6	76
EXPORTS:	- TOTAL	93	120	356	590

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.3	7.1	7.7	16	3.1	4.4

GENERAL GRAIN SITUATION

Though situated in the tropics, the climate of Zimbabwe is tempered by its altitude, as much of the country lies between 1,000 and 1,500 metres. Rainfall is abundant in the north. A large proportion of the land is not very fertile, and only about 7% is arable. Most of the rest is used for grazing. The main grain crop is white maize: millet and wheat are also cultivated. Grain production increased considerably after independence in 1980, especially as some land formerly used to grow tobacco was switched to food crops. But prolonged drought since 1982 seriously affected crops, especially maize, and production fell to only 1.3 m. tons in 1983, less than the average of the early 1970s. Production improved in 1985, however.

Population growth in Zimbabwe has recently been over 3% a year and an even faster rate - 4.4% - is projected up to the end of the century, when the total may have doubled to 16 m. Although a quarter of the population is urban, there has been little apparent tendency, as yet, for wheat and rice consumption to increase at the expense of local crops. The country is normally a net exporter of grain, but has recently had to import considerable quantities because of the drought. The import estimate for 1984/85 is 450,000 tons.

GRAIN TRANSPORTATION

The capital (Harare), a city of around 1 m. people, is situated in the north-east of the country; other urban areas lie mainly in a belt across the country to the south-west. The maize producing regions are spread throughout the country. There is, therefore, no strong focus for the distribution of grain, either imported or domestic.

Although landlocked, Zimbabwe has comparatively good **rail** connections to the sea. The shortest route is to Beira in Mozambique: this lies some 250 km. from Umtali on the Zimbabwe/Mozambique border. Another line runs through the south of Zimbabwe to the major port of Maputo, also in Mozambique. Southwards there are lines into South Africa, giving access to the ports of that country; and there is also a route, starting in Bulawayo in south-west Zimbabwe, which runs northwards through Zambia and connects (after very long distances) with Dar-es-Salaam in Tanzania and Benguela in Angola. Many of these lines and ports are, however, congested with the goods handled by the host countries.

The **road** network in Zimbabwe is extensive. The links between the main centres of population and with neighbouring countries are comparatively good.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The main problems facing Zimbabwe are that the sea ports which it must use for its exports and imports, particularly the nearby ones in Mozambique, are already overburdened with traffic. Difficulties may ensue, therefore, when there are exceptional import needs. However, the position was reported, in early 1985, to be under control. Although the transport systems are comparatively good, costs of importing are high because of the long distances involved. The limit for the internal distribution of grain is said to be about 15,000 tons a month. Long-term silo construction projects are scheduled, which will raise bulk storage capacity to over 400,000 tons.

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LATIN AMERICA AND CARIBBEAN

BARBADOS

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	-	-	-	-
	coarse grains	2	2	2	2
	TOTAL	2	2	2	2
IMPORTS:	- wheat	19	20	21	18
	rice (milled)	7	7	7	7
	coarse grains	10	23	26	26
	TOTAL	36	50	54	51
	- of which, food aid	n.a.	n.a.	T	T
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
0.24	0.25	0.25	n.a.	0.4	n.a.

GENERAL GRAIN SITUATION

A small and densely-populated island (250,000 people in 430 square km.), much of the available cropland in Barbados is still given over to the production of sugar cane, despite official attempts to encourage diversification. Grain production is minimal, averaging some 2,000 tons of maize. Population growth has been offset by emigration. Wheat consumption is, however, increasing at the expense of non-cereals foods (e.g. yams and sweet potatoes), and the growing livestock industry has created a demand for feed, partly satisfied by increasing imports of maize. Total grain imports currently average just over 50,000 tons a year.

PORTS FOR GRAIN (see Appendix)

Grain is landed at the country's capital, Bridgetown, a port well sheltered from the prevailing winds. Bulk grain is discharged by ship's gear at the rate of 1,000 tons a day (in buckets), or, when bagged, at 750 tons in slings.

GRAIN TRANSPORTATION

No part of the island is more than 25 km from the port and, given the relatively small amounts of grain handled, grain transportation is unlikely to give rise to any serious difficulties. Nearly all the **road** network (1,640 km) is paved. There are no **railways.**

SUMMARY OF HANDLING AND TRANSPORTATION PROBLEMS

Even if imports of grain should continue to rise, grain handling in Barbados ought not to pose any serious problems. Installation of shore-based handling equipment (which would preferably be able to discharge other dry bulk commodities as well as grain) could obviate any difficulties which might ultimately arise in chartering geared vessels.

BOLIVIA

(LANDLOCKED COUNTRY)

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	59	55	66	40
	rice (paddy)	92	100	86	61
	coarse grains	396	409	548	392
	TOTAL	547	564	700	493
IMPORTS:	- wheat	173	236	332	350
	rice (milled)	-	-	3	50
	coarse grains	1	-	-	2
	TOTAL	174	236	335	402
	- of which, food aid	n.a.	n.a.	144	278
EXPORTS:	- TOTAL	2	-	7	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.9	5.6	6.1	9	1.3	2.4

GENERAL GRAIN SITUATION

One of the poorest countries in Latin America, Bolivia has recently suffered from natural disasters - floods and droughts - as well as severe financial and payments difficulties. The bad weather associated with El Nino* has greatly reduced output of potatoes, the country's staple food, and also affected cereals production. Since 1980, total exports by Bolivia, and per capita incomes, have each fallen by some 30% (in real terms) and inflation has accelerated, reaching over 2000% in 1984.

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* Periodic changes in the ocean currents in the eastern Pacific which affect the weather in many Latin American countries.

Bolivia is normally self-sufficient in maize, its main grain crop, and also in rice. Wheat output, however, now covers only about 20% of the country's needs. Most of the grain is grown on a subsistence basis by small farmers in the mountainous "Altiplano", where yields are poor, but some farmers in the lower, eastern parts of the country produce rice using modern techniques. Total grains production increased very slowly during the 1970s, and there have suequently been some very poor crops (e.g. 1983). Consumption, on the other hand, has been rising quickly and grain imports - mainly wheat - more than doubled in the last decade, to reach 400,000 tons in 1983/84. Because of its severe shortage of foreign exchange, Bolivia has to rely on food aid for a considerable proportion of its import needs. Chronic malnutrition, especially among children, is widespread. Basic food prices were greatly increased in early 1985 as part of a government austerity programme intended to stem the country's economic decline: these steps have led to civil disturbances.

GRAIN TRANSPORTATION

Although landlocked, the western part of Bolivia is generally within 150 km of the Pacific Ocean and there are a number of possible routes to the sea. The main difficulty in using them is ascending some 4,000 metres to cross the Andes. Ports used for imports and exports include Arica and Antofagasta (Chile) and Matarani (Peru). There are also outlets eastwards: the port of Santos in Brazil has a direct rail link (over 1,300 km long) with Puerto Suarez on Bolivia's eastern border, and some goods go overland to Rosario (Argentina) and Montevideo (Uruguay).

The main urban areas of Bolivia lie along the eastern edge of the Altiplano, from the capital, La Paz, south-eastwards. Even here, the terrain is rugged and communications difficult. Agricultural production is hindered, both in the Altiplano and in the low-lying forests in the eastern half of Bolivia, by the poor roads and widely-distant markets.

Roads. Only 3% of the network of 40,000 km is paved, and as much as 60% is unimproved earth. The road system is vulnerable to damage from floods, when communities may be isolated for long periods. Improvements would encourage farmers to increase production because of easier marketing and allow the establishment of communal storage facilities. Some road improvement projects have taken place with the assistance of the WFP.

Rail. Although the system is not particularly large (under 4,000 km) it includes important links with neighbouring countries. La Paz is connected directly with Arica in Chile: most imported grain uses this route. It is also possible to reach La Paz from Matarani in Peru by a combination of rail and ferry on Lake Titicaca. In the south of Bolivia there are links with Antofagasta in Chile and with the system of north-west Argentina. Santa Cruz, in east Bolivia, is the junction for a line which runs eastbound into Brazil, and ultimately the port of Santos.

Waterways. It is officially estimated that commercially-navigable waterways extend for 10,000 km. Much of these, however, are in the sparsely-populated Amazonian areas.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Many of Bolivia's problems result from its geography. All imported grain has to be loaded at neighbouring countries' ports, with the attendant inconveniences and limitations. While most urban centres are served by rail, the lack of good roads in rural areas hinders the development of domestic agriculture. Food is in short supply and import requirements are likely to grow rapidly, taking account of the 40% population increase expected by the end of the century. Whether they can be satisfied will depend on the government's success in arresting the country's economic decline, and the availability of adequate food aid.

BRAZIL

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	2.1	2.5	1.8	2.1
	rice (paddy)	7.7	8.4	9.7	7.8
	coarse grains	16.5	18.5	22.3	19.3
	TOTAL	26.3	29.4	33.8	29.2
IMPORTS:	- wheat	2.9	4.1	3.9	4.3
	rice (milled)	T	0.2	0.1	0.3
	coarse grains	0.1	1.2	0.1	0.3
	TOTAL	3.0	5.5	4.1	4.9
	- of which, food aid	n.a.	n.a.	-	T
EXPORTS:	- TOTAL	0.8	0.5	0.6	0.8

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
93	121	130	181	2.7	2.0

GENERAL GRAIN SITUATION

The country is vast, but only 9% of its land area (845 m. ha.) is arable or used for permanent crops. Forest and woodland occupy about 70%: this is being cleared for agriculture at an average rate of some 2.5 m. ha. a year. The chief grains produced in Brazil are (yellow) maize and rice: output of both has been increasing but with wide year-to-year variations, due to droughts. Other important crops include soyabeans (which is exported in large quantities) and cassava. Efforts to increase the output of wheat (which is grown in the south of the country) have met with only limited success so far: average yields (1979-1983) were only 9 qph.

The population, some 130 m. in 1983, is rising at over 3 m. a year (2.7%) and is likely to exceed 180 m. by the end of the century. About 70% now live in urban areas, and the share continues to increase as people move from the poor rural communities seeking work. In 1980 Rio de Janeiro and Sao Paulo each had more than 10 m. people: by the year 2000 their populations are expected to have reached 19 m. and 25 m. respectively, and there may then be 12 other cities of 1 m. people or more.

Rice, maize and cassava are the staple foods in many parts of Brazil but wheat has been gaining in importance, especially in urban areas. There are considerable regional differences in food consumption levels, malnutrition being widespread in the north-east. Food use of wheat reached 5 m. tons in 1980, having doubled in a decade, and is estimated at about 6 m. tons in 1984/85. Wheat imports have increased equally rapidly, to about 5 m. tons. As part of a policy to reduce inflation and improve the balance of payments, consumer subsidies on bread have been progressively phased out, but consumption remains high because suitable alternatives are not readily available. Maize used to be exported regularly, but imports have been necessary after recent poor crops.

Great efforts are being made by the authorities to expand domestic grain production and restrain imports. It seems likely, however, that imports of wheat, at any rate, will continue at high levels for some years to come.

PORTS FOR GRAIN (see Appendix)

There are many ports along Brazil's long coastline capable of exporting or importing bulk grain. Santos, which serves as the outlet for the city of Sao Paulo, some 50 km inland, imports the largest quantity. Nearly 1.6 m. tons moved through it in 1982. Santos can accommodate grain vessels of 75,000 tons, and Rio de Janeiro (which handled 874,000 tons of imports in 1983) can take vessels of up to 51,000 tons. The other ports are, however, limited to 38,000 tons or less. Recent fixtures to Brazil suggest that grain is generally imported in vessels in the 25,000-33,000 ton range. Discharge rates vary, but most ports can unload vessels at 2,000 tons per day or more.

Developments include the provision of a new berth at Paranagua with a storage silo of 100,000 tons. This is an export facility, capable of loading grain at 1,500 tons per hour, but presumably could also be used, when necessary, to discharge vessels at a high rate as well. At Vitoria, a large new terminal being built at Capuaba Bay will be able eventually to load maize and soyabeans at 2,400 tons an hour and discharge wheat at 1,800 tons an hour into a 90,000 ton silo. Limited storage remains a constraint at most of the ports, as is the offtake capacity of their rail connections.

GRAIN TRANSPORTATION

Most of Brazil's population live in the eastern third of the country, densities being greatest near the coast from Fortaleza southwards. The coastline is well served with ports, most of which have rail connections. Wheat imported by Brazil is mostly required in the towns and cities. The main foodgrain-producing areas are also in the east and south-east of Brazil. Inland distribution of grain is not, therefore, particularly difficult, at least in theory. The main logistical problems to be overcome are in supplying the population - small in proportion but still considerable in numbers - who live in the more remote areas in the north and north-west of the country.

Road transport accounts for 20% of bulk grain movement. The total network is 1.4 m. km, of which 84,000 km (6%) is paved. The system is comparatively good in the south-east, but is much less well developed elsewhere. More lorries are required.

Most grain is moved by **rail.** There is an extensive system totalling some 25,000 km, although this is again mainly concentrated in the south-east. All the main ports except Belem (on the north coast) have rail connections. The rail system is not regarded as adequate, and the rates charged said to be too high. Improvements in the system would help to lower costs.

Waterways are extensive, some 50,000 km being navigable. In large areas of the country, especially the Amazon basin, they represent the only means of bulk transport. The potential of coastal shipping has not yet been fully developed, partly because of extensive bureaucratic formalities involved in cabotage.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Brazil seems likley to remain a major grain importer for some years to come. Congestion at the ports would be eased by a further expansion of port storage capacities and, particularly, measures which would reduce the cost of rail transport. Grain distribution might also be facilitated if grain imports were brought to the main ports in large bulk carriers, and then offloaded into smaller vessels which could serve the minor ports up and down the coast. The country's general development will involve the improvement of transport links in remote areas. These will, in turn, assist grain movement and encourage production and marketing.

CHILE

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	871	952	540	988
	rice (paddy)	70	120	131	n.a.
	coarse grains	565	681	739	740
	TOTAL	1,506	1,753	1,410	n.a.
IMPORTS:	- wheat	934	869	1,077	1,093
	rice (milled)	18	20	21	n.a.
	coarse grains	146	272	450	200
	TOTAL	1,098	1,161	1,548	n.a.
	- of which, food aid	n.a.	n.a.	2	21
EXPORTS:	- TOTAL	21	17	5	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
9.4	11.1	11.7	15	1.7	1.4

GENERAL GRAIN SITUATION

The country is mountainous, the highest ranges of the Andes forming its eastern border. The climate varies from the subtropical to the very cold, and from desert in the north (under 25 mm of rain annually) to very wet (over 3,000 mm) in much of the south. Agriculture is concentrated in the valleys of the central part of the country, around the capital, Santiago. The chief grain crop is wheat. Output has not increased in recent years, probably because the small farmers who mostly produce it have had no access to credit. There is believed, however, to be considerable potential for increased production. The country suffers from serious foreign debt problems, exacerbated by low world prices for copper, its principal export commodity.

Wheat is the staple food, being consumed in the forms of bread and pasta. Annual wheat consumption per capita is around 120 kgs, one of the highest levels in the world. Maize, some of which has to be imported, and oats are used for animal feed. Although population growth (1.7% in the 1970s) is not high compared with many developing countries, grain consumption has outpaced production, and imports have increased considerably. In the late 1960s they averaged about 400,000 tons, but by 1982/83 they exceeded 1.5 m. tons, including 1.1 m. tons of wheat. In an attempt to increase production, a system of producer prices has been introduced for wheat. This may help curb further increases in imports, although, should the country's economy recover, demand for feedgrains would probably outpace maize production.

PORTS FOR GRAIN (see Appendix)

Grain for Santiago is landed at two ports, Valparaiso (the most important commercial centre on the west coast of South America) and San Antonio, which now handles a greater tonnage of cargo. Other important ports for grain are Antofagasta, which also serves part of Bolivia, to which it is connected by rail, and Arica, in the far north, which serves both Bolivia and Peru. There are also numerous small ports up and down the long Pacific coastline. Bulk cargo can be handled at Valparaiso at the comparatively high rate of 400 tons an hour and, at San Antonio, 5,000 tons a day is possible with 24-hour working. In 1982 the World Bank agreed a loan of US$100 m. to finance development of Chilean ports.

GRAIN TRANSPORTATION

Much of Chile, especially the south, is very sparsely populated. The main cities are in the central part of the country, within easy reach of one or other of the main ports. This is also where most grain is grown. Grain, whether imported or home grown, has therefore to travel over relatively short distances. Good main **roads** link the larger towns and principal ports. But only about 12% of the system (of 79,000 km) is paved: more than half of the rest is gravel.

The **railway** network of 8,300 km is divided between no less than five different gauges. Two of these systems are quite extensive. The lack of uniformity reduces the utility of the system.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

There appear to be few logistical constraints at present on the import of grain by Chile. Unloading rates at the ports are not slow, and each has satisfactory rail links. Further development of the internal transportation system (especially road improvements) would, however, be desirable to facilitate the marketing of domestic produce.

COSTA RICA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	131	185	142	212
	coarse grains	88	114	112	164
	TOTAL	219	299	254	376
IMPORTS:	- wheat	76	98	126	103
	rice (milled)	1	-	1	40
	coarse grains	36	44	72	51
	TOTAL	113	142	199	194
	- of which, food aid	n.a.	n.a.	182	87
EXPORTS:	- TOTAL	4	42	11	42

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
1.7	2.3	2.4	3	2.7	1.4

GENERAL GRAIN SITUATION

Costa Rica is a small country with a tropical coast and mountainous interior. Its main agrticultural products are coffee and bananas. It also produces rice (which is exported), maize and sorghum, but no wheat. Grain output is variable but has tended to increase since the mid-1970s. Rice consumption has been increasing at the expense of maize, but per capita wheat use is not growing rapidly despite urbanization. Wheat imports have risen steadily to just over 100,000 tons, and those of maize now average some 50,000 tons. Population growth (2.7% a year in the 1970s) is expected to slow, but an influx of refugees from neighbouring countries affected by civil strife has caused emergency food needs. Costa Rica has a heavy external debt problem, and suffers from severe balance-of-payments constraints.

PORTS FOR GRAIN (see Appendix)

Port Limon (on the Caribbean coast) and Puntarenas (on the Pacific coast) are both linked by rail to the country's capital (San José) which is situated approximately mid-way between them. There is also a port at Golfito, in the south of the country, which has rail connections to neighbouring Panama. At Port Limon, the principal port of Costa Rica, grain is discharged by mobile grabs and there is some covered storage. Construction of deeper berths are planned. There is no grain storage at the other two ports.

GRAIN TRANSPORTATION

Most of the population is concentrated in the central belt of the country from Puntarenas through San José to Port Limon. Communications in that area are relatively good, but they are much less well developed in the rural areas.

Roads. Less than 10% of the network of 28,000 km is paved.

Railways. Each of the main ports is served by rail, and most grain is moved that way. Over 20% of the total length (845 km) is electrified, but all is single track.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Grain imports by Costa Rica seem likely to go on increasing, although not necessarily rapidly. Handling will be facilitated by the port improvements planned at Port Limon, but lack of storage facilities at the ports reduces flexibility in import planning. Improvements are required both to the railways and the national road network.

CUBA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	399	448	520	490
	coarse grains	87	81	97	97
	TOTAL	486	529	617	587
IMPORTS:	- wheat	887	1,210	1,395	1,740
	rice (milled)	234	188	201	207
	coarse grains	327	540	425	456
	TOTAL	1,448	1,938	2,021	2,403
	- of which, food aid	n.a.	n.a.	2	-
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
8.6	9.7	9.9	12	1.2	1.2

GENERAL GRAIN SITUATION

The rich soils, abundant rainfall and moderate temperatures of Cuba favour both sub-tropical and temperate crops. Nearly 30% of the land is arable (or under permanent crops) and another 22% is pasture. The main agricultural products are sugar (which takes up 40% of the arable land), tobacco and coffee. Rice is grown and also a small amount of maize, but no wheat. There is thought to be potential for much greater production of grain.

Cuba's population is about 10 m.: its growth has slowed in recent years, and is now just over 1% a year. Two thirds are urban, the population of Havana, the largest city in the Caribbean, exceeding 2.1 m. in 1980. The staple grains - wheat and rice - and other basic foods are subsidized and rationed. Wheat consumption has been growing particularly rapidly. Food use of maize is very small but large amounts are imported for use as animal feed. Total grain imports have been rising steadily, and exceeded 2.4 m. tons in 1983/84, about three quarters of the total being wheat. Grain imports will probably go on rising at least in the short-term future.

PORTS FOR GRAIN (see Appendix)

The country has numerous small ports, many of them equipped for loading sugar or molasses. Most grain is landed in bulk at the country's capital, Havana, which is situated near the western end of the island. The port has many berths suitable for the discharge of grain, and is equipped with elevators and silos with a total capacity of some 50,000 tons. Ships may discharge at 1,200 tons a day. At the port of Santiago de Cuba, at the eastern end of the country, there is a silo of capacity 8,200 tons, but bulk unloading is only possible using ship's gear.

GRAIN TRANSPORTATION

Much of the imported grain is no doubt consumed in Havana, which accounts for one quarter of the island's population, but long distances are involved in reaching some of the other large towns from the principal ports. Camaguey, for example, is 500 km from Havana and 250 km from Santiago de Cuba. But communications are generally good and the terrain is not difficult.

The **road** network extends for some 21,000 km, of which nearly half is paved. There is an extensive **railway** system, but much of it consists of plantation and industrial lines of both standard and narrow gauge and is not used for the transport of grain.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Cuba's ports and transportation systems appear to be able to cope with the present volume of imports without severe strain. Future import growth will depend on whether attempts are made to diversify the economy and increase grain production. If grain imports were to increase much further, the prevailing low discharge rates would probably pose increasing problems, and the development of grain facilities at some of the smaller ports might warrant consideration.

DOMINICAN REPUBLIC

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	231	361	447	496
	coarse grains	58	70	44	77
	TOTAL	289	431	491	573
IMPORTS:	- wheat	114	159	186	210
	rice (milled)	38	35	-	-
	coarse grains	67	130	174	197
	TOTAL	214	324	360	407
	- of which, food aid	n.a.	n.a.	149	98
EXPORTS:	- TOTAL	-	1	1	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.1	5.4	6.0	8	3.0	1.7

GENERAL GRAIN SITUATION

The Dominican Republic occupies the eastern part of the large island of Hispaniola (the western end is Haiti). There are large mountainous areas but also extensive fertile plains and valleys. Rice and maize are grown and efforts are being made - with some success - to stimulate higher output through irrigation programmes. It has been suggested that production might have increased faster but for the availability of cheap wheat supplied under aid programmes. In 1983 rice output reached nearly 500,000 tons and coarse grains (mainly maize) 77,000 tons. No wheat is produced in the Dominican Republic.

Recent years have seen large increases in wheat and rice consumption, mainly at the expense of non-cereal staples such as cassava. This may partly be the result of urbanization: 53% of the country's population was classed as urban in 1982 compared with only 30% in 1960. There has also been an increase in the use of maize for animal feed. While self-sufficiency in rice was reached in 1982/83, increasing imports of wheat and maize have been required. These reached 400,000 tons in 1983/84.

Projections published by the World Bank suggest that the rate of population growth (3% a year in the 1970s) may fall significantly up to the end of the century. But if the economy, at present heavily dependent on exports of sugar, continues to grow, some further shift in consumption towards wheat and meat may take place. The extent to which this is reflected in increased imports will depend on how successful the authorities are in achieving self-sufficiency in food.

PORTS FOR GRAIN (see Appendix)

Grain is received at two neighbouring ports, Santo Domingo and Haina, in the south-west of the island. Though regularly dredged, neither can accommodate large vessels, and the usual grain cargo size is 10,000 tons. Wheat is discharged at the rate of 1,000 tons a day by suckers and grabs, and stored in silos. Maize is discharged in bags using slings at 750 tons per day onto lorries for quick distribution. The present situation is considered satisfactory. Storage facilities are reported to be adequate by the country's authorities, and the rate of grain losses in store is relatively low.

GRAIN TRANSPORTATION

Although much of the Dominican Republic is mountainous, most of the population live in areas relatively accessible from the chief ports. Santo Domingo itself accounts for about 2 m. of the country's 6 m. inhabitants. Grain movement does not, therefore, pose serious problems.

Grain is moved by **road** in the Dominican Republic. No special problems are reported. The network extends for 12,000 km, of which half is paved. The main road from Santo Domingo and Santiago de los Caballeros, 200 km away, is being improved with the help of a loan from the International Development Bank. It is planned eventually to become a four-lane highway.

Most of the **rail** system (1,600 km in total) consists of privately-owned plantation lines.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Grain handling and distribution seems to be carried out efficiently and without undue delays. Costs could, perhaps, be lowered if larger vessels were able to use the main ports, but the necessary dredging and other improvements might only be worthwhile if considerable increases in the imports of grain (and other bulk cargoes) were anticipated. In view of its efforts to attain self-sufficiency in grain, the authorities are unlikely to give priority to such measures.

ECUADOR

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	52	34	39	38
	rice (paddy)	284	334	384	222
	coarse grains	330	259	364	294
	TOTAL	666	627	787	554
IMPORTS:	- wheat	179	285	380	355
	rice (milled)	9	9	9	35
	coarse grains	37	51	51	84
	TOTAL	225	345	380	474
	- of which, food aid	n.a.	n.a.	7	13
EXPORTS:	- TOTAL	5	3	16	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
6.0	8.0	9.3	13	2.9	2.0

GENERAL GRAIN SITUATION

Geographically, the country consists of three equally large areas: the ranges of the Andes, rising in many places to 5,000 metres or more; the Amazonian forests and jungles to the east; and the lands bordering the Pacific. The latter are partly swamps, and partly low mountain ridges.

The country is believed to have considerable agricultural potential, but at present arable land and permanent crops account for less than 10% of its total area. The principal grains are rice, which is sometimes exported in small quantities, and maize, in which the country is normally self-sufficient. A small amount of wheat is also grown. Subsistence farming predominates (over 40% of the country's economically active population is engaged in agriculture). A decline in grain prices relative to production costs has discouraged output, which rose only slowly during the 1970s, and fell in the early 1980s. The authorities have recently introduced various production incentives. There has been investment in irrigation, and land reform and schemes to settle the sparsely-populated eastern part of the country may result in increased output.

Population growth has been rapid (nearly 3% a year in the 1970s) and the urban population, which has been growing at nearly 5%, now accounts for 45% of the total. Wheat consumption has been increasing rapidly, partly at the expense of maize, and imports of wheat doubled over the last ten years to reach 350,000 tons in 1983/84. Ecaudor also imports barley (for food use and malting). Malnutrition persists in some rural areas.

PORTS FOR GRAIN (see Appendix)

Most of the grain is imported through the country's chief port of Guayaquil. Cargoes are limited to only 13,000 tons. Some of the berths are situated on the salt-water estuary of the River Guaya, and some upriver, where the water is shallower. Grain is discharged by suckers onto conveyors which move it into the silos. Four flour mills have been established, three of them on the river. Attempts are made to ensure an even flow of imports of wheat, at the rate of about 26,000 tons (i.e. two cargoes) per month. When shipments bunch up, congestion results. There has been an expansion in grain storage capacity (now 108,000 tons at the port) in line with the increasing level of imports. Investment is taking place in the port of Esmeraldas, in the north of the country, which is considerably closer to Quito than Guayaquil. It is to become a major bulk and container terminal, and the road access to Quito will be improved.

GRAIN TRANSPORTATION

Guayaquil is Ecuador's largest city (population 1.1 m. in 1980) but most other centres of population, including the capital, Quito (population 0.8 m.) are situated high in the Andes. Communications are difficult in that region.

Road. Nearly all the grain consumed in Ecuador moves by road. The network expands for 62,000 km, of which 19% (12,000 km) is paved, and over half, earth. Lorries, used to take grain from the silos to the areas of consumption, take a long time to complete the round trips; as a consequence, silos are often still full when new shipments arrive and vessels have to wait. Costs of road transport are high. Road building is given priority by the Government of Ecuador.

Rail. There is a limited network, amounting to just over 1,100 km divided between two gauges. All is single track. There is no railway serving Esmeraldas and the line serving Guayaquil reaches Quito in a very roundabout way. The current National Development Plan provides for the rehabilitation and modernization of the national railway system. It is proposed to link Guayaquil with the hinterland by a new electric railway, and the existing line from Quito to San Lorenzo, a small lumber port in the extreme north of the country, may also be improved.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Ecuador's grain imports have grown rapidly in recent years and further increases seem likely until higher production levels are achieved. Further port improvements will be required. The average cargo size is small, but this results from the physical limitations of the ports and may be difficult to remedy. Matters will no doubt improve when the new port of Esmeraldas is in operation. Congestion at the port of Guayaquil results from the slow turnround of the lorries used to transport grain from the silos. The country's transport system requires considerable investment both as far as foreign trade and improved domestic agricultural marketing are concerned. The grain handling situation will be much eased when the proposed electric railway system is completed.

EL SALVADOR

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	40	51	35	43
	coarse grains	508	642	539	547
	TOTAL	548	693	574	590
IMPORTS:	- wheat	76	124	159	139
	rice (milled)	4	2	3	8
	coarse grains	25	35	29	34
	TOTAL	105	161	191	181
	- of which, food aid	n.a.	n.a.	206	261
EXPORTS:	- TOTAL	2	8	-	2

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
3.5	4.8	5.2	8	3.0	2.5

GENERAL GRAIN SITUATION

A small, mountainous country, El Salvador has fertile soils and a sub-tropical climate, favouring intensive agriculture. The population of over 5 m. on a total area of 2.1 m. ha. means that it is one of the most densely populated countries in the Western Hemisphere. Population growth is around 3% a year. The main crop, and principal foreign exchange earner, is coffee, followed by cotton and sugar. White maize (the major food grain) and rice are mainly cultivated by small farmers. The country used to be self-sufficient, but grain production has fallen since 1980, partly as a result of civil conflict. Total consumption stopped increasing at the same time, implying a significant deterioration in food availabilities. Malnutrition affects the majority of the population. The civil upheavals have resulted in large movements of displaced persons who need urgent food assistance. Wheat imports increased steadily to nearly 160,000 tons in 1982/83. In recent years maize has had to be imported as well. Total grain imports in 1983/84 reached 180,000 tons. The government has undertaken a project, with WFP assistance, for increased production of basic grains using improved seeds.

PORTS FOR GRAIN (see Appendix)

Acajutla, the country's principal port, has recently been extensively modernized, and is now regarded as the main trading port in Central America. Vessels delivering cereals are usually in the 15,000-25,000 tons range, but improvements are in hand to allow 40,000 tonners to berth. There is a bulk cargo unloading unit which can discharge grain at the rate of 400 tons/hour onto conveyor belts leading to port warehouses. Discharge facilities are regarded as adequate, given the frequency of vessel arrivals. The port is believed to be able to handle 2.3 m. tons of cargo annually, but trade has recently been running far below that level. There are also ports at La Libertad and La Union: investment is being made in the expansion of the latter. Some grain enters the country over its land frontiers with Honduras and Guatemala.

GRAIN TRANSPORTATION

The main towns, including the capital, San Salvador (1980 population 433,000) lie some distance inland, but communications are good (apart from dislocations caused by the civil conflict) and grain transportation poses few problems.

Most grain movement is by **road.** About half of the 9,300 km network consists of all-weather roads. Major highways connect El Salvador with Honduras and Guatemala. There is a good secondary road system serving the more productive agricultural areas and providing quick access to the ports. Further access roads are being constructed under a government programme.

The **rail** network is short (602 km). There is a line linking the capital (San Salvador) with Guatemala, and thus giving access to the Caribbean at Puerto Barrios. Acajutla on the southern (Pacific) coast is served by a branch line.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

El Salvador has an adequate port and reasonably extensive transportation system. Its storage capacity, formerly a problem, has been considerably increased in recent years. Current difficulties in providing adequate food to some sectors of the population stem from civil conflict and reduced exports of coffee, cotton and sugar, on which the country's economy largely depends.

GUATEMALA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	46	50	45	45
	rice (paddy)	28	37	24	36
	coarse grains	735	977	1,177	1,127
	TOTAL	809	1,064	1,246	1,218
IMPORTS:	- wheat	75	100	130	116
	rice (milled)	3	5	-	4
	coarse grains	59	76	8	8
	TOTAL	137	181	138	128
	- of which, food aid	n.a.	n.a.	16	15
EXPORTS:	- TOTAL	-	3	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.3	7.3	7.9	12	3.3	2.5

GENERAL GRAIN SITUATION

Guatemala is a mountainous country with a tropical climate. It is liable to damage from floods, earthquakes and volcanic eruptions. Soils are, in general, not particularly fertile, but it is believed that more than the 16% of the total area which is presently cultivated could produce crops. Over half of the country's foreign exchange earnings are derived from exporting cotton, coffee and sugar, which are produced on large farms in the most fertile area (the Pacific plain). Production of white maize, the principal grain, declined in the 1970s because of lack of investment and better prices for export crops. There has recently been some recovery but productivity among the small grain producers remains low, because they cannot, for example, afford to use fertilizers. Relatively small amounts of wheat, rice and sorghum are also grown. Among other difficulties, Guatemala has been severely affected by the world economic recession, has suffered heavy unemployment, and there have been civil disturbances, especially in the north-west highlands.

Maize remains by far the most important food, although its share is slowly declining in favour of wheat and rice, probably associated with the steady urbanization of the country. Grain demand is increasing rapidly, as population growth rates (3.3% over the last decade) are among the highest in Latin America. The rural population still suffers, in general, from serious malnutrition. There is a steady requirement for coarse grains, especially maize, for animal feed. Demand for grain has outpaced production and imports increased to about 200,000 tons at the end of the 1970s. They have subsequently been lower but it must be expected that import demand, especially for wheat, will increase again in years to come.

PORTS FOR GRAIN (see Appendix)

There are several ports, but only Santo Tomás de Castilla, on the Atlantic coast, has facilities for the bulk discharge of grain. Unloading rates (using clam shells) are 100 tons an hour. Some importers are permitted to use their own equipment, e.g. suckers. The daily average per vessel is 2,500 tons. The grain can be unloaded directly onto lorries or rail waggons but inadequate numbers of them are often a cause of delay. There is also some warehouse space on the quayside. On the Pacific coast, some grains are landed (via lighters) at the port of San José. This port, which has good rail connections, has been considerably developed in recent years and may play a greater role in grain handling once the projected road connections have been completed. The port of Quetzal is also being developed so as to be able to handle grains.

GRAIN TRANSPORTATION

Guatemala City (1980 population 1.1 m.) lies among mountain ranges about 80 km inland from the Pacific coast. It has good rail links with both the Pacific and Atlantic coasts. Other major centres of population are also reasonably accessible, but many rural areas are very remote.

About 11% of the 26,000 km of **roads** are paved and a further 40% have gravel surfaces. Many rural areas are very poorly served. This inhibits the marketing of produce and, in general, the development of many of the country's rural regions.

Grains are also moved by **rail.** The system (1,800 km) links Guatemala with Mexico in the west and El Salvador in the east. A line also crosses the country from the south-west to the Atlantic coast at Puerto Barrios.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Taking into account developments in handling, the ports would appear adequate to handle Guatemala's grain needs for the foreseeable future, but transportation poses serious difficulties. There are too few lorries and rail waggons and the road system, especially in rural areas, is inadequate.

JAMAICA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	1	3	1	1
	coarse grains	9	8	3	3
	TOTAL	10	11	4	4
IMPORTS:	- wheat	163	160	185	167
	rice (milled)	41	43	55	46
	coarse grains	127	202	187	172
	TOTAL	331	405	427	385
	- of which, food aid	n.a.	n.a.	120	51
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
1.9	2.2	2.3	3	1.5	1.7

GENERAL GRAIN SITUATION

Though mountainous, Jamaica's climate and soils favour production of tropical crops. The most important are sugar cane and bananas, which occupy the the best land. Grain production is minimal (less than 10,000 tons a year). The staple foods are wheat, rice and yams. Although the total population has not been growing rapidly (1.5% a year in the 1970s) there has been a continuing drift to the towns, resulting in a tendency for per capita consumption of wheat and rice to increase. Flour, which is one of the most important elements in the diet, is mainly consumed in the form of dumplings. Meat consumption is also rising, resulting in a greater demand for feedgrains. Grain imports, averaging 330,000 tons in the early 1970s, increased to 420,000 tons in 1982/83, but fell back in 1983/84. Low prices of export commodities have led to a serious recession in the country's economy with high levels of unemployment, and there is evidence of increasing malnutrition.

PORTS FOR GRAIN (see Appendix)

The main ports are Kingston (the country's capital), situated in the south-east of the island, and Montego Bay, in the north-west. Kingston has numerous berths, and further extensions are planned. At Montego Bay unloading is by ship's gear.

GRAIN TRANSPORTATION

Half of Jamaica's population of 2.3 m. is urban, most living in and around the capital, Kingston. It may be assumed that most grain is consumed there, within easy reach of the port.

About 70% of the 18,000 km **road** network is paved. Communications are, however, poor in some mountainous districts.

The **railway** system is 370 km long. Lines link Kingston with the principal towns.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Unless there is a large expansion in the area devoted to food crops, which seems unlikely, grain imports by Jamaica will continue to grow. Although there are no reports of serious difficulties or congestion at the ports, the expectation of increasing amounts to be handled would point to the need for modern bulk discharge facilities. Transportation is difficult in some rural areas and improved roads would help grain distribution there.

MEXICO

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	2.6	2.7	4.5	3.5
	rice (paddy)	0.5	0.5	0.6	0.7
	coarse grains	11.8	16.1	15.3	20.9
	TOTAL	14.9	19.3	20.4	25.0
IMPORTS:	- wheat	0.5	1.0	0.1	0.5
	rice (milled)	T	T	T	T
	coarse grains	2.0	3.8	2.7	8.1
	TOTAL	2.5	4.9	2.9	8.6
	- of which, food aid	n.a.	n.a.	-	T
EXPORTS:	- TOTAL	0.1	T	T	T

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
51	69	75	109	3.2	2.2

GENERAL GRAIN SITUATION

Although it is a large country, much of Mexico is not well suited to agricultural production. The northern half is very dry and it is practically impossible to grow crops there without irrigation. Further south, the terrain is higher - even rugged - and in some hill areas the topsoil has been eroded by intensive cultivation. Land reform has broken up many of the old private estates, but some of the plots thus created are very small and can barely support those who live on them.

Since the 1940s Mexico has been the site of intensive research into varietal improvement of agricultural products, especially maize, wheat and beans. This is now carried on by the International Maize and Wheat Improvement Centre (CIMMYT). Improved varieties of wheat giving a high response to inputs (fertilizers and irrigation) have been exported with great success to many developing countries. In Mexico the adoption of improved varieties of wheat and maize, and the extension of irrigation, boosted crop production in the 1950s and 1960s. After 1970 growth was much slower, principally because of undercapitalization and poor returns to farmers, but since 1980, government expenditure on agriculture has greatly increased and output has started to expand again. In 1982 the wheat crop was a record 4.5 m. tons, and in 1983 maize production (most of it white) was officially estimated at around 15 m. tons.

Mexico's rate of population growth is very rapid (3.2% in the 1970s), and the latest projections suggest that the country's population may be nearly 110 m. by the end of the century, compared with 75 m. in 1983. The staple food is maize, but its consumption has been steadily giving place to wheat, a trend associated with urbanization. In 1982 some 68% of the population were classed as urban, compared with 52% in 1960. Demand for grain for food and animal feed expanded rapidly in the 1960s and 1970s when incomes were rising, but severe balance-of-payments difficulties have forced the authorities to begin reducing the heavy subsidies on bread and other foodstuffs. Since 1982 Mexico has suffered what is described as its worst economic and financial crisis since the Great Depression of the 1930s. WFP estimates suggest that at least half of the rural population do not have an adequate nutritional intake.

Grain imports soared from around 2 m. tons in the early 1970s to a peak of over 9 m. tons in 1980/81, but have since been rather lower, thanks to bigger domestic crops (helped by better weather) and the response of consumption to higher food prices. Imports surged again to 8.6 m. tons in 1983/84. They consist of wheat, maize and sorghum. In view of the continuing high population growth rate, and the problems facing Mexican agriculture, it cannot be ruled out that imports in some future years might be even higher than those recently experienced.

PORTS FOR GRAIN (see Appendix)

Most grain imported by Mexico originates in the United States. A substantial amount is delivered by rail across the land frontier between the two countries. The principal sea ports handling grain are Acapulco, Coatzacoalcos, Ensenada, Guaymas, Manzanilla, Tampico and Veracruz. On the whole, development of these ports to handle large quantities of grain has taken place recently and is not well documented. Most ports can only receive bagged cargoes: discharge rates are usually 600 tons/day. Where bulk discharge facilities exist, rates are usually between 1,000 and 1,500 tons a day. There is a 60,000 ton silo at Guaymas intended for the loading of grain: at other ports the storage (if any) is in warehouses. Lack of grain storage facilities is a major problem for Mexico. Plans have been announced for a major expansion in the port facilities, but these may be revised in view of current economic difficulties. New ports are planned at the Pacific coast (at Lazaro Cardenas, which will become Mexico's largest grain port) and on the Yucatan peninsula. This will help ease congestion at the traditional Gulf of Mexico ports.

GRAIN TRANSPORTATION

There are large towns in many parts of the country, but the biggest concentration of population, by far, is in the neighbourhood of Mexico City (1980 population 15 m.), which lies among the highest mountains midway between the Pacific and Gulf of Mexico coasts. Imported grain must move long distances over difficult terrain, and domestic grain movement, too, is considerable.

Over half of the 213,000 km of **roads** are surfaced. The network is extensive, but some rural areas, especially in the north and extreme south-east of the country, are not well served.

The **rail** network is also very extensive (over 25,000 km). Some major ports (e.g. Ensenada and Acapulco) are not connected, however. Some grain imported from the United States arrives by rail, but difficulties have arisen over an adequate supply of Mexican rail waggons, as the railway authorities fear these will be kept out of service and used as stores.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Recent improvements in the ports have enabled Mexico to import unprecedented amounts of grain without, apparently, undue difficulties. But the absence of bulk handling facilities at most ports must prove a costly disadvantage, and internal transportation, especially the availability of railway waggons, could be much improved. The lack of adequate grain storage deprives the country of flexibility in obtaining its grain at the most convenient places and times.

PANAMA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	159	175	176	169
	coarse grains	58	60	62	68
	TOTAL	217	235	238	237
IMPORTS:	- wheat	49	60	153	81
	rice (milled)	1	-	-	-
	coarse grains	19	20	34	35
	TOTAL	69	80	187	116
	- of which, food aid	n.a.	n.a.	3	2
EXPORTS:	- TOTAL	-	8	5	6

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
1.5	2.0	2.1	3	2.8	2.1

GENERAL GRAIN SITUATION

Panama is a small, tropical country, partly low-lying and swampy, but also with some mountainous areas. Most of it is forested, and less than 8% of the total area is cropland. Agriculture accounts for only 9% of the GDP - an unusually low proportion for a developing country. Over 40% of the GNP is derived from the service sector, including, in particular, revenues from the Panama Canal and the proceeds from shipping - in terms of tonnage, the Panamanian fleet is the fourth largest in the world. The main cereal crops are rice (in which the country is normally self-sufficient) and maize. Production is not much greater than in the early 1970s.

The country's population is small - about 2 million - but is increasing at nearly 3% a year. Economic growth and rapid urbanization led to increases in the consumption of wheat and rice at the expense of maize, and also to greater demand for animal products. As a result, imports of both wheat and feedgrains have risen rapidly. The total exceeded 180,000 tons in 1982/83 (after drought) and was about 120,000 tons in 1983/84.

PORTS FOR GRAIN (see Appendix)

The main ports are Balboa and Cristobal. Balboa is at the Pacific (south) end of the Panama Canal, close to the country's capital (Panama City), while Cristobal is near the second city (Colón), at the Caribbean end of the Canal. Both ports can accommodate large vessels. Information on grain discharge methods and rates is not available, although Cristobal is reported to have portable conveyors.

GRAIN TRANSPORTATION

One third of the country's population live in the capital (Panama City). It may be assumed that most of the imported grain is destined there, or to Colón. Both cities are close to major ports. In the rural areas communications are not good, probably a factor inhibiting agricultural development.

There are some 8,400 km of **roads,** of which about 30% are paved. Some regions, especially in the east, are poorly served.

There is a short **railway** system (about 600 km). Most of it is in the extreme west of the country, linking with the neighbouring areas of Costa Rica.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The ports of Panama appear able to handle likely quantities of grain imports. Marketing and distributing grain in rural areas is hampered by the inadequate road network. The country's damp, hot, climate is unfavourable to easy storage and handling of foodstuffs, and the construction of well-equipped facilities (in addition to the central warehouse recently completed by the government) would therefore be advantageous.

PERU

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	138	108	120	76
	rice (paddy)	471	547	765	770
	coarse grains	801	813	832	674
	TOTAL	1,410	1,468	1,717	1,520
IMPORTS:	- wheat	781	849	942	927
	rice (milled)	38	86	60	155
	coarse grains	311	182	542	569
	TOTAL	1,130	1,117	1,544	1,651
	- of which, food aid	n.a.	n.a.	103	171
EXPORTS:	- TOTAL	16	4	2	8

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
13.2	17.3	18.7	26	2.7	2.2

GENERAL GRAIN SITUATION

Most of Peru consists of mountains or tropical forests. Arable land amounts to only 3.2 m. ha. (2.5% of the total land area) and permanent crops 0.3 m. ha. (0.2%). It has been estimated that, at best, only 6% of the country could be cultivated all the year around. Agriculture in the mountain areas is based on traditional methods, and productivity - and consequently living standards - has tended to fall. One result has been mass migration to the towns, especially to Lima, the country's capital. The coastal strip has very little rainfall, but agriculture is possible where rivers from the Andes provide irrigation water.

The main grains are maize (one third of it white maize) and rice: some wheat is also grown. The prevailing low technology, and lack of price incentives, are probably the main reasons for the disappointingly slow growth in grain production. Crops, especially in the last few seasons, have also been affected by a series of natural disasters.

While maize is still widely consumed, especially in rural areas, the staple foodgrain in the urban areas, which now account for two thirds of the country's population, is wheat. Consumption of wheat has been increasing rapidly, due in part to large price subsidies. Urban demand has also led to a rapid expansion in the poultry industry. Demand for food and feedgrains have far outpaced production and, although grain imports increased from 1.1 m. tons in the early 1970s to over 1.6 m. tons in 1983/84, malnutrition remains a problem both in urban and rural areas.

Although the rate of population growth up to the year 2000 is projected to decline from recent levels, grain imports may be expected to increase further in view of the country's unfulfilled food needs and the difficulties of raising domestic output.

PORTS FOR GRAIN (see Appendix)

Imported grain is mainly handled at the ports of Callao and Matarani, although other ports along the 2,000 km coastline are used to serve local needs. Callao is part of the conurbation surrounding the country's capital, Lima. It can accommodate medium-sized vessels (drawing up to 9.1 metres) and is being dredged to 11 metres. It has a grain elevator (capacity 23,000 tons) which can unload wheat at 300 tons/hour. Matarani, in the south of the country, is connected by rail to the city of Arequipa and also (via Lake Titicaca) to Bolivia. The port has good warehouse facilities and grain can be discharged (by an electro-mechanical system) at 200 tons per hour. Plans for port development in Peru have had to be shelved in view of the country's present economic difficulties.

GRAIN TRANSPORTATION

The coastal conurbation of Lima-Callao is one of the largest in Latin America. Its population increased from 1.7 m. in 1960 to 4.7 m. in 1980, and it is still growing rapidly. Most of the other large towns are situated high in the Andes. Although these are, in most cases, linked by rail to Callao or Matarani, the distances are sometimes long. Communications in the forest regions, which comprise nearly half of the country, are practically non-existent.

Only 11% of the **road** network of 57,000 km is paved, and a further 20% has gravel surfaces. Access to the mountainous highlands of the country is very difficult, and the large areas of tropical rain forest further east and largely inaccessible. This hinders development of the agricultural potential of those regions. Many roads and bridges were destroyed or severely damaged by floods in 1983.

Some grain moves by **rail,** although the system (2,200 km) is comparatively short. An important line runs from Matarani to Puno, on Lake Titicaca, whence steamers connect with Lake ports in Bolivia.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

While the bulk unloading equipment at the main ports is apparently sufficient to cope with the current import levels, improvements are likely to be needed if the amounts handled go on increasing at recent rates. Distribution of grain within Peru, and also increased production, is made difficult by the nature of the terrain and the inadequate road and rail links.

TRINIDAD AND TOBAGO

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	16	23	30	30
	coarse grains	5	5	3	3
	TOTAL	21	28	33	33
IMPORTS:	- wheat	103	106	106	121
	rice (milled)	29	38	39	55
	coarse grains	72	102	117	124
	TOTAL	204	246	262	300
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	3	5	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
0.96	1.09	1.15	2	1.3	1.7

GENERAL GRAIN SITUATION

Trinidad produces tropical crops, in particular sugar, but only about 30,000 tons of grains (principally rice). The economy largely depends on exports of oil and oil products. The per capita GNP of Trinidad and Tobago (nearly US$7,000 in 1982) is among the highest of any developing country. Consumption of wheat and rice, the staple foods, has been increasing at the expense of maize, which is now little used for food. There is also a high level of meat (especially poultry) consumption involving considerable use of maize for animal feeding. Population growth is relatively slow, but increasing grains consumption has been reflected in a steady expansion of imports, from around 200,000 tons in the early 1970s to 300,000 tons in 1983/84. This growth may be expected to continue.

PORTS FOR GRAIN (see Appendix)

Most grain is handled at Port of Spain, where there are bulk unloading facilities and silos. But the unloading tower is fixed, and vessels have to move so that each hatch can be dealt with in turn. Point-a-Pierre, close to the town of San Fernando, has one deep-water berth for general cargo.

GRAIN TRANSPORTATION

The island is small and mainly low-lying. Most of the imported grain is needed in the principal towns of Port of Spain and San Fernando, but distribution throughout the island causes little difficulty. The **road** network is relatively well developed, with a total extent of 7,900 km, of which almost half is paved. There are no **railways.**

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

If, as seems likely, grain imports continue to increase in the longer term, handling at Port of Spain could be facilitated by the installation of more flexible bulk handling facilities. Transportation of grain is unlikely to give rise to any serious problems.

URUGUAY

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	397	288	316	350
	rice (paddy)	166	264	419	332
	coarse grains	429	360	302	341
	TOTAL	992	912	1,037	1,023
IMPORTS:	- wheat	59	68	2	64
	rice (milled)	-	-	-	-
	coarse grains	6	38	39	49
	TOTAL	65	106	41	113
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	131	286	409	382

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.8	2.9	3.0	3	0.3	0.7

GENERAL GRAIN SITUATION

The climate and terrain of Uruguay favour pasture and cereals production, although crops suffer from time to time from serious floods and droughts. Wheat, the principal grain, used once to be regularly exported, but output has tended to decline. Rice production, on the other hand, has been increasing. Other cereals include maize and sorghum. Production of grains has been discouraged by inadequate returns for all but the most efficient producers: this reflected the government's efforts to keep prices low for the large urban populations. Uruguay has suffered severe financial and economic difficulties in recent years.

The staple foodgrain is wheat, but there has latterly been some increase in the use of maize for food. Large amounts of coarse grains are used for animal feed. Apart from rice, which is exported on an increasing scale, exports of grain are now largely confined to good crop years, and imports in substantial quantities are sometimes required: in 1983/84, for example, 113,000 tons of wheat and coarse grains were imported.

PORTS FOR GRAIN (see Appendix)

Uruguay is well served with ports. The principal ones which handle grain (exports and imports) are Fray Bentos, situated about 100 km up the River Uruguay; Nueva Palmira, near the mouth of the same river; and the country's capital, Montevideo. Vessels of 30,000 tons can use all of these ports, although cargo sizes are usually smaller. At Fray Bentos, bulk discharge is made direct onto lorries at 130-150 tons an hour; at Montevideo and Nueva Palmira rates are 300 tons/hour or more. The only problem noted with grain handling is a shortage of silo capacity at Montevideo. The port there has recently been considerably improved, with modernized quays and a new container terminal. A new export facility is under construction at Nueva Palmira.

GRAIN TRANSPORTATION

As much as 84% of the country's population is now urban, more than half living in the capital, Montevideo (1980 population, 1.4 m.). Most towns are within easy reach of one or other of the main ports. The terrain is not difficult and communications are good. Grain handling does not, therefore, give rise to great difficulties.

Paved **roads** account for only 13% of the 50,000 km network: as much as 40,000 km are still made of earth. The system connecting the main towns and ports is, however, comparatively good. Most grain movement within Uruguay takes place by road.

The **railways** require modernization. Two lines link Montevideo with Brazil, and Fray Bentos has also rail connections.

SUMMARY OF GRAIN TRANSPORTATION AND HANDLING PROBLEMS

Assuming that Uruguay's grain import needs do not suddenly expand above current levels, few serious difficulties seem likely in its grain handling. Matters would however be facilitated by the construction of a new silo at Montevideo and general improvements in the country's rail system.

VENEZUELA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1	1	-	-
	rice (paddy)	281	621	670	507
	coarse grains	588	1,061	879	710
	TOTAL	870	1,683	1,549	1,219
IMPORTS:	- wheat	651	771	801	971
	rice (milled)	19	-	-	-
	coarse grains	652	1,299	1,669	1,680
	TOTAL	1,322	2,070	2,470	2,651
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	21	19	26	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
10.6	15.0	16.4	26	3.5	2.6

GENERAL GRAIN SITUATION

The country's wealth as an oil-exporting developing country has enabled Venezuela to invest in agriculture and raise yields. Production of white maize, the staple food, has not risen much in the last decade because of reduced areas, but output of rice increased considerably, and favourable support prices led to a large expansion of sorghum production on the larger mechanized farms, partly at the expense of other crops. Very little wheat is grown.

Increasing prosperity and urbanization have hastened the substitution of rice and, to some extent, wheat for maize in urban diets, and permitted a level of meat consumption which is well above the average for South America. Until 1979 grain consumption was also encouraged by food price controls, but these have subsequently been lifted, in part. The demand for grains for food and feed has outpaced production and imports, particularly of maize for feed, have increased sharply. Total cereals imports exceeded 2.6 m. tons in 1983/84, twice the level of the early 1970s.

Although oil export earnings have recently declined, economic prospects for Venezuela remain generally good, and a continuing high rate of population growth is likely to result in further increases in grain requirements. Even if agriculture is developed further, much of this increase will have to be supplied by imports.

PORTS FOR GRAIN (see Appendix)

Grain is imported at five ports. The main ones are Puerto Cabello, La Guaira (which serves the country's capital, Caracas, a short distance inland) and Maracaibo. Guanta and Puerto Sucre, both in eastern Venezuela, import smaller quantities. Congestion used to be a problem, particularly at La Guaira, but total cargo handling capacity has recently been increased, and now stands at about 13 m. tons. Puerto Cabello (which handled over 2.1 m. tons of grain in 1984) has a conveyor system, but elsewhere unloading is performed at a low rate by privately-owned pneumatic equipment. Limited storage capacity at the ports causes congestion which is aggravated by queues waiting to use the weighing scales. Grain is moved from the ports by privately-owned lorries.

Recent fixtures for bulk grain cargoes of up to 20,000 tons to (unspecified) Venezuelan ports quote discharge rates of between 600 tons and 1,000 tons a day.

GRAIN TRANSPORTATION

Caracas, the capital and largest city of Venezuela, has a population of over 3 m. Maracaibo is next largest, with nearly a million. The country's other main towns are mostly located along the coast or among the ranges of the Andes parallel to the coast. As there are several ports which can be used for imports, the distances over which grain has to be transported are usually not great. Much of the south of the country is, however, isolated and remote.

The total **road** network is about 78,000 km, of which 30% is paved. There is a reasonably good system connecting the main centres of population. There is a shortage of the special (30-40 ton) lorries which carry the grain from the port storage facilities to the mills.

Railways are not an important means of transport in Venezuela. The total length is only 173 km.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Improvements at the ports are desirable to allow a speedier and more efficient discharge of grain. This would include increasing the number of berths equipped with bulk discharge equipment, the relocation of weighing scales and the installation of new ones (steps which the National Ports Institute already has in hand). There is also a need for increased storage capacity. The main difficulty affecting grain transportation is that there are too few lorries to convey grain from the ports.

ASIA

BANGLADESH

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	0.1	0.6	1.0	1.1
	rice (paddy)	17.3	19.9	21.3	21.7
	coarse grains	0.1	0.1	0.1	0.1
	TOTAL	17.5	20.6	22.3	22.8
IMPORTS:	- wheat	1.6	1.3	1.6	1.6
	rice (milled)	0.3	0.2	0.3	0.3
	coarse grains	0.1	T	T	T
	TOTAL	1.9	1.5	1.9	1.9
	- of which, food aid	n.a.	n.a.	1.0	1.1
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
68	88	95	159	2.7	2.9

GENERAL GRAIN SITUATION

Much of Bangladesh consists of low-lying plains divided by the Rivers Ganges and Jamma and their extensive deltas. The country is liable to devastating floods but also suffers, on occasion, from severe drought. The land is intensively cultivated, but yields on the small and typically fragmented farms are comparatively low. Improved water control through flood protection, irrigation and drainage is a key factor in expanding agricultural production, and the government is devoting large sums to them under the current five-year plan. It is also hoped to increase domestic production and use of fertilizers.

The main food crop is rice: production reached 21.7 m. tons (in terms of paddy) in 1983, some 4 m. tons more than the average of the mid-1970s. Attempts have been made, with some success, to promote the cultivation of wheat, which is cheaper to grow. Production, which was negligible in the early 1970s, now averages about 1 m. tons. In order to keep consumer prices down, prices paid to producers of both wheat and rice are low in comparison with world market levels. Instead, the government promotes production by granting extensive subsidies for fertilizers and other inputs.

Bangladesh, whose current population is almost 100 m., is one of the most densely populated countires in the world (over 650 people a square km in 1983), as well as one of the poorest. Population growth rates are high - around 2.7% a year, and are projected to increase up to the end of the century, when the total population may well be more than 150 m. Only 12% of the population were classed as urban in 1982, but cities such as Dhaka (1980 population - 2.8 m.) are growing rapidly.

Because of its economic circumstances, Bangladesh cannot purchase all its foodgrain needs, and has to rely heavily on food aid. Through the Public Food Distribution system the government distributes foodgrains at subsidized prices. Even so, food supplies per capita are among the lowest in the world. Most grain imports are of wheat, which is more readily available as aid than rice. The amount of wheat imported annually varies according to the domestic food situation: it has been as much as 2.2 m. tons (in 1979/80) but averages about 1.5 m. tons. Rice imports average 300,000 tons. No coarse grains are imported.

PORTS FOR GRAIN (see Appendix)

The main port is Chittagong, situated in the east of the country near the mouth of the short Karnatuli River. The maximum draught is 9.1 metres, and larger vessels must lighten at an outer anchorage. Grain is discharged in bulk at daily rates varying from 1,000 to 1,500 tons. The port has a silo of 200,000 tons capacity. Chittagong is subject to severe congestion: it was recently reported that ships waiting to berth were delayed by up to 21 days in February 1985. Compounding the problem is a massive accumulation of silt at the port entrance. Dredging has now begun.

Grain is also landed at Chalna, in the heart of the country, situated some 90 km from the sea on the River Pusur, one of the mouths of the Ganges. Chalna is nearer to Dhaka, the country's capital, but there is no direct road or rail connection across the River Ganges. There are no jetties or wharves at Chalna, and no mechanical equipment available at the anchorage. Grain is unloaded into lighters using ship's gear.

GRAIN TRANSPORTATION

Bangladesh is not a very large country but there are major difficulties in transporting grain to the capital, Dhaka, and some other cities because of the many wide rivers separating them from the ports.

Less than 10% of the **road** network of some 45,000 km is paved. Routes are circuitous because of the many rivers and channels which have to be crossed. In a recent road construction project it was estimated that three small culverts were required for each mile of road (1.6 km) and one larger culvert or bridge every three miles (4.8 km). There are many ferry crossings, which can be a cause of congestion and delay. Road maintenance costs are high because of frequent flood damage.

The **railway** system extends for over 4,000 km, nearly equally divided between two gauges. There are no bridges across the River Jamma, and therefore no rail connections between the eastern and western parts of the country. The port of Chittagong is linked by rail to Dhaka.

Waterways are extensive, some 84,000 km being suitable for navigation. The bulk of the traffic in the central and Southern areas is moved by water. Silting is a major problem.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Communications are the principal problem affecting grain handling in Bangladesh, and the needs of growing urban areas such as Dhaka will be hard to supply unless new road and railway bridges are built. Facilities at the principal port, Chittagong, are inadequate and serious congestion, and delays to ships, have occurred when import needs increase. Developments in hand at the port of Chalna will improve the distribution of imported grain in the west of the country. Further heavy investments in the infrastructure will be required as, even if the country succeeds in modernizing agriculture and raising yields, natural disasters may be expected to recur.

CHINA (PEOPLE'S REPUBLIC)

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	42	54	68	81
	rice (paddy)	118	141	164	172
	coarse grains	73	80	82	90
	TOTAL	232	276	315	344
IMPORTS:	- wheat	4.4	10.5	13.0	9.8
	rice (milled)	T	0.1	0.2	0.1
	coarse grains	2.6	4.6	5.4	6.8
	TOTAL	7.1	15.2	18.6	16.7
	- of which, food aid	n.a.	n.a.	T	0.2
EXPORTS:	- TOTAL	2.8	1.4	0.9	1.2

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
829	1003	1040	1196	1.9	0.9

GENERAL GRAIN SITUATION

The country is the third largest in the world, and embraces many different climatic zones. Only about 11% of the total area (i.e. about 100 m. ha.) is cultivated, the rest being mainly mountain or desert. Arable land is intensively cultivated, multiple cropping being widely practiced. The potential for opening up new land appears limited, except in the north-west where irrigation would be needed: indeed, the area devoted to crops appears to be falling, because of the pressure of population growth and the effects of erosion.

Grain production is concentrated in the eastern half of China, the main crops being wheat (especially in the north-east) and rice, which is mostly grown in the south-east. There is also a considerable output of maize, barley and sorghum. The rate of growth of production, especially of wheat, has leaped ahead in recent years after the introduction of new policies, including cash incentives. Grain output rose from 230 m. tons in the early 1970s to 344 m. tons in 1983, and that of wheat from under 40 m. tons to 82 m. tons in the same period. The 1984 wheat crop was another record, at 88 m. tons.

The population of the People's Republic of China passed 1,000 m. in 1980 and stands at about 1,040 m. in 1985. Even though the rate of growth is declining, and may average less than 1% a year between 1980 and 2000, the total at the end of the century is likely to be around 1,200 m. Population density averages just over 100 per square km, but in the eastern third of the country it is far higher. Unlike most other developing countries, urban population growth has not outpaced that of rural populations: indeed it was, until recently, official policy to prevent it from doing so. There are, nevertheless, numerous towns and cities, some of the biggest concentrations being in the north-east, and in the region of Shanghai. In 1980, there were no fewer than 31 cities of 1 m. or more people, the two largest (Beijing and Shanghai) each having over 10 m.

The staple foods in China are rice and wheat. Per capita consumption of these grains has been increasing, while that of other basic foods such as maize, millet and sorghum, roots and tubers was declining. The difficulties of supplying the conurbations near the coast from inland has no doubt helped accelerate the consumption of foods, like wheat, which could more readily be obtained as imports. The population's basic food needs are assured by a comprehensive rationing scheme.

Recent economic advances have been accompanied by improvements in living standards, which are now starting to be reflected in food consumption patterns. Demand for milk is increasing in the major cities and intensive dairy systems are being set up. The cattle are fed, at present, with agro-industrial by-products, maize silage and vegetables. The development of feedstuff and fodder industries is seen as an answer to the problems caused by the recent heavy accumulations of surplus grain. Should meat consumption begin to expand, the demand for grain for animal feed, at present believed to be small, could rise very rapidly.

During the 1970s demand for grain outpaced domestic supply, and imports of wheat increased rapidly to a peak of about 14 m. tons in 1980/81. China was then the second largest wheat importing country (after the USSR). Latterly, however, there has been a massive increase in domestic wheat production, and imports have declined. Local surpluses of maize made possible exports of around 1 m. tons during 1984 and larger quantities are being exported in 1985. Exports may be expected to continue, as an export elevator (capacity 50,000 tons) is to be built at the port of Dalian.

PORTS FOR GRAIN (see Appendix)

China has a very long coastline - 11,000 km in all - and numerous ports. The total capacity (all goods) of its ports rose to 280 m. tons in 1984, nearly 12% up on the previous year. Many of these are capable of handling grain, the chief ones being Dalian, Guangzhou, Huangpu, Qingdao, Shanghai, Tianjin and Xingang. A problem common to most is the small number of deep-water berths. Some ports can accept only quite small vessels, larger ones having to discharge into lighters. Most of the larger ports have modern pneumatic grain handling equipment. At Shanghai, which normally handles the largest amount of grain imports, discharge rates (per vessel) are said to average 700 tons an hour, but elsewhere rates are lower (e.g. 300 tons an hour at Dalian). Grain loading procedures are very labour-intensive and exports of grain are mostly being made in vessels of 3,000-5,000 tons.

In general, the capacity of the ports has not increased at the same rate as the volume of imports, and serious delays are common. In 1980 the average layover time for foreign ships was nearly 8 days, and total demurrage payments in that year are estimated at US$200 m. The situation has no doubt eased to some extent with the subsequent decline in import volumes. New measures, linking dock workers' pay with their productivity and rewarding firms which help speed cargo transit while fining those which do not, came into effect in early 1985. They are expected to raise the handling capacity of some ports by as much as 30%. It has been reported that a number of ship unloaders (rated at 750 tons per hour) and belt conveyors are to be installed in 1985 as part of the modernization programme at Dalian and Tianjin.

GRAIN TRANSPORTATION

Keeping China's 250 m. or more urban people supplied with their grain needs is a task which taxes the capacity of the transport systems to their utmost. It is generally accepted that transportation remains a weak link in the national economy, requiring rapid improvement so that it can catch up with the overall pace of development. Most of the larger towns and cities, it is true, have agricultural hinterlands, but the demand of the conurbations around Shanghai and Beijing far outstretches the ability of nearby rural areas - themselves densely populated - to supply them. It is easier and cheaper to supply their grain needs by imports than to bring the grain over long distances by rail or road.

The **road** network now amounts to over 900,000 km, about 11 times as much as existed in 1949. Construction has proceeded rapidly in recent years (at an average rate of 8,000 km a year) but, even so, is lagging behind the requirements of the fast-growing economy. The economic development of many of the mountainous areas is still seriously hindered because of poor communications. Better roads would also stimulate the production of marketable products including grains. There are too few lorries, despite the import of 300,000 new and second-hand trucks from France and Japan. Long-distance freight movement by road is still very difficult.

The length of the **railway** system is reported to have increased to 52,000 km in 1980, 140% more than in 1949. But the volume of goods traffic carried grew 31 times over some period which, bearing in mind the relatively small increases in the number of locomotives (150%) and in waggons (470%), indicates a growing strain. Priority tends to be given to the transportation of high-value commodities, such as minerals. There is an intensive development programme to improve the rail network.

Water transport is of great importance in China, and over one third of internal freight traffic is carried by water. In 1981 there were some 108,000 km of inland waterways, some of them navigable by ships of 10,000 tons.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

China's rapid economic development calls for a continuous updating and expansion of its transportation network. Until the latter can cope efficiently with the distribution of the country's own harvests, grain imports in substantial quantities are likely to be required. The ports are at present congested, partly because there are few deep-water berths, and partly, no doubt, because the local transport system only allows slow movement of grain from the port areas. More locomotives, waggons and lorries for grain would be of particular assistance.

Storage facilities for grain in China are belived to be considerable, but the surplus after the bumper 1984 crop was so large that state purchasing agencies have been reluctant to buy more grain, and the government has urged peasants to store it in their own houses, as a temporary measure. Total storage capacity for grain at the end of 1984 was estimated at108.5 m. tons, and a further 35 m. tons was to be added by the end of 1986.

CHINA - TAIWAN PROVINCE

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1	2	3	3
	rice (paddy)	3,271	3,190	3,160	2,600
	coarse grains	107	119	567	603
	TOTAL	3,379	3,311	3,730	3,206
IMPORTS:	- wheat	623	642	650	608
	rice (milled)	28	5	-	-
	coarse grains	1,664	3,434	4,120	4,000
	TOTAL	2,315	4,081	4,770	4,608
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	14	229	307	550

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
n.a.	18	19	n.a.	n.a.	n.a.

GENERAL GRAIN SITUATION

The island of Taiwan is mountainous, and only about a quarter is cultivated. Rainfall is abundant, and typhoons are a serious risk, especially in the summer. The main grain crop is rice, which occupies nearly half of the cultivated area, but sowings have been declining, as farmers have switched to more profitable crops such as feedgrains, vegetables and fruit. The government is encouraging the restructuring of agriculture, to enable greater mechanization and the use of the most modern techniques.

The population of Taiwan is some 19 m., increasing at about 1.5% a year. Wheat forms a relatively minor part of the diet, but its consumption has been increasing at the expense of rice which, however, remains the principal foodgrain. Coarse grains use has been rising steeply, to supply the expanding livestock industry. The net result is that total grain imports have doubled since the mid-1970s to 4.7 m. tons (of which 4 m. tons was coarse grains and the rest wheat) in 1983/84. Rice is regularly exported, sales reaching a peak of over 0.5 m. tons in 1983.

PORTS FOR GRAIN (see Appendix)

Increasing trade caused serious problems of port congestion in the 1960s and 1970s but the situation has been eased by investment in major projects including the construction of two new ports.

Grain is imported through the large ports of Kaohsiung, which can acommodate 75,000 ton bulk carriers and has four grain silos with a combined capacity of 160,000 tons, and Keelung, where there is a silo of 50,500 tons. Grain discharge at both ports is by suckers, at a rate of up to about 1,800 tons an hour. Port congestion has been reported from time to time but further development is contemplated. It is intended that these ports should serve as regional transhipment centres.

GRAIN TRANSPORTATION

The principal city of Taiwan is Taipei with a population, in 1980, of over 3 m. It is only a short distance inland from the important port of Keelung. Other towns and cities are mostly on or near the coastal plain in the west of the island. This area is well served with roads and railways and internal transportation of grain would appear to pose few problems.

The **road** network extends for over 17,500 km, mostly asphalted. There have been major improvements in recent years.

Increasing amounts of goods are conveyed by **rail.** The government system, which links the ports of Kaohsiung and Keelung with the main population centres on the west coast, has just over 1,000 km of track but there are also extensive private systems connected with the sugar, forestry and mining industries.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Recent investments have enabled the Province of Taiwan to accommodate a very rapid increase in grain imports, but further improvements in the harbours and handling system may be required if grain demand, especially for feed, should continue to outpace production growth.

INDIA

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	25	33	37	45
	rice (paddy)	64	77	70	90
	coarse grains	27	30	28	32
	TOTAL	117	139	135	164
IMPORTS:	- wheat	4.0	0.8	4.3	2.5
	rice (milled)	0.2	0.1	-	0.3
	coarse grains	0.5	T	T	T
	TOTAL	4.7	0.9	4.3	2.8
	- of which, food aid	n.a.	n.a.	0.1	0.2
EXPORTS:	- TOTAL	0.2	0.8	0.6	0.2

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
539	663	732	994	2.1	1.9

GENERAL GRAIN SITUATION

About 40% of the land area of India (3.3 m. square km) is cultivated, and 70% of that is devoted to cereals, principally rice. Much of the country has soils which can be very productive when irrigated and fertilized, but many farmers are too poor to be able to realize that potential without government assistance. The introduction of high-response varieties of wheat in certain areas in the 1960s showed what could be done if inputs were made available, and wheat production leaped ahead from about 10 m. tons in the early 1960s to over 40 m. in the early 1980s. Rice production has also increased, though not to the same degree, as procurement prices have, in general, been less favourable than for wheat.

While the annual rate of population growth has fallen from the 2.3% experienced in the 1960s and 1970s, numbers are still increasing at some 15 m. a year. The World Bank projects that the population of India, now some 750 m., will reach about 1,000 m. by the year 2000. Urban growth has been accelerating, and a quarter of the total population was classified as urban in 1982, there then being 36 cities of over 500,000 persons. Calcutta and Bombay each had over 8 m. people and Madras and Delhi over 5 m. Projections suggest that all four cities will each have over 10 m. people in the year 2000.

As many as 300 m. people are below the official poverty line and most of these have very little to eat. Malnutrition is still a major problem, affecting millions of children. It is being combatted by public feeding programmes. It is difficult to generalize because there are many regional differences in food consumption habits, but consumption of certain foods, particularly millet, sorghum, cassava, maize and, to some extent, rice, seem to be giving way to wheat, probably as a consequence of urbanization. For religious as well as economic reasons very little meat is consumed - an annual average of not much more than 1 kg per capita. There is correspondingly little feed use of grain. Milk production is, however, being encouraged under a major dairy development project, the cattle being fed with locally-produced brans, oilcakes and damaged grains.

In the mid-1960s India was one of the largest importers of grain, the total exceeding 10 m. tons in some years. The accelerating growth of production enabled India to reach self-sufficiency by the early 1980s and, indeed, to build up a considerable grain stock. The normal, safe, buffer stock (of wheat and rice) is put at 16 m. tons; but government stocks on 1st October 1984 stood at 20.1 m. tons, including 16.9 m. tons of wheat. Foodgrain stocks rose again to a record 22.5 m. tons in January 1985, posing some severe storage problems. As supplies from the 1985 crop begin to move into the markets, the authorities are expected to intensify their efforts to export grains to relieve the pressure. Imports have continued in the early 1980s - they reached 2.8 m. tons in 1983/84 for example - both to satisfy food aid needs and because of difficulties experienced from time to time by the government in purchasing adequate amounts from producers for the public distribution system.

Whether India will be able to remain self-sufficient in future years will depend on maintaining the impetus of recent production advances. There is scope for further irrigation - only 68 m. ha. of a potential 113 m. ha. was under irrigation in 1985 - and there may also be scope for increasing the production of dry-land farming. While fertilizer use has increased considerably in recent years (it has approximately doubled since the early 1970s), applications are still very low in comparison with many developed countries. On the other hand, there is still a large unsatisfied potential demand for foodgrains, which could emerge if the economy were to grow faster. A run of bad harvests, for whatever reason, could therefore lead to renewed heavy import demand.

PORTS FOR GRAIN (see Appendix)

Grain imports may be received at a number of ports, the chief ones being Bombay and Kandla on the west coast, and Madras and Calcutta on the east coast. At Bombay and Calcutta lighters are used but bulk carriers can come alongside the quays at Madras and Kandla. Grain is usually received in bulk and bagged in the ports. The normal rate of discharge is 1,000-1,500 tons a day.

The ports require major improvements to handle import and export cargoes. Recent grain imports have suffered serious delays because of the slow clearance of shipments and lack of availability of railway waggons. A major modernization scheme was provided for in the Sixth Plan (1980-85) and large sums have also been allocated under the Seventh Plan (1985-90). Measures include the deepening of channels, and provision of additional cargo berths at several ports. The World Bank has approved a loan of US$250 m. for the construction of a new port at Bombay, which will accommodate vessels of up to 70,000 tons. The Government of India is seeking foreign and private investment to finance further schemes to develop the infrastructure.

GRAIN TRANSPORTATION

Although transport links are comparatively well developed, the sheer size of India creates considerable logistical problems for the movement of grain. Even when the country is as a whole self-sufficient, many regions have to supplement their supplies from surplus areas. The latter are normally in the east and north (for rice) and in the north-west (for wheat). The deficit areas are such populous states as Assam (in the extreme north-east), Bihar (north-west of Calcutta) and Uttar Pradesh (east of Delhi). Particularly just after the harvest, a great deal of long-distance grain movement is taking place in India. Imports, when necessary, have to move considerable distances to reach some major centres of population. For example, Delhi is about 900 km from the sea at its nearest point and Nagpur, which lies in the centre of the country, is more than 600 km from the coast.

The **road** network is extensive, exceeding 1.6 m. km., of which over one third is surfaced. Trunk roads now join most major towns. Some rural areas are still poorly served, however, making difficult the marketing of surpluses and the distribution of necessary inputs such as seeds, fertilizers and pesticides. Although India has now a substantial production of petroleum, much still has to be imported, at great expense. This constraint will limit the possibilities of expanding road transport. Road maintenance is a problem.

Most interstate movement of grain is by **rail.** The system is extensive (over 60,000 route-km) but suffers from being divided almost equally between broad gauge and metre gauge. There are also several small networks of various narrow gauges. At one time efficient, the system has suffered from lack of investment.

There are about 16,200 km of navigable **waterways** in India mainly on the Ganges and Brahmaputra systems. Some grain traffic moves by inland waterway and some also by coastal shipping.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

If its people are to be adequately fed there will need to be a large increase in the volume of grain transported in India before the end of the century. The basic facilities - of roads, railways and ports, if imports are required - already exist, but increasing expenditure will be required on their maintenance. Provision for the bulk transportation of grain by rail and road would greatly facilitate its movement, and also reduce waste.

A great deal of investment is also required to provide adequate storage facilities, particularly in production areas.

INDONESIA

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	21.5	27.6	34.1	34.3
	coarse grains	2.9	3.9	3.2	4.0
	TOTAL	24.5	31.6	37.3	38.3
IMPORTS:	- wheat	0.8	1.3	1.5	1.6
	rice (milled)	1.1	1.7	0.3	1.2
	coarse grains	0.1	T	0.1	0.1
	TOTAL	2.0	3.0	1.9	2.8
	- of which, food aid	n.a.	n.a.	0.1	0.3
EXPORTS:	- TOTAL	0.1	T	T	T

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
120	151	159	212	2.3	1.7

GENERAL GRAIN SITUATION

Indonesia occupies a group of islands and parts of islands, some very large, situated on the equator. Much of the terrain is mountainous and inaccessible, and there are also extensive tidal swamps. The climate is generally hot and rainy throughout the year. The natural vegetation is predominantly dense forest, arable land representing only 10% of the total. Foodgrain production is centered on the island of Java, which is also exceptionally densely populated. Soils there are fertile and, where adequate irrigation can be provided, two, or even three, crops can be grown in a year.

Rice output has risen by about 50% over the last decade, to some 34 m. tons in 1983. This was achieved by increased floor prices, and government programmes to improve irrigation, subsidize fertilizers, and introduce improved seeds. The small number of farmers with larger land holdings have benefited from these schemes but most farmers work on small, non-viable holdings and their crop yields remain very low. Some maize* is produced in Indonesia (4 m. tons in 1983) but no wheat.

The country is one of the most populous in the world, with more than 160 m. people. But the numbers are very unevenly distributed, two thirds living on Java and the neighbouring small islands of Bali, Madura and Lombok, which have only 7% of the total land area. The rate of population growth averaged 2.3% a year in the 1970s: even though the rate is expected to decline, total numbers may well exceed 210 m. by the end of the century. The population is still predominantly rural, but urban growth is gathering pace. Some 35 m. people now live in the towns and cities and their numbers are increasing by 1.5 m. a year.

Diets are largely based on rice: its per capita consumption has in fact been increasing at the expense of maize. Wheat, which was consumed in negligible amounts before the mid-1960s, is now becoming an established food in the urban areas, but average consumption still amounts to only 10 kgs a year. The retail price of wheat has recently been increased to encourage consumption of rice, which is now in surplus following large crops. Although average food availabilities may now be adequate for the country as a whole, there is evidence of continued malnutrition in some rural areas.

At one time the world's largest rice importer, increasing production has enabled Indonesia to reduce its purchases from around 1.7 m. tons on average in the late 1970s (and over 2 m. tons in some years) to 0.3 m. tons in 1982. They rose again to over 1 m. tons in 1983 because of a poor crop, but declined to about 0.5 m. tons in 1984. Wheat imports, on the other hand, have risen to over 1.6 m. tons in 1983/84, when total grain imports reached nearly 3 m. tons.

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* Mostly yellow maize.

PORTS FOR GRAIN (see Appendix)

The country has nearly 50 major ports and numerous smaller ones. The principal ones for grain unloading are Belawan (Sumatra), Tanjung Priok, which serves the city of Jakarta in Java, Tanjung Perak (also Java) and, to a lesser extent, Kupang (Timor). The smaller islands are served by transhipment, parts of Sumatra being served via Singapore. Cargoes are usually bagged in holds and discharged at 1,000-1,500 tons a day: the maximum bulk discharge rate is 3,000 tons a day. Port storage facilities are limited.

GRAIN TRANSPORTATION

The main requirement for grain transportation is to supply the major cities (e.g. Jakarta, whose population in 1980 was 7.3 m.), and the smaller, scattered islands where production is insufficient for local needs.

The **road** network extends for 134,000 km, but most of it is unmetalled and, reportedly, in poor or bad condition. Many roads become impassable during the rainy season. The best system is in Java. A five-year development plan was begun in 1982 to construct and repair roads and bridges at an estimated cost of US$5 bn.

The **railway** system extends for nearly 7,000 km. The most comprehensive network is in Java but there are also lines in Sumatra. The system requires investment and modernization, as much of the track is in poor condition.

Inter-island **shipping** is poorly developed at present.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

While Indonesia, despite its very large population, is not far from self-sufficiency in rice, poorly developed communications pose considerable difficulties for the distribution of the crop and the development of new areas. Wheat, all of which has to be imported, is now an established part of urban diets. Heavy investment will be required in roads, railways and coastal shipping to enable domestic production to flow smoothly to market, and enable any necessary imports to be distributed efficiently. Additional bulk discharge equipment at the ports would facilitate the flow of imports.

IRAN

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	5,069	5,855	5,500	5,300
	rice (paddy)	1,369	1,362	1,400	1,400
	coarse grains	1,218	1,228	1,489	1,504
	TOTAL	7,656	8,445	8,389	8,204
IMPORTS:	- wheat	1,005	1,360	1,984	3,639
	rice (milled)	208	516	432	451
	coarse grains	323	1,046	1,341	1,505
	TOTAL	1,536	2,922	3,757	5,595
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	3	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
28.7	38.4	42.1	70	3.0	3.0

GENERAL GRAIN SITUATION

Iran consists of a large and mainly arid plateau, ringed by high mountain ranges. About 11% of the land area is under cultivation, mostly with grain. Yields are low in many areas because of unreliable water supplies and undercapitalization. The current development plan (1983/84-1987/88) gives priority to agriculture, with the aim to reduce dependence on imports. But production since 1981 has been affected by unfavourable weather and, no doubt, the repercussions of continuing conflict with Iraq.

Wheat is the staple food, per capita consumption levels being among the highest in the world*. Total consumption is still increasing mainly because of the high population growth rate (3% a year in the 1970s). There has also been an increase in rice consumption. The use of coarse grains, particularly barley, for animal feed has expanded rapidly. Grain imports have accordingly risen considerably, from an average of 1.5 m. tons in the early 1970s to reach 3.8 m. in 1982/83 and 5.6 m. in 1983/84. Imports may be lower in 1984/85, however, because of increased government procurement of wheat.

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* Over 150 kgs a year in terms of flour.

PORTS FOR GRAIN (see Appendix)

The main grain importing ports are Bandar Abbas (on the Strait of Hormuz), Bandar Emam and Boshehr (The Gulf), and Char Bahar (Gulf of Oman). Some of these ports have reportedly suffered war damage. Grain is also sometimes received at the northern (Caspian Sea) ports, and imported overland from Turkey.

Bandar Abbas (which handles most of the grain imports) and Bandar Emam can accommodate vessels of 30,000 tons or more, but the other ports are smaller. At Bandar Abbas grain is usually discharged into lorries using suckers and grabs. Discharge rates can reach 4,000 tons per vessel per day, but are often lower because insufficient lorries are available, especially during the harvest season. At the other ports discharge is usually in bags, using ship's gear. Improvements in the bulk handling and discharging systems are required. A silo which will unload vessels at 2,000 tons a day is under construction, and other silos are planned. There is, however, no general storage problem for grain in Iran. Total capacity at present is some 6.2 m. tons (of which 4.0 m. is on-farm). Future requirements will be met by planned increases of 1.1 m. tons in capacity.

Some grain has reportedly been transhipped in 2,000-5,000 ton barges from ports in the United Arab Emirates, where extensive bagging facilities exist.

GRAIN TRANSPORTATION

The population of Iran is mainly concentrated in the western half of the country. The capital, Tehran, is a large city (over 5 m. people in 1980), about 100 km south of the Caspian Sea. Most of the other towns and cities are also well inland, many being situated among high mountain ranges. The needs of these cities imply a considerable internal movement of grain, but this does not normally give rise to much difficulty except during the short harvest period when the limited capacity of the rural transportation system becomes apparent.

The **road** network extends for 85,000 km, of which 19,000 km has a bitumen surface and a further 36,000 km consists of gravel and crushed stones. Grain movement during the harvest (which is concentrated in a short period) stresses the limited capacity of the rural transport system, and improvements are required.

Some grain is also moved by **rail.** The system extends for 4,600 km and provides links with Turkey and other neighbouring countries. Most of the grain-importing ports in the south of the country do not, however, have any rail connections. Improvements are planned, including links to Bandar Abbas.

SUMMARY OF GRAIN HANLDING AND TRANSPORTATION PROBLEMS

Despite its economic difficulties and the continuing conflict with Iraq, Iran has been able to import large quantities of grain in recent years. A better flow of grain through the ports would, however, result from the installation, as planned, of improved bulk handling systems, more lorries, and the construction of rail links. Internal distribution will also benefit from planned improvements in road and rail transport.

IRAQ

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR	1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION: - wheat	1,384	1,100	1,000	1,000
rice (paddy)	143	213	163	200
coarse grains	635	728	938	797
TOTAL	2,162	2,041	2,101	1,997
IMPORTS: - wheat	552	1,678	1,960	2,960
rice (milled)	159	314	370	440
coarse grains	54	300	235	445
TOTAL	765	2,292	2,565	3,854
- of which, food aid	n.a.	n.a.	-	-
EXPORTS: - TOTAL	47	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
9.4	13.2	14.7	26	3.4	3.4

GENERAL GRAIN SITUATION

Agriculture is concentrated in the plains of central Iraq which can be irrigated from the Rivers Tigris and Euphrates. The rest of the country is mostly desert. The agricultural areas are poorly drained, and suffer from severe flooding. Salinity is a major problem.

The most important crops are barley and wheat. Attempts to encourage maize production in the 1970s to supply the rapidly expanding poultry industry have not been very successful so far. Total grain production averages about 2 m. tons but is variable. It has not increased since the early 1970s.

The population of Iraq grew at the extremely rapid rate of 3.4% a year in the 1970s, and no slowing down is expected before the end of the century. By then the population, which was 15 m. in 1983, may reach 26 m. There has also been a very strong trend towards urbanization: the urban population of Iraq grew from 2.9 m. in 1960 to 9.4 m. in 1980, and the capital, Baghdad, increased from 1.0 m. to 5.1 m. people during the same period. These factors have led to a very rapid growth in grain requirements, especially of wheat. Wheat consumption is high (over 110 kgs a year in terms of flour in the mid-1970s) and that of rice is increasing. Most of the barley is used for animal feed.

At one time self-sufficient in grain, Iraq has now become a major importer. Its purchases, mostly of wheat, increased from 0.8 m. tons in the mid-1970s to 2.6 m. in 1982/83 and nearly 3.9 m. in 1983/84.

The economy generally has been seriously affected by the conflict with Iran, which has inhibited export of petroleum and interrupted access to the main port of Basrah. While improved self-sufficiency in food supplies remains an important policy objective, it will require heavy investment in irrigation to bring more land into cultivation. As grain demand is likely to go on increasing at a rapid rate, imports may be expected to remain at a high level for some years to come.

PORTS FOR GRAIN

Iraq's principal port is Basrah, situated at the extreme south-east of the country, on the Shatt-al-Arab, the waterway between the confluence of the Rivers Tigris and Euphrates and the Gulf. Basrah was considerably expanded in the late 1970s after an upsurge in imports had caused serious congestion. Vessels of up to 20,000 tons can enter, and be discharged at up to 8,000 tons per day at a bulk loading installation equipped with mobile pneumatic ship unloaders. Larger vessels can discharge outside the port into lighters. The port has a 65,000 ton grain silo.

Since the outbreak of hostilities with Iran, Basrah, which is close to the war zone, has been difficult to operate and much of Iraq's grain imports have been brought by road through neighbouring countries (e.g. Jordan and Turkey). A large bulk carrier (95,000 tons) is berthed at Aqaba in Jordan to act as a storage and bagging station for Iraqi imports. It can receive grain at up to 12,000 tons per day and discharge onto the quayside at 5,000-6,000 tons per day.

New berths are under construction at Basrah, and the development of a grain import facility at Umm Qasr, a new port which lies 40 km south, on the border with Kuwait, is under consideration.

GRAIN TRANSPORTATION

Most towns and cities are situated on, or close to, the Rivers Tigris and Euphrates. Baghdad, the capital, is situated roughly in the middle of the country, 450 km from Basrah, 800 km from Iskanderun (Turkey), and over 1,000 km from Aqaba (all distances measured in a straight line). Servicing its considerable grain needs, therefore, involves very long hauls, especially when Basrah cannot be used.

Over 30% of the 20,800 km of **roads** are paved. Large investments were foreseen under the 1981-85 Plan, including several roads and expressways linking Iraq with Kuwait, Jordan, Syria and Turkey. The distances over which large quantities of grain have to be moved, e.g. from Aqaba, would suggest that a large fleet of lorries is required to keep the supplies moving. Difficulties on this account have, however, not been reported.

The **rail** network is relatively small (1,700 km) but includes important lines from Baghdad to Basrah, and also to Syria, where connections are made with the system in Turkey. Major expansions are planned (e.g. a line to Saudi Arabia) but execution is being delayed by the Gulf War.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The current situation is dominated by the Gulf War, which is putting enormous strains on the handling and transportation systems. In view of the expected high rate of population growth, and the difficulties in increasing agricultural output, grain import needs seem likely to remain high in the medium-term future, and may even increase further. Assuming, however, that the port of Basrah can ultimately be re-opened, and that a recovery in oil revenues enables planned improvements in the transport sector to be carried out, the country should be able to accommodate its future grain needs without serious difficulty.

ISRAEL

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	202	162	130	295
	rice (paddy)	-	-	-	-
	coarse grains	68	34	50	89
	TOTAL	270	196	180	384
IMPORTS:	- wheat	439	501	517	425
	rice (milled)	37	40	59	58
	coarse grains	963	1,145	984	1,011
	TOTAL	1,439	1,686	1,560	1,494
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	-	-	2	1

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
3.0	3.9	4.1	5	2.7	1.3

GENERAL GRAIN SITUATION

A small country of varied topography, parts of Israel are very fertile and, with irrigation, can be most productive. Much of the irrigated land is devoted to high-value crops, such as citrus fruit. Grain cultivation is intensive, with high inputs and the use of modern methods, but output falls far short of the country's requirements. Production (mainly consisting of wheat) is very variable. It reached a record 384,000 tons in 1983, more than double the 1982 crop.

Population growth, at one time extremely rapid, slowed to an average 2.7% a year in the 1970s, and is expected to decline further to the end of the century. Ninety per cent of the population are now classified as urban, the Tel Aviv conurbation (1.2 m. in 1980) alone accounting for one third of the total. Direct food use per capita of wheat is stable but there has been a large increase in requirements of grain and soyabeans for animal feed, as meat consumption has risen. Grain imports vary with the size of the domestic crop, but have been tending to rise. They stood at about 1.5 m. tons (including 0.4 m. tons of wheat and 1.0 m. tons of coarse grains) in 1983/84.

PORTS FOR GRAIN (see Appendix)

Most grain is imported through the port of Haifa in the north of the country, but some enters through Ashdod, which is south of Tel Aviv. Haifa is a deep-water port (over 12 metres): at Ashdod the draught is 11 metres. Cargo sizes vary between 20,000 and as much as 55,000 tons. All grain is discharged in bulk. Suckers are used to load the grain into elevators, and grabs are used when lorries are to be loaded directly. Discharge rates are 10,000 and 5,000 tons a day, respectively. There is sometimes congestion at the ports, and shortages of railway waggons and lorries can be a problem, especially at harvest time.

GRAIN TRANSPORTATION

Israel is a small country, and most of its principal towns are only a short distance from the ports. The distribution of grain supplies (which are moved both by road and rail) does not, therefore, cause any major logistical difficulties.

The **road** system in Israel is well-developed with nearly 12,000 km paved. There are insufficient lorries.

Although the **railway** network is not extensive (less than 900 km in total), most principal towns are linked with Ashdod or Haifa. A line is being constructed to serve Eilat, on the Gulf of Aqaba. There is a shortage of railway waggons.

SUMMARY OF GRAIN HANLDING AND TRANSPORTATION PROBLEMS

Congestion sometimes arises at the ports, esepcially at harvest time, because there are too few lorries and waggons. Distribution would also be facilitated by the proposed extension of the railway system.

JORDAN

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	119	68	19	50
	rice (paddy)	-	-	-	-
	coarse grains	21	22	23	57
	TOTAL	140	90	42	107
IMPORTS:	- wheat	157	252	325	324
	rice (milled)	22	33	46	36
	coarse grains	43	145	221	188
	TOTAL	222	430	592	548
	- of which, food aid	n.a.	n.a.	18	19
EXPORTS:	- TOTAL	4	39	72	1

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.3	2.9	3.3	6	2.4	3.7

GENERAL GRAIN SITUATION

Only 6% of the total land area is cultivated. Most of the country is very arid, supporting only the migratory herding of animals. Grain can, however, be grown on some of the uplands, where rainfall is more abundant, and there have recently been steps to provide irrigation and cultivate high-value crops in the otherwise barren valley of the River Jordan. Soil erosion is a problem, being countered by terracing, and afforestation of bare slopes.

Grain production regularly suffers from drought but in good years can exceed 150,000 tons. But the total in 1982 was only 42,000 tons. The main crop is wheat, but some barley is also grown.

Wheat consumption levels are high (about 115 kgs per capita) and stable. Some grain (mainly imported maize and barley) is used for animal feed. Population growth, 2.4% on average in the 1970s, is expected to accelerate towards the end of the century, when total numbers may reach 6 m. compared with 3.3 m. in 1983. The largest city is Amman (about 660,000 in 1980).

Grain imports by Jordan (mainly wheat and maize) have increased rapidly. From just over 200,000 tons on average in the early 1970s they reached almost 600,000 tons in 1982/83, and were only slightly lower in 1983/84. Jordan also re-exports certain amounts of grain to neighbouring countries (e.g. Iraq). In view of the difficulties in raising domestic production, further increases in imports may be expected.

PORTS FOR GRAIN (see Appendix)

The country has only one port (Aqaba), on the Gulf of Aqaba, an arm of the Red Sea. It handles all of the grain imported by Jordan and also some of the imports of Iraq. Large investments have been made in recent years to expand the capacity of Aqaba which can now accommodate 25,000 ton vessels. Handling of food supplies, which are accorded priority for berthing, is usually speedy. Bulk discharge (at 5,000 tons a day) is by suckers onto belt conveyors which carry the grain to elevators outside the port area. There are also facilities for unloading bagged cargo. Unloading capacity is regarded as insufficient, and an additional ship unloader will be required to accommodate likely future increases in imports. Grain storage is not a problem: Aqaba can accommodate 150,000 tons in silos, and the overall capacity in Jordan is put at 400,000 tons.

GRAIN TRANSPORTATION

The capital, Amman, and most of the other large towns lie in the north of the country, around 300 km from Aqaba. The one main road out of Aqaba thus carries a considerable volume of traffic, although serious congestion has not been reported.

About three quarters of the 6,300 km of **roads** in Jordan are paved. There is a good link from Amman to Damascus (in Syria), and main roads also link the country with Iraq and Saudi Arabia. Wheat is moved in bulk and animal feed in bags.

One **railway** line traverses the country from north to south, although the southern section which continues to Medina in Saudi Arabia is not in operation. There are plans to upgrade the whole length from Damascus to Medina. If a link with Aqaba were also constructed, bulk transportation of grain would be greatly facilitated.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Further expansion of the port of Aqaba, including the provision of an additional ship unloader, will be needed if grain imports continue to increase, and extension of the railway network would greatly facilitate grain distribution.

LEBANON

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	56	42	25	20
	rice (paddy)	-	-	-	-
	coarse grains	11	11	8	8
	TOTAL	67	53	33	28
IMPORTS:	- wheat	317	373	284	361
	rice (milled)	34	21	30	22
	coarse grains	161	283	135	188
	TOTAL	512	677	449	561
	- of which, food aid	n.a.	n.a.	37	14
EXPORTS:	- TOTAL	9	94	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
2.5	2.7	2.6	3	0.1	1.3

GENERAL GRAIN SITUATION

Unlike most countries in the region, Lebanon, which is small and mountainous, has abundant water resources, with many rivers and streams. About a quarter of the area is cultivated, and a further 17% is considered cultivable. The main cereal-growing district is the fertile Bek'aa valley, which lies inland, parallel with the coast. The principal crop is wheat. Civil strife has dislocated agricultural production, and grain output, which averaged nearly 70,000 tons in the early 1970s, fell to only 28,000 tons in 1983.

The population is believed to have fallen sharply due to the civil war but demand for wheat, the staple food, continues at a high level. Coarse grains (particularly maize) are used for animal feed.

Grain imports are variable, but in recent years have averaged 500,000 tons, including about 350,000 tons of wheat.

PORTS FOR GRAIN (see Appendix)

The principal port of discharge is Beirut. This has, however, been subject to severe disruption and occasional closure during the civil war. Grain can also be landed at Tripoli, further north, and at Sidon in the south. Some grain is imported overland from Syria.

The usual cargo size at Beirut is 25,000 tons but larger vessels can be accommodated. Grain is discharged at 7,000 tons a day by pneumatic unloaders into a silo which serves both the requirements of Beirut and as a transhipment facility. An extra gantry discharge would facilitate unloading. At Tripoli, where the harbour is shallower, discharge is by lighters. Although there is sufficient storage capacity in Beirut, more elevators are required inland.

GRAIN TRANSPORTATION

Although mountainous, the country is small and the towns and cities where grain is needed are mainly situated on or near the coast. In normal times grain transportation therefore poses few problems, but there have been considerable disruptions during the period of civil war.

Most grain in the Lebanon is transported by **road.** The network extends for some 7,300 km, of which over 80% is paved. Considering the mountainous terrain, the country is generally well served. Civil disorder has, however, made road transport difficult in some areas.

The **rail** system extends for under 400 km. One line runs the length of the coast, and another links Beirut with Damascus in Syria.

Coastal shipping has increasingly been used to transport grain since civil disturbances have made land routes hazardous.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Until the onset of civil strife in the mid-1970s, Lebanon was able to handle its grain imports without much difficulty. The extent to which the ports and lines of communication have been damaged in recent years cannot easily be assessed, but undoubtedly much reconstruction will be required once peace is restored.

MALAYSIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	1,969	1,978	1,832	2,000
	coarse grains	25	17	9	9
	TOTAL	1,994	1,995	1,841	2,009
IMPORTS:	- wheat	372	477	464	545
	rice (milled)	259	284	403	385
	coarse grains	265	511	776	849
	TOTAL	896	1,272	1,643	1,779
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	33	14	167	16

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
10.4	13.9	14.9	21	2.9	2.1

GENERAL GRAIN SITUATION

Malaysia comprises three territories: peninsular Malaysia, which forms the southern tip of the mainland of Asia; and Sabah and Sarawak, both in the north of the island of Borneo. The terrain is generally hilly, with higher mountains in places, and the climate is equatorial with very heavy rainfall. Most of the land is covered in tropical rain forest, arable land (mostly in the peninsular) amounting to 13% of the total area.

The principal subsistence crop is rice. Despite much government expenditure on fertilizers, the planting of higher-yielding varieties, and improvements in irrigation, output has only advanced slowly in recent years, and Malaysia is still some way short of its target of self-sufficiency. There is still widespread poverty among small farmers who have not benefited from these improvements. Rice output (in terms of paddy) reached 2 m. tons in 1983: there was no production of wheat and very little of other grains.

Most of the country's population of about 15 m. lives on the coastal strips of peninsular Malaysia: Sabah and Sarawak are sparsely inhabited. Population growth averaged 2.8% in the 1960s and 2.9% in the 1970s: the World Bank projects it to average 2.1% to the end of the century, when the total would be about 21 m. Urbanization has not proceeded very far as yet - only 30% of the population were urban in 1982, but the population of the capital, Kuala Lumpur, is now over 1 m., and growing rapidly.

Consumption of rice has tended to outpace domestic output, and wheat consumption is also steadily increasing. Exports of minerals and petroleum have made parts of the country reasonably prosperous, and meat, in the form of poultry, represents a significant part of local diets. This in turn has resulted in an increasing requirement for imported coarse grains, mainly maize. Total grain imports in 1983/84 reached about 1.8 m. tons, having doubled in a decade.

PORTS FOR GRAIN (see Appendix)

The principal ports for grain are Penang, Port Kelang and Lumut, on the western coast of the Malaysian peninsula. Port Kelang serves Kuala Lumpur which lies 50 km inland, and there is a flour mill at Lumut. The port of Sarawak is Kuching, while Labuan serves western Sabah. These ports (except Kuching) can accommodate vessels drawing at least 9 metres. Discharge is generally by suckers or ship's gear.

GRAIN TRANSPORTATION

About 80% of the population of Malaysia live in the peninsular, where there are several ports and transport systems are reasonably good. Most of the towns in Sarawak and Sabah are near the coast, the interiors of those territories being sparsely populated. Distribution of wheat and rice does not appear to pose any very great problems.

The total **road** network is over 37,000m km, mainly in peninsular Malaysia, where there is a reasonably comprehensive main road system. There are few good roads in Sabah or Sarawak.

The **rail** system, almost entirely in peninsular Malaysia, comprises nearly 2,400 km of track. There are links to Thailand and Singapore.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Malaysia seems likely to import grains on an increasing scale. Improvements are being carried out in the ports, but transportation, especially in Sabah and Sarawak, remains a more intractable difficulty.

PAKISTAN

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	7.6	9.9	12.4	10.9
	rice (paddy)	3.7	4.8	5.2	5.2
	coarse grains	1.5	1.5	1.7	1.7
	TOTAL	12.8	16.3	19.3	17.8
IMPORTS:	- wheat	1.1	0.9	0.4	0.4
	rice (milled)	T	-	-	-
	coarse grains	T	T	-	-
	TOTAL	1.1	0.9	0.4	0.4
	- of which, food aid	n.a.	n.a.	0.3	0.4
EXPORTS:	- TOTAL	0.6	1.0	1.0	1.0

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
61	82	90	140	3.1	2.7

GENERAL GRAIN SITUATION

Pakistan is a large country consisting of extensive areas of mountains and high plains, as well as the wide and low-lying valley of the Indus and its tributaries. Most of the country is hot and arid, and very little agricultural production would be possible without irrigation. Soils near the main rivers are naturally fertile, but have suffered in many places from increased salinity as a result of irrigation. In upland areas, overgrazing and the removal of forest cover have led to severe run-off in the monsoon season. This, in turn, causes flooding, erosion, and the silting up of irrigation systems. The government is giving high priority to reafforestation to contain these problems.

The main food crop is wheat. The use of high-response wheat varieties, and increased applications of fertilizers, enabled output to soar from only about 4 m. tons in the mid-1960s to over 12 m. tons in 1983. Rice production has also increased, although less rapidly, partly due to extensions in irrigated areas following the opening of the huge Tarbela dam. The effective life of the dam may, however, be shortened by severe silting.

The population of Pakistan (90 m. in 1983) has been growing at a rapid 3% a year. It is projected by the World Bank to reach 140 m. by the year 2000. Numbers have recently been increased by an influx of refugees from Afghanistan: it is estimated that some 3 m. of them are now living in Pakistan. Per capita consumption of both wheat and rice has increased, partly at the expense of maize. Little meat is eaten and there is a correspondingly small use of grain for animal feed. Large numbers of people still suffer from undernutrition and malnutrition.

Rice is an important export crop, and quantities sold have averaged about 1 m. tons in recent years. Wheat imports have fallen since the surge in production, and the country has been a net exporter in some recent seasons. In 1983/84 it imported 360,000 tons of wheat (as food aid for Afghan refugees) and exported about 200,000 tons of wheat. Exports in the next few years may be limited, because surpluses are to be used to build up the national wheat reserve. But regular imports are not expected, either.

PORTS FOR GRAIN (see Appendix)

Pakistan has a short sea coast and most of this is desolate and inaccessible. Karachi is the only large port, situated near the mouth of the Indus. The port can normally accommodate vessels drawing up to 9.8 metres, but entry may not be possible to them under certain tide conditions. Usual cargo sizes are 20-25,000 tons. Wheat is discharged in bulk using vacuvators at about 4,500 tons a day. Bagged cargoes (e.g. pulses) are unloaded by electric shore cranes. Grains are discharged onto the quayside for bagging and subsequent removal in railway waggons and lorries. A new port (Muhammad bin Quasim), situated 60 km east of Karachi, will have 12 berths and bulk grain handling facilities, and cater for ships with a maximum draught of 14 metres (i.e. up to 75,000 tons dwt.).

GRAIN TRANSPORTATION

The crop areas in Pakistan are generally quite close to the main centres of population, and the marketing of the domestic crop does not therefore involve long distances. Import of grains is another matter, however, as the country's single port, Karachi, is about 1,000 km away from the populous north-east of the country. The corridor between them is, however, quite well served both by road and by rail. Grain supplies to Afghan refugees move by rail from Karachi to Peshawar and Quetta.

The **road** network extends for over 97,000 km. There are main roads along both sides of the Indus, and an extensive network in the populous northern plains. Many parts of the country (e.g. the south-west) are still not well served. Grain transport costs are very high.

The **railway** system extends for 12,600 km (of track). Lines link Lahore with Karachi and other main towns. More locomotives and waggons are needed to ensure a smooth flow of grain supplies.

The Indus River system is not much used for **water-borne** freight traffic because of the many barrages and dams at various points along its length.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The amount of wheat imported by Pakistan has been comparatively small in recent years, and is not expected to increase, although there is a constant flow of supplies to Afghan refugees in the north-west of the country. The country may have substantial export surpluses of grain in some years. The new port facilities being constructed at Muhammad bin Quasim, enabling large vessels to berth, will help relieve the limitations at Karachi. The distance of the sea coast from the main areas of consumption puts a stress on road and rail connections which may not be well adapted for the movement of grain in bulk (transport at present is in the form of bagged grain).

Pakistan has suffered from a severe shortage of storage capacity. Projects assisted by the World Bank and the Asian Development Bank are resulting in major increases in godown (warehouse) capacity, but a shortfall of over 1 m. tons would remain at the end of the 6th Plan Period in 1987-88. The Government of Pakistan is exploring the possibilities of obtaining assistance to construct further godowns to fill that gap.

PHILIPPINES

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	5.8	7.5	7.7	8.2
	coarse grains	2.4	3.1	3.1	3.4
	TOTAL	8.2	10.6	10.9	11.5
IMPORTS:	- wheat	0.6	0.8	0.9	0.7
	rice (milled)	0.2	T	-	-
	coarse grains	0.1	0.2	0.3	0.5
	TOTAL	1.0	1.0	1.2	1.3
	- of which, food aid	n.a.	n.a.	T	T
EXPORTS:	- TOTAL	T	0.1	-	T

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
36.9	48.1	52.1	73	2.7	2.1

GENERAL GRAIN SITUATION

The country consists of numerous groups of mountainous islands spread over a wide area. One of the few extensive lowland areas is in the neighbourhood of Manila, the capital, on the northern island of Luzon. While rainfall is generally quite high, there are both regional and seasonal variations, and in some sheltered valleys natural water supplies are insufficient for crops. About one third of the land area is arable, much of this being devoted to rice, the main food crop. The climate is suitable for the cultivation of white maize, but no wheat is grown.

The government pursues its policy of food grain self-sufficiency by subsidizing fertilizers, and providing credit for the purchase of better seed varieties and pesticides. These measures have succeeded in raising rice output from below 6 m. tons in the mid-1970s to over 8 m. tons in 1983, although average yields are still low as many farmers cannot afford to irrigate their crops properly. Attention has now been given to increasing maize production: this rose to 3.4 m. tons in 1983, compared with about 2.4 m. in the mid-1970s.

The population of the Philippines, now 52 m., increased at an average 2.7% a year in the 1970s. Growth is expected to slow to about 2% a year for the rest of the century, but the total may still reach 73 m. in the year 2000. About 40% of the population is regarded as urban. The biggest city, by far, is Manila, whose numbers rose from 2.3 m. in 1960 to nearly 6 m. in 1980 and could double again by the year 2000.

The staple food for most people is rice, but wheat is increasingly becoming an important component of diets, especially in urban areas. Essential food items such as rice and wheat flour are subsidized. While nutritional standards are improving there is still malnutrition among the poorest people. Despite the measures to promote self-sufficiency, total cereal imports have been gradually increasing, from about 1 m. tons in the mid-1970s to almost 1.3 m. in 1983/84. Most of this is wheat, but substantial amounts of maize are also imported for animal feed.

PORTS FOR GRAIN (see Appendix)

Manila, on the island of Luzon, is the principal port for grain imports, handling about three quarters of the total. Significant quantities are also landed at Illigan (Mindanao), Cebu (Cebu) and Hondagua (Luzon). Grain is usually discharged in bulk, using grabs, suckers and clamshells. At most ports, discharge is direct into silo but at Manila barges and lighters have to be used. Conditions there are very difficult. Rough seas may cause spillage of up to 4% of the cargo during unloading; there are too few barges, insufficient berths, too few grabs and vacuvators, and a general shortage of storage facilities. It has been reported that grain discharge rates at Manila average only 1,000 tons a day, and that vessels of 20,000 tons (the normal cargo size) have to remain in port for 20-30 days.

A study carried out for the Asian Development Bank suggested that very large savings in freight costs could be made by importing grain in 60,000 ton vessels and using a floating pneumatic elevator to load to barges or, better still, constructing a shore-based grain terminal.

GRAIN TRANSPORTATION

Most of the towns and cities in the Philippines are either on the coast, or within easy reach of it. Their grain supplies can therefore be satisfied by direct import, as in the case of Manila, or coastal shipping, without involving a great deal of movement overland.

There is a comparatively good **road** network on the larger islands, but only about one fifth of the total 154,000 km is surfaced.

The **railway** system is small. Excluding industrial lines it amounts only to about 800 km, all on the island of Luzon. It is believed that more extensive use of the railways would save energy, and new investment is taking place.

Grain is also conveyed between the islands by **coastal shipping.**

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

The Philippines seems likely to remain a grain importing country for many years to come. Conditions at the principal unloading port (Manila) urgently need improving, as the method by which grain is discharged into barges is costly, wasteful and inefficient. Storage capacity in the Philippines amounts to 4.4 m. tons, but some of the private warehouses are inadequate, and grain stored there suffers losses due to rodents and pests. Transport systems need further investment, especially to cope with bulk grain transportation.

REPUBLIC OF KOREA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	119	54	115	21
	rice (paddy)	6,253	7,395	7,308	7,608
	coarse grains	1,894	1,219	900	933
	TOTAL	8,266	8,668	8,323	8,562
IMPORTS:	- wheat	1,678	1,856	1,804	2,463
	rice (milled)	435	759	310	200
	coarse grains	953	2,392	3,245	4,300
	TOTAL	3,066	5,007	5,359	6,963
	- of which, food aid	n.a.	n.a.	53	-
EXPORTS:	- TOTAL	1	16	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
32.2	38.1	40.0	51	1.7	1.5

GENERAL GRAIN SITUATION

Most of the Republic of Korea consists of rugged uplands, and the climate, except near the coast, is harsh in winter. The natural vegetation is forest, but in places excessive felling has allowed the cover to degenerate to scrub. Rice, the principal crop, occupies about one quarter of the arable land. Holdings are typically small and unsuited to mechanization, but output has been stimulated by subsidies. Production reached 7.6 m. tons in 1983, compared with 6.3 m. tons on average in the mid-1970s. Other grain crops are barley (output of which has been declining), and small amounts of maize and wheat. In order to improve grain self-sufficiency, the government is undertaking flood control and land reclamation projects under its development plans.

The population of 40 m. is growing at about 1.6% a year, but urban growth is as high as 5%. Only 28% of the population was classified as urban in 1960 but by 1982 the proportion had risen to 62%. Seoul, the capital, grew from 2.4 m. to over 9 m. in that period. More than 3 m. people now live in the second city, Pusan, and there are four other cities with more than 500,000 inhabitants. As a result of these trends there has been significant depopulation in some rural areas.

The country's rapid industrial growth has brought with it considerable advances in living standards, and a shift in diets towards wheat and meat, although rice consumption remains high. Some of the wheat is eaten in the form of noodles. Imports of wheat and, especially, feedgrains (including feed wheat in some years) have soared, while those of rice have tended to decline. In the mid-1970s the Republic of Korea imported, on average, 3.1 m. tons of grain (including 1.7 m. tons of wheat) but by 1983/84 the totals were 7.0 m. and 2.5 m. tons respectively.

PORTS FOR GRAIN (see Appendix)

The principal grain discharging ports are Pusan, at the south-east corner of the country, and Inchon (which serves Seoul) on the west coast. The capacity of both ports has been massively expanded in recent years and is expected to grow further.

Pusan has a bulk grain handling facility with a capacity of 2 m. tons a year. Up to 83,000 tons of bulk grain can be stored in silos, unloading being by a conveyor belt system rated at 400 tons an hour. Current rates of discharge are about 4,000 tons a day. Inchon can accommodate two 50,000 ton vessels simultaneously, and unload them pneumatically at 400 tons/hour each.

GRAIN TRANSPORTATION

Most of the large towns and cities are situated in the western and southern parts of the country, usually only a short distance from the coast. They have good road and rail links with the main ports. Most goods are carried by **road.** The network extends for 54,000 km, of which one third is paved. Good roads now link all the main population centres.

Priority is being given to the development of **railways** because of the expense of imported petroleum. The system extends for over 6,000 km and serves most of the main cities.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Although imports of grain have increased considerably in recent years, the port, transport and storage systems of the Republic of Korea have been greatly expanded. There are currently few logistical problems affecting the movement of grain. But further modernization may be required if imports continue to grow.

SAUDI ARABIA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	145	145	362	606
	rice (paddy)	2	1	-	-
	coarse grains	261	156	103	110
	TOTAL	408	302	465	716
IMPORTS:	- wheat	453	858	847	311
	rice (milled)	191	358	471	400
	coarse grains	84	1,261	4,806	2,333
	TOTAL	728	2,477	6,124	3,044
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	1	9	13	6

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
5.8	9.2	10.4	19	4.8	3.7

GENERAL GRAIN SITUATION

A large country (about 2.2 m. square km), Saudi Arabia consists largely of desert. Agriculture was traditionally based on nomadic grazing, crop production being possible only at a few oases. But oil wealth has enabled the country to develop extensive irrigation systems and introduce advanced agricultural techniques. The aims are to reduce dependence on imported food, diversify the economy, raise rural living standards, and thus prevent an undesirable drift to the towns. Wheat production, negligible before the 1970s, exceeded 600,000 tons in 1983 and soared to 1.3 m. tons - more than the country's requirements - in 1984. Now that self-sufficiency in wheat has been attained, the very high support prices have been reduced to some extent, and attention is to be paid to other crops, particularly feed crops.

The rapid economic advance, and extremely fast population growth* (boosted by an influx of foreign workers) has tripled grain consumption in a decade. The largest increase has been in feedgrains, especially barley, of which Saudi Arabia has been by far the world's largest importer. Some 350,000 tons of poultry is consumed in Saudi Arabia annually: chicken feed is subsidized by 50%. Some of the grain imports were used to create large reserves, and after peaking at some 6 m. tons in 1982/83, total grain purchases were much lower in the following year. The current estimate for 1984/85 is 4.5 m. tons.

PORTS FOR GRAIN (see Appendix)

Most grain is imported through two ports: Jeddah on the Red Sea, and Damman on the Arabian Gulf. Until recently, discharge was in bags, which were often left in the port area for long periods prior to being moved by truck. After extensive modernization, Jeddah now has a 150,000 ton capacity grain silo complex with milling and feed mill units. Suckers have now been installed for the bulk discharge of wheat, but barley is still imported in bags, for the convenience of onward transportation. Ships of up to 40,000 tons may berth, and discharge grain using pneumatic equipment with a total rating of 8,000 tons a day. At Damman there is an automatic bagging facility and many mobile pneumatic grain dischargers. Despite the very large volume of imports of grain in recent years, no undue difficulties have been encountered, and it is not considered that further improvements in grain discharging will be necessary.

GRAIN TRANSPORTATION

Much of the country is virtually uninhabited. The population is concentrated in the area surrounding Riyadh, and to the north-west of that city: and either side of the highlands which are parallel to the Red Sea coast. These areas are conveniently served by, respectively, Dammam and Jeddah, and inland transportation of grain poses few problems apart from a shortage of lorries.

A large **road** building programme has been undertaken, and the network now exceeds 64,000 km. Metalled roads link most of the main cities and the ports, and more roads are being built to open up remote areas of the country. Most grain moves by road. The rapid increase in production has caused serious delays as lorries wait to deliver the grain at the silos. It is planned to use more large grain lorries and to increase storage capacity (now 1.3 m. tons) to 1.5 m. tons.

The main **railway** line connects Damman with Riyadh, and is used for the transport of grain. Other lines are under construction.

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* It averaged 4.8% a year in the 1970s, and is projected at 3.7% a year up to the end of the century, when the country's population may reach 19 m. compared with 10 m. in 1983.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

As a result of extensive port expansion and modernization, Saudi Arabia has encountered few problems in dealing with the very large increases in grain production and imports. Further improvements in hand in the road and railway systems, and the introduction of larger lorries, should enable it to cope with traffic requirements in future years. The occasional problems that have arisen with respect to grain storage should be solved when the planned increase in capacity to 1.5 m. tons is completed.

SRI LANKA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	1,327	1,969	2,156	2,200
	coarse grains	47	41	38	40
	TOTAL	1,374	2,010	2,194	2,240
IMPORTS:	- wheat	670	681	519	667
	rice (milled)	356	252	112	177
	coarse grains	2	1	2	-
	TOTAL	1,028	934	633	844
	- of which, food aid	n.a.	n.a.	83	362
EXPORTS:	- TOTAL	1	3	1	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
12.5	14.8	15.4	21	1.7	1.8

GENERAL GRAIN SITUATION

While there is high ground in the centre of Sri Lanka, the greater part of the island consists of low-lying plains. The climate is generally hot and wet, although there is a marked dry season in the north and east. Soils are not naturally very fertile, but there are plenty of rivers and streams to provide irrigation water.

Nearly one third of the land area is cultivated. The main food crop is rice, which occupies one third of all irrigated land. Most of the holdings are extremely small, but the introduction of improved varieties and major irrigation projects have enabled production to grow rapidly: from an average of 1.3 m. tons in the mid-1970s it had reached 2.2 m. tons in 1983. A small amount of coarse grains are grown but no wheat. The agricultural economy has been adversely affected in recent years by high prices for imported fuel and fertilizers.

Population growth in Sri Lanka has been moderate compared with many other developing countries - 1.7% on average in the 1970s - and by far the greatest part of the population is still rural. The principal town, Colombo, has a population of about 600,000. There was a considerable expansion in the consumption of wheat in the 1960s and early 1970s, mainly at the expense of rice, but wheat consumption levels now appear to have stabilized following changes in the public distribution system. A food stamp system has replaced the former free rations of rice and wheat. Very little meat is eaten in Sri Lanka, and virtually no grain is used for animal feed.

Grain imports averaged over 1 m. tons in the mid-1970s but have since declined, owing to the improved production of rice. Imports in 1983/84 amounted to 844,000 tons, including 667,000 tons of wheat.

PORTS FOR GRAIN (see Appendix)

The main ports are Colombo (which is also the capital) and Trincomalee. At Colombo, where there are a number of deep-water berths, one quay is equipped with a pneumatic installation for bulk discharge of wheat with a working capacity of 100-200 tons per hour (2,000 tons a day). The grain is taken by elevator belt conveyor to a flour mill at the end of the quay. Trincomalee, where there is also a flour mill, can accommodate one vessel of 40,000 tons dwt alongside the jetty.

GRAIN TRANSPORTATION

Most of the imported grain is used in Colombo, and communications between other towns and the ports are generally good.

The total **road** network extends for over 152,400 km: this includes over 27,000 km of main roads. Urban centres are connected by good, all-weather roads but more roads are needed in rural areas. Construction has been slowed because of a foreign exchange shortage.

Railways are of relatively minor importance. The system extends for little over 1,500 km (of track).

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Neither grain handling at the ports nor internal distribution appear to cause great problems for Sri Lanka at present, although if import volumes were for any reason to increase, improved facilities might be required at Colombo.

SYRIAN ARAB REPUBLIC

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	1,474	1,700	1,544	1,612
	rice (paddy)	2	-	-	-
	coarse grains	669	959	728	1,135
	TOTAL	2,145	2,659	2,272	2,747
IMPORTS:	- wheat	242	473	670	530
	rice (milled)	61	79	58	150
	coarse grains	16	156	333	95
	TOTAL	319	708	1,061	775
	- of which, food aid	n.a.	n.a.	21	17
EXPORTS:	- TOTAL	105	56	566	60

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
6.3	9.0	9.6	17	3.7	3.2

GENERAL GRAIN SITUATION

Nearly half of the Syrian Arab Republic is arable land, but, except in the short Mediterranean coastal strip where rainfall is relatively abundant, crops require irrigation to produce reliable yields. Extensive irrigation programmes, now in hand, should both reduce the extreme fluctuations characteristic of the country's grain output, and also increase production. The most important grain crop is wheat, whose output averages 1.5 m. tons a year. Barley is also extensively grown.

The country has a high population growth rate (3.7% in the 1970s) and a thriving economy, based on petroleum, textiles and mining. Nearly half of the population is now urban, the largest cities (Damascus and Aleppo) having more than doubled in size over the last 20 years to 1.4 m. and 0.9 m. people respectively. Bread made from wheat, and barley, rice and bulgur wheat are the staple foods. Grain consumption has increased rapidly, requiring increased imports both of wheat and feedgrains. Total grain imports, which averaged 0.3 m. tons in the early 1970s, exceeded 1 m. tons in 1982/83, but were lower in 1983/84 following a good crop. Import growth is at present restricted by a shortage of foreign exchange. In the long run, however, grain needs may further outpace production.

PORTS FOR GRAIN (see Appendix)

Grain is landed at Lattakia or Tartous. Both ports are being developed. At Lattakia there is a silo of 45,000 tons capacity, and further storage space in open sheds. Bagged cargoes are landed at 750 tons/day, and bulk cargoes at 3,000 tons per day using mobile ship unloaders. Tartous now has a 100,000 ton harbour silo, bulk pneumatic unloaders (total discharge: 600 tons/hour), and a facility for transhipment into coastal vessels. A network of bulk storage silos has been established throughout the country, serviced by road or rail.

GRAIN TRANSPORTATION

Damascus is about 230 km (by road) from Tartous, the nearest Syrian port, while Aleppo, the other large town, is 150 km from Lattakia. A substantial amount of bulk grain movement is therefore required to supply urban needs, although there are no reports of any great difficulties in doing so. Both road and rail are used for grain movement, some being in bulk, and some in bags.

About two thirds of the **road** network (about 20,000 km) is surfaced, and good roads link the main centres of population in the west. Further development, especially in the east of the country, is planned.

The **railway** is being extended and now totals almost 2,000 km (mostly standard gauge). Lattakia is served by rail, and some imported grain moves this way. A line connecting Tartous with the rest of the system is under construction.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Increased grain imports are putting pressure on the port facilities at Lattakia and Tartous and the roads and railways which link them with the centres of population inland. Improvements in hand to both roads and railways should enable the country to cope with any future increases.

TURKEY

GRAIN PRODUCTION AND TRADE

Million metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	12.9	16.9	17.5	16.4
	rice (paddy)	0.2	0.3	0.4	0.3
	coarse grains	6.4	7.6	8.7	7.9
	TOTAL	19.6	24.8	26.5	24.6
IMPORTS:	- wheat	0.3	0.2	-	0.5
	rice (milled)	T	T	T	T
	coarse grains	T	-	T	0.1
	TOTAL	0.4	0.2	T	0.6
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	0.2	1.0	1.0	1.4

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
35.3	44.9	47.3	65	2.4	1.9

GENERAL GRAIN SITUATION

Geography and climate divide Turkey into two distinct agricultural zones: the coastal strip, which is fertile and relatively well watered, especially in the west, and the high Anatolian plateau, surrounded by mountain ranges, which is dry, suffers severe winters and has generally poor soils. About 60% of the cultivated land is devoted to cereals, three quarters of it wheat. Most is grown on the high plains, but variable rainfall makes production there uncertain. Some grain, especially maize, is grown in the coastal areas, although most cultivated land there is devoted to higher-value crops. The country is usually self-sufficient in foodstuffs, but drought can severely reduce production in certain years.

Grain production increased rapidly in the 1950s and 1960s when much pastureland was ploughed up, and grew further in the 1970s due to the extension of irrigation, use of higher-yielding varieties, and increased application of fertilizers. Unfavourable price relationships between wheat and fertilizers have, however, latterly induced farmers to use less.

Per capita grain consumption in Turkey is among the highest in the world. In 1980, for example, food use of wheat amounted to 228 kgs per capita. Substantial (and increasing) amounts of wheat, barley and maize are also used for animal feed. The country's population is now growing at around 2% a year, less rapidly than in the past but still adding a million people each year.

At times, Turkey has been a net exporter of wheat and barley, and at other times a net grain importer on a considerable scale. In 1983/84 imports reached about 1 m. tons, but 1.4 m. tons was exported. When imports are made, they are not spread evenly through the year, but are concentrated in the pre-harvest period (March-June), so that the pressure on the ports can be considerable. Bearing in mind the population growth and the inherent variability of grains production, it cannot be ruled out that large imports will be needed in some future years.

It was decided in 1967 to establish a large national wheat reserve to help the Soil Products Office (TMO) exercise effective market control. The reserve did not reach the level intended, but has contributed to food security in years of short crops. The main problem for Turkey in the 1970s and early 1980s was, however, how to export or store its surplus production.

PORTS FOR GRAIN (see Appendix)

Grain is handled at a number of ports, the main ones for imports being Istanbul, Iskenderun, Mersin and Izmir. Exports and transit traffic for other countries, such as Iran and Iraq, are handled at Iskenderun, Mersin and Samsun. Some grain is exported overland via Syria and Iraq, but no imports are made that way.

The ports named can handle vessels drawing about 9 metres, and up to 40,000 tons dwt. Daily rates of discharge at the larger ports are generally about 2,000-2,500 tons a day, but at Samsun and Trabazon only 1,000-1,500 tons is possible. Most grain is discharged pneumatically into silos or, using portable pneumatic equipment, placed directly in waggons or railcars.

Problems currently affecting grain handling at the ports include inadequate numbers of tugboats and pilots, limited draughts and too few elevators and suckers. The authorities consider that a number of steps will be required to cope with any future increase in grain handling. This will include: increased port silo capacity; providing deeper (and longer) berths so as to accommodate larger vessels; bringing into service more elevators and pneumatic equipment to increase discharge rates: and improving the transport links between the ports and the areas of consumption. Improvements are in progress at a number of ports including Antalya and Taşucu on the south coast, Izmir on the west coast, Derince on the Sea of Marmara and Haydarpaşa, which lies on the Bosporus, opposite Istanbul. The scope for improvement at Istanbul itself is extremely limited due to shortage of space.

GRAIN TRANSPORTATION

Collection and distribution of domestic grain within Turkey, and exports, probably cause much more strain on the domestic transportation system than do imports, as the latter are mostly destined for areas close to the main ports. All grains except rice are normally moved in bulk.

The **road** network includes 61,000 km of highways, of which 20% are closed in the winter, and over 26,000 km of village roads.

The **railway** system extends for over 10,000 km. There are links with Bulgaria, Syria, Iran and the USSR. Although most of the larger ports have rail connections, routes tend to be circuitous and indirect because of the difficult terrain. Rail transportation of grain has been unsatisfactory in the past, but difficulties will be alleviated by the planned introduction of 300 special grain waggons and various improvements in the network, including a projected direct link from Ankara to Istanbul.

Some grain is distributed by coastal **shipping.** Larger vessels are to be brought into service to facilitate this.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Discharge rates are slow and present port facilities could not easily cope with a large increase in grain imports or exports. Steps are in hand to remedy this. Transport is difficult in Turkey because of the mountainous ranges which surround the central plain: better links, especially railways, would facilitate grain movement. Turkey has a severe grain storage problem. Much of the domestic harvest is stored in the open air. Plans have been made for major improvements in storage facilities both inland and at the ports.

VIETNAM

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	-	-	-	-
	rice (paddy)	11,034	11,186	14,500	14,500
	coarse grains	327	483	477	462
	TOTAL	11,361	11,669	14,977	14,962
IMPORTS:	- wheat	504	958	569	450
	rice (milled)	1,368	129	5	11
	coarse grains	98	64	-	-
	TOTAL	1,970	1,151	574	461
	- of which, food aid	n.a.	n.a.	17	2
EXPORTS:	- TOTAL	13	7	37	22

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
42.3	53.7	57.2	88	2.4	2.5

GENERAL GRAIN SITUATION

Vietnam is a tropical country, bordering the South China Sea. The climate is mostly hot and wet, although the north has a marked cool season. The principal grain crop is rice. Until recently, output was concentrated in the large river delta of the Mekong in the extreme south, the smaller delta of the Songkoi (Red River) in the north, and the narrow coastal strip between them. In many places two or even three crops a year are grown, and yields have been rising due to the introduction of high-yielding varieties. Wartime devastations, compounded by bad weather at the end of the decade, kept rice production down in the 1970s, but increased procurement prices and other incentives have encouraged a substantial increase in recent seasons. Pressure on land resources has led to the development of upland areas for cash cropping. Rice production in 1982 and 1983 reached around 14.5 m. tons, compared with about 11 m. tons in the latter 1970s. Other grains (e.g. maize) are grown to a limited extent, but yields are low because of insufficient supplies of fertilizer.

The population stands at some 57 m., and is increasing at 2.5% a year. By the year 2000 it may, according to World Bank estimates, have reached 88 m. It is still mainly rural, although the two principal cities (Hanoi and Ho Chi Minh City) each have over 2 m. people. Rice is by far the predominant food of the Vietnamese people. In the mid-1970s, per capita consumption stood at 140 kgs/year (milled basis). The trend has, however, been downwards, with some diversification towards wheat and animal products. Imports of rice, heavy during the 1970s, have now virtually ceased, but the country continues to import around 500,000 tons of wheat a year. Diets appear to be inadequate everywhere in quantity and quality, but food rationing prevents starvation.

PORTS FOR GRAIN (see Appendix)

The main port facilities are at Haiphong, Da Nang, and Ho Chi Minh City. Haiphong is the port for Hanoi, the principal city of northern Vietnam. Because of limited draughts, grain vessels normally anchor in the bay to discharge into lighters. Similarly, at Da Nang, only vessels drawing less than 4.9 metres can use the entrance channel. Larger ones have to discharge at an anchorage, which is not well sheltered from the north-west winter monsoon. Ho Chi Minh City, where there are extensive quays and storage sheds, can accommodate larger vessels. Grain can be discharged in bulk into silos at 1,500 tons a day, and bagged cargoes at 1,000 tons a day in slings. Delays have been reported in unloading grain at these ports, resulting in demurrage charges.

GRAIN TRANSPORTATION

Most imported wheat is consumed in the principal cities, and does not therefore require much inland transportation.

The transportation network was seriously damaged during the war. There are about 350,000 km of **roads**, of which 60,000 km are main roads. A shortage of trucks has been remedied by recent purchases, but there remain shortages of fuel and spare parts.

The **railway** system has been reconstructed and several lines are open, including one from Hanoi to Ho Chi Minh City. The total track is 3,200 km.

Barges are used to transport grain in the river deltas and around the coasts.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Vietnam continues to suffer the effects of its devastating war. More investment is required in the transport system (e.g. in spare parts for lorries) to allow grain to be moved efficiently. Imports are at present at low levels but could rise if the rapidly increasing population begin to eat wheat or livestock products on a significant scale. Direct access of large vessels to quaysides would then be desirable, as would the installation of bulk unloading and storage facilities.

YEMEN ARAB REPUBLIC

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	57	55	83	40
	rice (paddy)	-	-	-	-
	coarse grains	1,126	831	692	290
	TOTAL	1,183	886	775	330
IMPORTS:	- wheat	172	452	471	721
	rice (milled)	5	16	24	30
	coarse grains	7	4	8	9
	TOTAL	184	472	503	760
	- of which, food aid	n.a.	n.a.	33	5
EXPORTS:	- TOTAL	-	-	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
4.8	5.8	6.2	12	1.9	2.9

GENERAL GRAIN SITUATION

The Yemen Arab Republic (also known as North Yemen) benefits from high average rainfall in the mountainous interior, but is dry on the coast. Much of the land is highly fertile and many crops (including coffee, at one time the country's main foreign exchange earner) can be grown. Serious droughts are, however, experienced in some years and the construction of efficient irrigation systems and water storage schemes is given priority. The main cereals crop is sorghum: millet, wheat, barley and maize are also grown. Grain production averaged nearly 1.2 m. tons in the early 1970s but has subsequently declined: it was under 800,000 tons in 1982 and only about 320,000 tons in 1983, when there was a drought. It is reported that agricultural land is going out of use because of the migration of a large proportion of the male workforce to Saudi Arabia and the Gulf states. Their remittances represent one third of the country's GNP.

Although the country's population has been increasing at nearly 2% a year, grain consumption does not appear to have risen much. Falling production of sorghum has, however, been offset by increasing imports of wheat, which rose from 170,000 tons in the early 1970s to over 700,000 tons in 1983/84. Only very small amounts of rice or coarse grains are imported.

PORTS FOR GRAIN (see Appendix)

The main ports used for grain are Hodeida and Salif. Draughts are between 8.6 and 9.2 metres and the usual tonnage of vessels delivering grain is 20,000 tons. At Hodeida grain is discharged in bulk using suckers at the rate of 20 tons per hour (12 hour day). A conveyor system enabling discharge rates to be improved to 400 tons a day is planned. Further investment in discharge facilities is being undertaken: at present, some cargoes are discharged using ship's gear or portable equipment onto the quayside where they are bagged and trucked to storage or distribution centres. The port suffers from silting but work is being undertaken to construct a deep sea berth and provide dredging and other equipment. At Salif, where vessels of up to 50,000 tons can be moored offshore, grain is discharged in bags. Some grain is discharged at Mokha, at the southern end of the country's coastline, where lighters have to be used. It is planned to develop this port. The main difficulty encountered in the ports is shortage of labour.

GRAIN TRANSPORTATION

Although the capital, Sanaa, is linked to Hodeida, 150 km away, by a good road, some other towns are remote and difficult to reach. The population is still predominantly rural.

All grain in the Yemen Arab Republic moves by **road.** With bilateral assistance, much investment has been made in the road system, which now totals about 16,000 km, although less than 1,300 km was asphalted by 1981. The Highway Authority has also been undertaking improvements, with WFP help, in the rural road system, to stimulate social and economic development of those areas. There are too few lorries to move grain.

There are no **railways** in the country.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

At present, grain is landed at the ports in small cargoes with slow discharge rates. Projects are in hand which will improve both. Labour shortages remain a difficulty. The road system is now adequate although maintenance poses problems. There are too few lorries to move grain. Storage facilities are sufficient in the main towns but more small silos are needed in the villages.

YEMEN, PEOPLE'S DEMOCRATIC REPUBLIC

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	20	22	20	20
	rice (paddy)	-	-	-	-
	coarse grains	79	87	99	99
	TOTAL	99	109	119	119
IMPORTS:	- wheat	101	144	157	211
	rice (milled)	31	45	56	33
	coarse grains	4	2	5	9
	TOTAL	136	191	218	253
	- of which, food aid	n.a.	n.a.	1	15
EXPORTS:	- TOTAL	5	-	2	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
1.6	2.0	2.2	3	2.1	2.5

GENERAL GRAIN SITUATION

The terrain of the People's Democratic Republic of Yemen is generally mountainous and rugged, and the climate varies between dry and arid. Less than 0.5% of the land area is under cultivation, which is limited to small patches of better soil near the few river beds (which flow intermittently) or where irrigation from wells is possible. Plans have been made for extensive water distribution schemes in the Hadhramaut valley. Principal crops include cotton, vegetables and bananas. There is a limited production of grains, principally millet and wheat. Total grain output averages about 100,000 tons a year, and has not been increasing.

Diets are based mainly on wheat, millet and rice. Population growth averaged 2.1% in the 1970s, but is projected to accelerate to 2.5% for the rest of the century. The grain self-sufficiency ratio declined from about 40% in the early 1970s to 30% in 1983/84, when imports reached 253,000 tons including 211,000 tons of wheat.

There is a serious shortage of skilled workers due to emigration to neighbouring oil-producing countries.

PORTS FOR GRAIN (see Appendix)

All grain is landed at Aden, a large natural harbour. Vessels have to anchor in mid-stream and cargoes are transferred by lighter or barge to the wharf. Unloading rates average only about 500 tons a day. There is a shortage of lighters, and also of trucks to carry the grain away from the port. Aden has limited storage facilities. Congestion is a serious problem, caused by the scarcity of labour especially when work is required on the farms.

There are extensive expansion schemes for the Port of Aden, including five new deep-water berths. New deep-water facilities are being developed at Mukulla and Nishtun, ports serving the east of the country.

GRAIN TRANSPORTATION

Half the urban population of the country lives in Aden, a city of some 350,000 people. Providing grain to some of the other towns, which lie towards the interior, is difficult because of the lack of good roads.

The **road** network extends for about 10,500 km, most of which are only rough tracks. These are frequently blocked by flash floods or sand drifts. The bad conditions impose severe wear and tear on vehicles. About 10% of the total has bituminous surfacing. Between independence (in 1967) and 1980, 485 km of asphalted roads were built and over 770 km improved or reconstructed. Costs of transport are very high.

Further projects on roads and bridges are in hand, for which the government is obtaining assistance from friendly countries and banking institutions. One aim is to improve the marketing of agricultural products in the remote areas.

There are no **railways** in the Yemen People's Democratic Republic.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Unloading of grain is slow at Aden, and difficulties also arise because of the shortage of labour. Inland grain distribution is difficult, partly because of the poor state of many roads, and also because of the location of the main port at the extreme western end of the country.

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EUROPE

MALTA

GRAIN PRODUCTION AND TRADE

'000 metric tons (grain equivalent)

YEAR		1972-76 AVERAGE	1977-81 AVERAGE	1982	1983
PRODUCTION:	- wheat	2	3	3	3
	rice (paddy)	-	-	-	-
	coarse grains	3	2	2	3
	TOTAL	5	5	5	6
IMPORTS:	- wheat	56	39	11	24
	rice (milled)	1	1	1	1
	coarse grains	80	81	48	75
	TOTAL	137	121	60	100
	- of which, food aid	n.a.	n.a.	-	-
EXPORTS:	- TOTAL	4	8	-	-

POPULATION

MID-YEAR POPULATION (millions)				AVERAGE GROWTH RATE (% a year)	
1970	1980	1983	2000 (PROJECTED)	1970-1980	1980 - 2000 (PROJECTED)
0.33	0.36	0.38	n.a.	0.9	n.a.

GENERAL GRAIN SITUATION

A small island, centrally situated in the Mediterranean, Malta's poor, rocky soils and dry climate do not favour grain production. Output averages only about 5,000 tons of wheat and barley. The staple foodgrain is wheat, the consumption of which is more or less stable: maize and barley are imported for animal feed.

PORTS FOR GRAIN (see Appendix)

All grain is imported into Valetta, the island's capital and only large town. It has a fine natural harbour able to accommodate numerous large vessels. Grain is normally imported in cargoes of 5,000-12,000 tons and discharged in bulk by suckers into an elevator at the rate of 1,000 tons a day. Bagged cargoes are unloaded directly onto lorries. The present silo has a limited capacity of only 12,750 tons - in fact, storage capacity in the whole island only amounts to 51,000 tons.

Handling at Valetta will be revolutionized when a new grain terminal, now under construction, becomes operational during 1985. It will enable bulk carriers of 60,000-80,000 tons dwt to berth and discharge grain directly into a silo whose overall capacity will be 86,000 tons. Discharge will be by mechanical ship unloaders, rated at 1,100 tons an hour. Smaller coastal feeder vessels of up to 20,000 tons will be able to load directly from the silo at 1,250 tons an hour. The silo will include bagging facilities.

It is hoped that, taking account of Malta's location in mid-Mediterranean, the new terminal will be used for grain transhipment operations to African and European ports, and also some in Near East Asia. The projected annual throughput of the terminal is around 2 m. tons.

GRAIN TRANSPORTATION

The island is small, and even the furthest point of the neighbouring island of Gozo, which forms part of the territory, is less than 40 km in a direct line from Valetta. Since most grain is in any case consumed in the capital, internal transportation difficulties hardly arise for grain.

There are no **railways** but over 90% of the 1,300 km of **roads** are paved.

SUMMARY OF GRAIN HANDLING AND TRANSPORTATION PROBLEMS

Such problems as used to occur in grain handling will be overcome when the new grain facility, allowing large vessels to unload rapidly into a silo of great size, becomes operational.

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APPENDIX TABLES

The following tables, set out in pages 218 to 243, give details of the capacities and facilities of the main grain-importing ports of the developing countries covered in this study (except the seven landlocked countries and Iraq, whose one port is at present out of action because of hostilities).

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PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
AFRICA					
ALGERIA					
Algiers	Capital and principal city, halfway along the Mediterranean coastline	n.a.	11.6	15	Bulk discharge, mostly using ships' gear.
Annaba	450 km E. of Algiers, near border with Tunisia	n.a.	13 (Deepest berth)	- AS FOR ALGIERS -	
Oran	Major city 350 km W. of Algiers	n.a.	10 (Deepest berth)	- AS FOR ALGIERS -	
Skikda	Town 80 km W. of Annaba	n.a.	13 (Deepest berth)	- AS FOR ALGIERS -	
ANGOLA					
Cabinda	In extreme N. of country, 360 km from Luanda.	n.a.	9.8 (anchorage)	n.a.	Discharge into lighters at anchorage.
Lobito	400 km S. of Luanda.	n.a.	10.4	n.a.	2 elevators.
Luanda	The principal city of Angola, mid-way along its coastline.	n.a.	Bulk berth: 9.8 other berths: 10.4	n.a.	Vacuvators and electric conveyor belt.
BENIN					
Cotonou	A large modern port midway between Lome (Togo) and Lagos (Nigeria)	1982: 205 1983: 126 (including grain destined for Niger)	10	12	Wheat: In bulk using vacuvators Other grains: In bags using ships' own gear.
CAMEROON					
Douala	The country's principal town, located 24 km up the River Vouri.	1982: 469 1983: 362 (Incomplete) Totals include some grain transhipped to neighboring countries.	8 (less bet. March and August)	Rice: 7 Flour: 2 Wheat: 1	Two suckers available but most grain is unloaded bagged.
EGYPT					
Alexandria	Mediterranean Coast, W. side of Nile Delta. Harbour is protected by reefs.	1982:2,419 1983:3,137	9.8	20	Vacuvators, also floating and dockside cranes.
El Adabiya	Head of Gulf of Suez, 15 km S. of Suez.	1982: 337 1983: 461	7.9	30-50	Small pneumatic elevators. Lighters also used. Bagging on shore.
Port Said	Mediterranean end of Suez Canal.	1982:1,355 1983:1,469	8.2	20 (60 max. at floating silo).	Tanker (capacity 20,000 tons) used as floating silo. Lighters also used to discharge vessels.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
Lorries or rail waggons	500 (D)	Silo	25	The main grain port has 49 general cargo berths.	ALGERIA Algiers
- AS FOR ALGIERS -		Silo	16	23 general cargo berths. Quays have rail connections.	Annaba
- AS FOR ALGIERS -		Silo	30	20 general cargo berths	Oran
- AS FOR ALGIERS -		Silo	20	17 berths	Skikda
n.a.	n.a.	n.a.	n.a.	Anchorage subject to heavy swell and unloading may be delayed by thunderstorms during rainy season. One pier for lighters. Two berths (draught 10.4 m) being constucted at new pier.	ANGOLA Cabinda
Direct into Silo	500 (D)	Silo other	25 15	Two quays. Connected to Benguela railway. Offtake 500 tons a day.	Lobito
n.a.	400 (D)	Warehse.	16	Berths can accommodate 8 large freighters. New berths planned.	Luanda
Lorries or rail waggons	500 (D)	Silos and warehouses.	13	Port subject to storms when vessels must anchor offshore. 8 general cargo berths. Major port expansion, including 2 new berths, is in progress. Cotonou also serves Niger, reached by railway to Parakou, then road.	BENIN Cotonou
Lorries	Bulk: 1,640 (D) Bags: 750 (D)	Small warehouse	n.a.	11 cargo berths River requires continuous dredging. Douala handles 90% of the trade of Cameroon and also some transit trade for neighboring countries.	CAMEROON Douala
n.a.	1,500-2,000 (D) can reach 2,500.	Silo	48	Second city and principal Port. Has 6 grain berths in inner harbour. Entrance channel being dredged from 10.5 to 13 m. Improvements planned, including new grain berth with 52,000 ton silo.	EGYPT Alexandria
n.a.	2,000 (D) can reach 2,500	n.a.	n.a.	2 wharves and one lighterage quay. Draughts limited because of sunken vessels. New deep-water quays to be built.	El Adabiya
n.a.	1,500-2,000 (D) can reach 3,000.	Floating storage	20	Expansion planned.	Port Said

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
EGYPT Safaga	Red Sea Coast, 400 km S. of Suez	1982:1,270 1983:1,040	n.a.	30-50	Portable pneumatic elevators.
ETHIOPIA Assab	S. end of Red Sea 600 km N.E. of Addis Ababa.	n.a.	10.4	30	Usually bulk.
Massawa	On Red Sea, 400 km N.W. of Assab.	n.a.	9.1	30	Usually bulk.
GHANA Tema	Situated on open coast, 30 km from Accra.	1983: 150 (approx.)	7.5-9.6 at berths	26.5 (max. 28)	Wheat: Conveyor system. Other grains: In bags.
Takoradi	170 km W. of Accra	1983: 15 (approx.)	7.9-8.5 at berths	26.5 (max. 28)	Vessel's own grabs.
IVORY COAST Abidjan	Also chief city. Port is situated on a lagoon, access from sea being via. Vridi Canal (2km long)	1983/84: 600 excluding grain destined for other countries.	9.8	n.a.	One berth equipped with belt conveyor. Bagging may take place in ship's holds or after unloading.
KENYA Mombasa	Indian Ocean. 90 km N. of border with Tanzania: 400 km S.E. of Nairobi.	1981/82:300 1982/83:235 1983/84:190	9.5 -11.0	20	Mostly bulk (grabs and suckers). Maize in bags using slings.
LIBYAN A. J. Benghazi	In E. of country, 650 km from Tripoli.	n.a.	8.5	n.a.	(Summer only): Large vessels can anchor in roads and discharge grain in bags into lighters.
Tripoli	Also largest city Situated 150 km from W. border (with Tunisia.	n.a.	9.6	45	Bagged, into lighters
MADAGASCAR Tamatave	On E. coast, 250 km N.E. of Tananarive.	1983/84:250	9.4 (harbour)	n.a.	In bags. Lighters are used.
MAURITANIA Nouadhibou	350 km N. of Nouakchott	n.a.	n.a.	n.a.	Lighters

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	2,000 (D)	n.a.	n.a.	Quay can accomodate 1 large vessel and 2 medium-sized ones. New silo complex planned	EGYPT Safaga
n.a	Has reached 4,000 (D)	Warehse	n.a.	Suffers heavy congestion because of slow offtake, which averages 1,800 tons a day. New unloading equipment to replace existing outdated machinery received early 1985.	ETHIOPIA Assab
n.a.	Under 1,000 (D)	Warehse	n.a.	6 berths Suffers congestion	Massawa
Wheat: storage silos in flour mill area. Other grains: direct into lorries	Bulk: 250-300 (D) Bags: 350-450 (D)	Elevators	n.a.	Handles 80% of Ghana's imports and 90% of its grain. Port suffers from swell and dangerous winds during tornadoes. Much of the port's equipment is out of use because of inadequate maintenance.	GHANA Tema
n.a.	Bags: 380 (D)	Sheds, open stores	n.a.	Much of the port equipment is out of use. Security is a problem.	Takoradi
Silo, lorries and rail waggons.	Bulk: 1,000 (D)	Silo	n.a.	One of the largest ports in West Africa. Has 10 Berths. 2 new deep-water quays under construction. Port serves also Burkina Faso, Mali and parts of Ghana.	IVORY COAST Abidjan
Mostly taken by lorries to godowns. 25% is bagged for rail delivery.	Bags: 750 (D) Bulk: official rate is 1,500 (D) but can reach 3,000 (D) and even 4,000.	Godowns	100	Numerous general cargo berths. Spillage a major problem. Grain imports concentrated in period August-November. Construction of bulk handling facility and port elevators required.	KENYA Mombasa
n.a.	Bags: 750-1,000 (D)	Covered	n.a.	4 Berths	LIBYAN A.J. Benghazi
n.a.	Bags: 750-1,000 (D)	Covered	n.a.	Considered one of the finest and safest ports in N. Africa. 2 piers have 12 m. depth alongside. Silo complex under construction.	Tripoli
n.a.	600 (D)	Warehse	n.a.	Also known as Taomasina. Work often delayed by rain. Lack of storage space causes severe overcrowding. Silos being financed by World Bank loan.	MADAGASCAR Tamatave
n.a.	n.a.	n.a.	n.a.	Principally a loading port for iron ore.	MAURITANIA Nouadhibou

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
MAURITANIA Nouakchott	Also largest city. 200 km N. of border with Senegal.	n.a.	7-8.5	3 (max.)	Lighters
MAURITIUS Port Louis	On the N.W. coast	1982: 156 1983: 157	12.2 (harbour) 10.2-11.0 (quays)	10-12	Rice in bags, discharged into lighters, then lifted into elevator using slings. Flour in bulk (or containers) using buckets.
MOROCCO Agadir	Atlantic coast, 500 km S.W. of Rabat.	n.a.	9.0	20-30	Bulk, using mechanical shovel.
Casablanca	Atlantic coast, 50 km S.W. of Rabat.	n.a.	9.1-10.1	20-30	Bulk into silos or on quay.
Kenitra	Atlantic coast, 50 km N.E. of Rabat. Port is 15 km up river	n.a.	3.5 at low water	n.a.	Bulk into silos or on quay.
Nador	Mediterranean: 70 km W. of border with Algeria	n.a.	7.5	n.a.	n.a.
Safi	Atlantic coast, 300 km S.W. of Rabat.	n.a.	9.3	20-30	Bulk
Tangier	Straits of Gibraltar.	n.a.	8.5	20-30	Bulk
MOZAMBIQUE Beira	Halfway along the Indian Ocean coastline, 700 km N. of Maputo. Umtali, on Zimbabwe border, is 250 km inland	n.a.	8.5-9.8 (wharves)	n.a.	Larger vessels use lighters.
Maputo	Capital and principal city of Mozambique, at the S. end of the country.	n.a.	10.1	n.a.	Bags in slings, Bulk in buckets and holdalls.
Nacala	Small town in N. of country, 900 km N.E. of Beira	n.a.	7.6-10.1 (main quay)	n.a.	Bagged cargoes only.
NIGERIA Calabar	On bank of river Calabar, 67 km from sea, and 30 km W. of border w/. Cameroon	n.a.	5.9	n.a.	Lighters

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	400 (D)	n.a.	n.a.	Exposed wharf on unsheltered coast. Unloa- difficult of impossible from January to March (heavy swell) and July to October (rains)	MAURITANIA Nouakchott
Rice: Elevator Flour: Lorries	Bags: 35-45 (H) Bulk: 1,000 (D)	Rice: Silo Flour: Shed	25 16	5 general cargo quays with at least 10 m. draught. Low labour productivity is a prob- lem. Plans for grain complex, including bulk handling facilities.	MAURITIUS Port Louis
Quays, where grain is bag- ged	2,000 (D)	Ware- houses	n.a.	1 deep-water dry cargo berth. New berths being built.	MOROCCO Agadir
Silos or quay	100 (H) each chute	Silos	70	Silo quay has 13 berths. Port can suffer from swell in winter.	Casablanca
Silos or quay	70 (H) each chute	Silos	n.a.	Large vessels anchor outside river entrance	Kenitra
n.a.	n.a.	n.a.	n.a.	New port being developed.	Nador
Quays, where grain is bag- ged	2,000 (D) or more	Silos	24	One loading berth and one waiting berth.	Safi
Quays, where grain is bag- ged.	2,000 (D)	n.a.	n.a.	-	Tangier
n.a.	Bags: 750 (D) Bulk: 1,000 (D)	Sheds	n.a.	Berths for 10 ocean-going vessels. Port app- roached by tidal river channel, 18 km long. Beira is the chief port of entry for Zim- babwe, Malawi and Zaire. Silo of 15,000 tons to be constructed.	MOZAMBIQUE Beira
n.a.	Bags: 750 (D) Bulk: 1,000 (D)	n.a.	n.a.	Berths for 12 ocean-going vessels. Exten- sive rail marshalling-yards. Rail links to Zimbabwe and South Africa.	Maputo
n.a.	600 (D)	n.a.	n.a.	Large vessels can safely anchor offshore. Has rail link to Malawi.	Nacala
n.a.	n.a.	n.a.	n.a.	Anchorage for 3 ocean-going vessels. New port, with 4 berths being built upstream.	NIGERIA Calabar

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
NIGERIA Koko	60 km up Benin River, 230 km E. of Lagos.	n.a.	6.7	n.a.	n.a.
Lagos-Apapa	Lagos is the second largest city in Nigeria, 80 km E. of border Benin	n.a.	8.2	n.a.	Lighters used. Discharge by vacuvators with simultaneous bagging.
Port Harcourt	On Bonny Estuary, 66 km from sea, and 460 km S.E. of Lagos.	n.a.	7.6 (in river)	n.a.	n.a.
SENEGAL Dakar	Largest city in Senegal, situated on a promentary, forming the most westerly pointin mainland Africa.	1982: 531 1983: 732 (includes cargoes handled for neigboring countries)	10.0	1-31	In bags or bulk. Bulk discharge is by suckers or grabs with simultaneous bagging at 800 tons a day.
SOMALIA, DEM. REP. Berbera	On N. (Gulf of Aden) coast, 950 km N. of Mogadiscio.	n.a.	8.5	5 (max)	Bags, or bulk using ship's gear.
Mogadiscio	Also principal city of Somali Dem Rep, on its S.E. (Indian Ocean) coast.	n.a.	8-12	10	Bags, or bulk using ship's gear.
SUDAN Port Sudan	Red Sea, 600 km N.E. of Khartoum	n.a.	10.7	50-60	Silo berth has elevator (50 tons/hour) supplemented by vacuvators. General cargo berths: grain is bagged in ship's holds (at 400 tons/hatch/day) and lifted in slings using both shore cranes and ship's gear.
TANZANIA Dar - Es - Salaam	Also largest city in Tanzania. On Indian Ocean. Approached by 2 km entrance channel.	1982: 58 1983 (8 months): 109	6.7 (lowtide)	12	In bulk, using grabs and vacuvators. Large vessels discharge into lighters.
TUNISIA Bizerte	N. coast, 60 km N.W. of Tunis	1982: 161 1983: 156	9.1	20-25	Bagged in holds.
Gabes	Gulf of Gabes, 330 km S. of Tunis.	1982: 131 1983: 70	11.0	20-25	Bagged in holds.
La Goulette	The port for Tunis, 10 km inland	1982: 568 1983: 726	9.8	20-25	Bulk (suckers).

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	n.a.	n.a.	n.a.	Port of growing importance: considerable improvements planned.	NIGERIA Koko
Silo	800 (D)	Silo	80	Large port complex, well served by road, rail and inland waterway. Serves also Burkina Faso, Cameroon and Chad. Port operations may be slowed by bad weather.	Lagos-Apapa
n.a.	n.a.	Sheds	n.a.	Served by road and rail. Is a transit port for cargoes to and from Chad and Niger.	Port Harcourt
Bags: Warehouses Bulk: Silo or onto quays.	Bags: 1,000 (D) Bulk: 2,000 (D)	Warehouses and silos	80	Numerous general cargo wharves. Port serves Mali and Mauritania, and is central bagging and distribution centre for the West African Coast. Construction of new container terminal will free more of the port for handling grain.	SENEGAL Dakar
n.a.	Bags: 500 (D)	n.a.	n.a.	Two berths, equipped with mobile cranes.	SOMALIA, DEM. REP. Berbera
n.a.	Bags: 500 (D)	n.a.	8	6 general cargo berths. Port lies on exposed coast, and suffers from heavy swells.	Mogadiscio
Bulk: Flour mills Bags: Road vehicles	Silo berth: 3,000 (D), using vacuvators	Silo	30	One silo berth and 5 general cargo berths used for grain. Berths are to be deepened and improved, and silo throughput to be increased to 700,000 tons/year.	SUDAN Port Sudan
Direct into landbased transport	Bags: 750 (D) Bulk: 1,000 (D)	Sheds	n.a.	11 deep-water berths. Cargo handling is fully mechanised. Port also handles grain destined for Zambia, Zaire, Rwanda and Burundi.	TANZANIA Dar - Es - Salaam
Quayside or waggons	800 (D)	Silo (nearby)	20	Silo be enlarged to 30,000 tons	TUNISIA Bizerte
Quayside	600 (D)	n.a.	n.a.	Large number of general cargo berths. Silo of 30,000 tons planned.	Gabes
Silo	2,000 (D)	Silo	30	-	La Goulette

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
TUNISIA					
Sfax	E. coast, 230 km South of Tunis.	1982: 191 1983: 179	10.1	20-25	Bagged in holds.
Sousse	E. coast, 110 km South of Tunis.	1982: 53 1983: 55	7.9	20-25	Bagged in holds.
ZAIRE					
Matadi	At W. extremity of country, 133 km up River Zaire	n.a.	6.7-8.5 depending on river conditions	n.a.	Bagged.
LATIN AMERICA AND CARIBBEAN					
BARBADOS					
Bridgetown	Principal town on Barbados, at S.W. corner of island.	1982: 54 1983: 51	9.6	n.a.	Ship's gear in bags using sling and paletts, also in bulk using buckets.
BRAZIL					
Belem	Principal city of N. Brazil, lies 180 km from sea up Estuary of River Para.	n.a.	6.7 at bulk wheat terminal	n.a.	Vacuvators.
Fortaleza	N. coast, 1,150 km E. of Belem.	1982: 276 1983: 241	9.7	25	Travelling suction tower.
Maceio	E. coast, 200 km S. of Recife.	1982: 144 1983: 129	10.1	38	Wheat in canvas slings.
Paranagua	S. Brazil, about 550 km S.W. of Rio de Janeiro. Port situated 20 km up inlet.	n.a.	9.5	n.a.	Mechanical loaders and unloaders.
Recife	N.E. Brazil.	1982: 512 1983: 444	9.1	38	Pneumatic elevators.
Rio de Janeiro	Second largest city in Brazil mid-way along the E. coast.	1982: 757 1983: 874	9.8	51	n.a.
Rio Grande	S. Brazil, close to border with Uruguay. Situated on lagoon, 11 km from sea.	n.a.	11.3	n.a.	Floating elevators and suckers.
Salvador	State of Bahia, 650 km S. of Recife.	1982: 236 1983: 234	9.8	38	Suckers.
Santos	Approached through natural channel, 10 km long.	1982:1,592 1983:1,167	9.8	75	Suckers and conveyor belts.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
Waggons	600 (D)	n.a.	n.a.	-	TUNISIA Sfax
Quayside	600 (D)	n.a.	n.a.	-	Sousse
n.a.	750 (D)	n.a.	n.a.	2 piers can accommodate 9 large vessels.	ZAIRE Matadi
n.a.	Bags:750 (D) Bulk:1,000 (D)	n.a.	n.a.	Port has bulk sugar loading facilities.	BARBADOS Bridgetown
Waggons, lorries or silo	1,200-1,500 (D)	Silo	n.a.	Handles relatively small amounts of grain. New grain terminal suction line will have capacity of 200 tons/hour.	BRAZIL Belem
n.a.	2,000 (D)	Silos	n.a.	-	Fortaleza
Lorries	n.a.	n.a.	n.a.	New grain elevator being installed. Heavy seas can cause difficulties in winter.	Maceio
n.a.	300-600 (H)	Silos	65	Major grain export port. 3 berths normally use for grain, and 3 for meals. New berth, with 100,000 ton storage silo, being constructed: will unload at 1,500 tons/hour. Port serves Paraguay: New rail connection to be completed.	Paranagua
n.a.	2,000 (D)	Silo	38.5	-	Recife
n.a.	2,000 (D)	Silo	75	-	Rio de Janeiro
Wheat terminal	n.a.	Silo	130	Principally a grain loading port.	Rio Grande
Mills	1,500 (D)	n.a.	n.a.	-	Salvador
Rail waggons, lorries and silos	2,500 (D)	Silos	68	Also a major loading port. Serves Sao Paulo, Brazil's largest city, which lies 40 km inland.	Santos

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
BRAZIL (cont'd)					
Vitoria (Capuaba)	400 km N.E. of Rio de Janeiro	1982: 132 1983: 237	9.1	38	Suckers.
CHILE					
Antofagasta	1,000 km N. of Valparaiso.	n.a.	8.2	n.a.	Screw conveyors and belts.
Arica	Extreme N. of Chile, close to border with Peru.	n.a.	10.4	n.a.	n.a.
San Antonio	50 km S. of Valparaiso.	n.a.	8.5	n.a.	Grabs.
Valparaiso	Midway along Chile's coastline.	n.a.	9.8	n.a.	Grabs to portable hoppers.
COSTA RICA					
Golfito	Pacific coast, 30 km W. of border with Panama.	n.a.	7.9	n.a.	Grabs.
Port Limon	Atlantic coast, 110 km E. of San Jose.	n.a.	7.6 At deepest general cargo berth	n.a.	Mobile grabs or ship's gear.
Puntarenas	Pacific coast, 80 km W. of San Jose	n.a.	7.9	n.a.	Ship's own gear.
CUBA					
Havana	W. end of island	n.a.	10.1	n.a.	Elevators.
Santiago de Cuba	S.E. coast, 800 km E. of Havana.	n.a.	9.8	n.a.	Vessels tie up to dolphins alongside pier. Bulk discharge using ship's gear
DOMINICAN REP.					
Haina	S. coast, 15 km W. of Santo Domingo.	n.a.	9.1	10	In bulk, using suckers and grabs, except for maize, which is discharged in bags using slings and pallets.
Santo Domingo	South coast.	n.a.	8.8	10	AS FOR HAINA.
ECUADOR					
Guayaquil	On R. Guayas, which opens out S. of city into wide estuary. Is 80 km from open sea.	About 300	7.2	13 (max.)	Suckers
EL SALVADOR					
Acajutla	Near W. end of Pacific coastline, 100 km from San Salvador.	1983: 270	9-10	15-25	90% in bulk, 10% in bags. Clamshells using quayside cranes.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	2,500 (D)	Silo	30	New complex under construction will be able to unload wheat at 1,800 ton/hour into 90,000 tons silo.	BRAZIL (cont'd) Vitoria (Capuaba)
n.a.	1,000 (D)	Silos	5	Swell may sometimes affect grain berth. Port also serves Bolivia, with which there are rail connections.	CHILE Antofagasta
n.a.	n.a.	Warehouses	n.a.	Serves Bolivia and Peru.	Arica
Rail waggons or trucks	5,000 (D) (24- hour)	n.a.	n.a.	Berth subject to heavy swell.	San Antonio
Trucks	400 (H)	n.a.	n.a.	Most important commercial centre on W.coast of S. America. Port serves capital city Santiago, 100 km inland.	Valparaiso
Rail waggons	n.a.	None	None	-	COSTA RICA Golfito
n.a.	n.a.	Covered	n.a.	Pricipal port of Costa Rica. Has 4 general cargo berths, and more under construction.	Port Limon
Railcars	n.a.	n.a.	n.a.	Two berths, no elevators.	Puntarenas
Silos	1,200 (D)	Silos	50	Capital and largest city in Cuba. Port has many docks and berths for general cargo.	CUBA Havana
n.a.	1,000-1,500 (D)	Silo	8	-	Santiago de Cuba
Bulk: Silos Bags: lorries	Bulk: 1,000 (D) Bags:750 (D)	Silos	3	-	DOMINICAN REP. Haina
AS FOR HAINA		n.a.	n.a.	Island's pricipal city.	Santo Domingo
Conveyor belts to silos	1,200 (D) (in good weather)	Silos	108	Guayaquil is Ecuador's largest city. Port handles all bulk grain imports. Onward transportation is by road.	ECUADOR Guayaquil
Conveyor belts to port warehouses	400 (H) (max.)	Warehouses	n.a.	Recently modenised, is now the leading port Central America. New tower unloader to be installed, and other improvements will enable 40,000 tons vessels to berth.	EL SALVADOR Acajutla

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
GUATEMALA San Jose	Pacific coast, 80 km S. of Guatemala City.	n.a.	No limit in roads.	n.a.	Vessels anchor in roads and discharg into lighters.
Santo Tomas de Castilla	Gulf of Honduras (Atlantic) coast, 230 km N.E. of Guatemala City.	1982: 101	8.8	n.a.	Bulk using clam shells. Some importe use their own suckers.
JAMAICA Kingston	S.E. end of island	n.a.	10.7	10-13	n.a.
Montego Bay	N.W. of island	n.a.	9.6	n.a.	Ship's gear only.
MEXICO Acapulco	Pacific coast, 300 km S. of Mexico City.	n.a.	9.0 (At cargo pier)	n.a.	n.a.
Coatzacoalcos	Gulf of Mexico, 200 km S.E. of Vera Cruz.	n.a.	9.1	n.a.	n.a.
Ensenada	Pacific coast of lower California.	n.a.	9.1	n.a.	n.a.
Guaymas	E. coast of Gulf of California.	n.a.	9.1	n.a.	n.a.
Manzanillo	Pacific coast, 200 km S.W. of Guadalahara.	n.a.	10.1	n.a.	n.a.
Tampico	Gulf of Mexico, 350 km N. of Mexico City. Port is 13 km up Panuco River.	n.a.	9.1	n.a.	Ship's gear.
Vera Cruz.	Gulf of Mexico, 320 km E. of Mexico City.	n.a.	8.5	n.a.	Bulk.
PANAMA Balboa	Port at S. terminal of Panama Canal.	n.a.	10.7-12.2	n.a.	Bulk.
Cristobal	At N. end of Panama Canal.	n.a.	12.2	n.a.	Portable conveyors.
PERU Callao	Adjacent to Lima, the capital city	n.a.	9.1 at berths	n.a.	Two independent towers. Four pneumatic grain dischargers.
Matarani	S. Peru, 200 km from border with Chile.	n.a.	9.1	n.a.	Electro-mechanical suction system.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	n.a.	n.a.	n.a.	Good rail connections.	GUATEMALA San Jose
n.a.	2,500 (D) per vessel	Warehouse	n.a.	The main grain unloading port in Guatemala. Can accommodate 6 general cargo vessels. Proposed to dredge channel to permit vessels drawing 11 m. to enter.	Santo Tomas De Castilla
n.a.	n.a.	Sheds and open space.	n.a.	Capital of Jamaica and its only large town. Eight berths with at least 10.7 m. for general cargo.	JAMAICA Kingston
n.a.	n.a.	n.a.	n.a.	-	Montego Bay
n.a.	n.a.	Warehouses	n.a.	-	MEXICO Acapulco
n.a.	n.a.	Open storage area	n.a.	-	Coatzacoalcos
n.a.	n.a.	Warehouses	n.a.	-	Ensenada
n.a.	n.a.	Silos	60	Has grain loading facilities (at 1,200 tons/ hour)	Guaymas
n.a.	n.a.	Warehouse	n.a.	-	Manzanillo
n.a.	n.a.	Warehouses and open storage	n.a.	Depth varies because of silting.	Tampico
n.a.	n.a.	Warehouses	n.a.	Has one grain discharge installation.	Vera Cruz
Trucks	n.a.	None	None	Nearest port to Panama City. Has accommodated a 51,000 ton vessel.	PANAMA Balboa
n.a.	n.a.	n.a.	n.a.	Close to City of Colon. Has accommodated 66,000 ton vessel. Port is being greatly expanded.	Cristobal
n.a.	300 (H)	Elevator	23	6 general cargo berths. Port being dredged to accommodate vessels drawing 11 m.	PERU Callao
n.a.	200 (H)	Warehouse	n.a.	Serves inland City of Arequipa, also deals with cargoes for Bolivia.	Matarani

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
TRINIDAD & TOBAGO Pointe-à-Pierre	W. coast, 40 km S. of Port of Spain.	n.a.	8.7	25 (dwt) max.	n.a.
Port of Spain	Close to N.W. corner of island.	n.a.	9.0 (max. at low water)	n.a.	Fixed suction discharge tower.
URUGUAY Fray Bentos	On R. Uruguay, 340 km from Montevideo.	n.a.	5.8	23 (max. 35)	Portable vacuvators.
Montevideo	On R. plate.	n.a.	9.8	18 (max. 35)	Mobile vacuvators.
Nueva Palmira	R. Uruguay, 100 km downstream from Fray Bentos.	n.a.	7.6	30	Portable vacuvators and loading belts.
VENEZUELA Guanta	250 km E. of Caracas.	1982: 84 1983: 108 1984: 112	10.1	Maize 14-20 Wheat 15-20 Sorghum 20-25 Oats 2-4	n.a.
La Guaria	The port of Caracas, which lies a short distance inland.	1982: 374 1983: 446 1984: 527	9.8 -11.3 at quays	AS FOR GUANTA	n.a.
Maracaibo	At entrance to Lake Maracaibo, 500 km W. of Caracas.	1982: 547 1983: 551 1984: 578	7.0-10.1 At quays	AS FOR GUANTA	n.a.
Pueto Cabello	110 km W. of Caracas.	1982:2,094 1983:2,040 1984:2,183	7.9-10.4 At quays	AS FOR GUANTA	Conveyor.
Puerto Sucre	300 km E. of Caracas. Close to City of Cumana.	1982: 31 1983: 84 1984: 66	9.1 At quays	AS FOR GUANTA	n.a.
ASIA BANGLADESH Chalna	On R. Pusur (part of Ganges Estuary), 90 km from open sea.	n.a.	7.8	n.a.	Lighters. No mechanical equipment available at anchorage.
Chittagong	In E. of country 14.5 km up R. Kanafuli.	n.a.	9.1	n.a.	Vessels can lighten at outer anchorage Discharge in bulk.
CHINA (PEOPLES REPUBLIC) Dalian	N.E. China, 450 km E. of Beijing.	n.a.	10.4	35	Shipboard or quayside cranes. Grabs.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	n.a.	n.a.	n.a.	One berth for ocean-going general cargo vessels.	TRINIDAD & TOBAGO Pointe-á-Pierre
Belt into silos	n.a.	Silos	15	Principal town in Trinidad.	Port of Spain
Lorries, railcars and silos	130-150 (H)	Silo (nearby)	30	Also belt conveyor for grain loading.	URUGUAY Fray Bentos
Lorries, barges or quayside	300 (H)	n.a.	n.a.	Capital and principal city of Uruguay. New berth with 20,000 ton elevator planned on swamp area.	Montevideo
Lorries, barges and silos	350 (H)	Silo	n.a.	Terminal export elevator under construction Will load at 800 tons/hour and unload at 500 tons/hour.	Nueva Palmira
n.a.	About 1,000 (D)	Private silo	43	One quay for bulk cargoes.	VENEZUELA Guanta
n.a.	About 1,000 (D)	Silos	69	Principal port of Venezuela. 2 quays for bulk cargoes.	La Guaria
n.a.	About 1,000 (D)	Silos	100	4 quays for bulk cargo.	Maracaibo
n.a.	n.a.	Silos	353	The main port for grain imports. Has 7 quays for bulk cargoes.	Puerto Cabello
n.a.	About 1,000 (D)	n.a.	n.a.	2 quays for bulk cargoes.	Puerto Sucre
n.a.	n.a.	n.a.	n.a.	Anchorage only - no jetties or wharves. New grain terminal to be constructed.	ASIA BANGLADESH Chalna
n.a.	1,000-1,500 (D)(300 (H) at grain berth).	Silo	200	Deep-water berths under construction at Patenga (mouth of Kanafuli River).	Chittagong
n.a.	300 (H)	n.a.	n.a.	Said to be able to handle 1.5 m. tons of grain annually. Export elevator is under construction.	CHINA (PEOPLES REPUBLIC) Dalian

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
CHINA (PEOPLES REPUBLIC)					
Guangzhou	South China on Pearl River.	n.a.	6	n.a.	Modern pneumatic unloading equipmer
Huangpu	Estuary of Pearl River, 20 km from Guangzhou.	n.a.	7.9	n.a.	Large vessels can use lighters.
Qingdao	On S. side of Shantung Peninsula in N. China, 550 km S.E. of Beijing.	n.a.	9 at low water	30 (max.) in port, 10 (max.) at berths	n.a.
Shanghai	E. China, close to estuary of Yangtze Kiang River.	n.a.	9.5	35	Modern pneumatic equipment.
Tianjin	N. China, 60 km up Hai River, 100 km S.E. of Beijing.	n.a.	4.5	n.a.	Mechanical loading and unloading facilities.
Xingang	N. China, at mouth of Hai River.	n.a.	n.a.	10 (max.) at berths	n.a.
CHINA (TAIWAN PROVINCE)					
Kaohsiung	Near S.W. corner of island.	n.a.	10.4 (berths)	Can accommodate 75,000 ton bulk carriers.	Suckers.
Keelung	N.extremity of island	n.a.	10.4	n.a.	Suckers.
INDIA					
Bombay	W. coast, situated on islands, connected to mainland by causeways.	n.a.	Anchorage 6.7-9.6	n.a.	Large vessels discharge into lighters
Calcutta	E. India, about 130 km up River Hooghly from its mouth in Bay of Bengal	n.a.	7.9	n.a.	Moorings in steam: discharge into lighters.
Cochin	W. coast of S. India.	n.a.	9.1	n.a.	n.a.
Haldia	On Hooghly River, 60 km S. of Calcutta.	n.a.	9.1	n.a.	n.a.
Kandla	On Gulf of Kutch in N.W. India.	n.a.	9.8	n.a.	Bulk discharge by vacuvators.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
					CHINA (PEOPLES REPUBLIC)
n.a.	n.a.	n.a.	n.a.	Said to be able to handle 2.5 m. tons of grain annually. Larger vessels use port of Huangpu, at mouth of Pearl River.	Guangzhou
n.a.	400 (H)	Mainly godowns	n.a.	-	Huangpu
n.a.	n.a.	n.a.	n.a.	-	Qingdao
n.a.	700 (H)	n.a.	n.a.	Largest cargo-handling port in China. Said to be able to handle 8 m. tons of grain annually. Has 4 grain berths.	Shanghai
n.a.	n.a.	n.a.	n.a.	Port for Beijing. Needs constant dredging. Was severely damaged by earthquake in 1976. New equipment for 750 tons/hour unloading being installed.	Tianjin
n.a.	n.a.	n.a.	n.a.	-	Xingang
					CHINA (TAIWAN PROVINCE)
n.a.	2,000 (H)	Silos	160	Area suffers from typhoons, July-September Has many deep-water wharves, but suffers congestion. Newly developed as grain transhipment centre.	Kaohsiung
n.a.	1,800 (H)	Silo	50	Serves capital (Taipei), about 20 km inland. Well sheltered from typhoons. Newly developed as grain transhipment centre.	Keelung
					INDIA
n.a.	n.a.	Warehouses & open storage areas.	n.a.	New port, to accommodate vessels up to 70,000 tons dwt is to be constructed.	Bombay
n.a.	n.a.	n.a.	n.a.	Difficult navigation in Hooghly R., dredging constantly needed.	Calcutta
n.a.	n.a.	n.a.	n.a.	Deep-water wharf. Port suffers from silting during monsoon.	Cochin
n.a.	n.a.	n.a.	n.a.	New dock system with deep-water berths to be constructed.	Haldia
n.a.	100 per gang shift.	Sheds & open storage areas.	n.a.	One of the nearest ports to Delhi, about 900 km N.E.. Five mooring berths.	Kandla

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
INDIA (cont'd)					
Madras	East coast.	n.a.	7.9-11.0	n.a.	Bulk discharge.
INDONESIA					
Belawan	N.W. Sumatra.	n.a.	9.0	n.a.	Normally bagged in holds.
Tanjung Perak (Surubaya)	N. coast of E. Java.	n.a.	8.5 at wharf	n.a.	Normally bagged in holds.
Tanjung Priok	N. coast of W. Java.	n.a.	8.0 at wharf	n.a.	Normally bagged in holds.
IRAN					
Bandar Abbas	Strait of Hormuz.	63% of imports	10.4	30	Usually in bulk, using grabs and suckers.
Bandar Emam	S.W. Iran, at head of the Gulf.	23% of imports	11.0	35	AS FOR BANDAR ABBAS.
Boshehr	S.W. Iran, 180 km S.W. of Shiraz.	8% of imports	8.2	15	AS FOR BANDAR ABBAS.
Chah Bahar	Extreme S.E. Iran	4% of imports	8.8	25	AS FOR BANDAR ABBAS.
ISRAEL					
Ashdod	Town 30 km S. of Tel Aviv.	(inc. soyabeans) 1982: 90 1983: 46	11.0	20-55	Bulk discharge by grabs or suckers.
Haifa	Large town 90 km N. of Tel Aviv.	(inc. soyabeans) 1982:2,166 1983:2,171	12.2	20-55	AS FOR ASHDOD.
JORDAN					
Aqaba	At head of Gulf of Aqaba, an arm of Red Sea.	1982: 534 1983: 592	10.1	25	Suckers and conveyor belts.
LEBANON					
Beirut	Capital & principal city. About mid-way along the Mediterranean coastline.	About 500	12.2	25	Bulk, pneumatic.
Tripoli	70 km N. of Beirut.	10-40	7.9 at quay	25	Lighters.
MALAYSIA					
Kuching	W. end of Sarawak	n.a.	7.6	n.a.	n.a.
Labuan	N.W. coast of Sabah.	n.a.	9.1	n.a.	Bulk.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
n.a.	1,000-1,500 (D)	Sheds & Ware-houses	n.a.	3 mooring berths for general bulk cargo.	INDIA (cont'd) Madras
n.a.	About 1,000 (D)	n.a.	n.a.	Has ocean-going berths.	INDONESIA Belawan
n.a.	About 1,000 (D)	n.a.	n.a.	-	Tanjung Perak (Surubaya)
n.a.	About 1,000 (D)	n.a.	n.a.	-	Tanjung Priok
Lorries	4,000 (D) per vessel	n.a.	n.a.	New port for ocean-going vessels. Has 6 discharging berths.	IRAN Bandar Abbas
AS FOR BANDAR ABBAS		n.a.	n.a.	-	Bandar Emam
AS FOR BANDAR ABBAS		n.a.	n.a.	2 deep-water berths.	Boshehr
AS FOR BANDAR ABBAS		n.a.	n.a.	-	Chah Bahar
Elevators and lorries	Grabs:5,000 (D) Suckers: 10,000 (D)	Silo	n.a.	-	ISRAEL Ashdod
AS FOR ASHDOD		Silo	n.a.	-	Haifa
Elevator (out-side port area)	5,000 (D)	n.a.	n.a.	The only port in Jordan. Also serves Iraq. Vessels may have to leave anchorage at short notice when strong S. winds blow.	JORDAN Aqaba
Elevators	7,000 (D)	Silo	105	11 deep-water berths. Was an important transhipment port, but has suffered severe damage in the civil war.	LEBANON Beirut
n.a.	n.a.	n.a.	n.a.	7 - 8 vessels can berth at quay.	Tripoli
n.a.	n.a.	Covered & open storage	n.a.	-	MALAYSIA Kuching
Shore silos	100 (H)	n.a.	n.a.	-	Labuan

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
MALAYSIA (con'd)					
Lahad Datu	Inlet on E. coast of Sabah.	n.a.	9.8	n.a.	n.a.
Lumut	W. coast of Peninsular Malaysia, 170 km N.W. of Kuala Lumpur.	n.a.	n.a.	15	n.a.
Penang	Island on W. coast of Peninsular Malaysia. 300 km N.W. of Kuala Lumpur.	n.a.	9.8	n.a.	Lighters are used to transport cargoes from Penang to Butterworth, the railhead on the mainland opposite the island.
Port Kelang	S.W. coast of Peninsular Malaysia.	n.a.	10.9 at dry bulk berth	n.a.	Bulk.
Sandakan	N.W. Sabah	n.a.	7.6	n.a.	n.a.
PAKISTAN					
Karachi	100 km W. of mouth of River Indus.	1982/83: 478 1983/84: 470 incl. pulses	9.8	20-25	Wheat in bulk using vacuvators. Pulses in bags using slings from electric shore cranes.
PHILIPPINES					
Batangas	Luzon: 100 km S. of Manila.	1982: 76 1983: 87 (including soyabeans)	11.0	25	Usually in bulk, using grabs, suckers or clamshells.
Cebu	E. coast of island of Cebu.	1982: 136 1983: 132	8.5	25	AS FOR BATANGAS
Hondagua	Luzon: Port on Lamon Bay, 150 km S.E of Manila.	1982: 114 1983: 98	9.8	25	AS FOR BATANGAS
Iligan	N. coast of Mindanao.	1982: 118 1983: 108	12.2	25	AS FOR BATANGAS
Manila	On bay on W. coast of Luzon.	1982: 845 1983: 923 (including soyabeans)	9.8	25	Discharge into barges.
REPUBLIC OF KOREA					
Busan	S.E. coast	n.a.	13.4	n.a.	Conveyor system.
Inchon	N.W. coast	n.a.	14.0	50 (max.)	Pneumatic unloaders.
SAUDI ARABIA					
Dammam	On the Gulf: 360 km N.E. of Riyadh	1983: 728	13.5	75 (max.)	Pneumatic discharge towers.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
					MALAYSIA (cont'd)
n.a.	40 (H) for palletised cargoes	Godowns	n.a.	No cranes available.	Lahad Datu
n.a.	n.a.	n.a.	n.a.	Flour mill in port.	Lumut
n.a.	n.a.	Godowns	n.a.	Numerous berths. Bulk cargo terminal to be developed.	Penang
Conveyor belts	800-1,200 (H)	Godowns	n.a.	Serves the capital, Kuala Lumpur, which lies 50 km inland. Major new port developments planned.	Port Kelang
n.a.	n.a.	Godowns	n.a.	A major transhipment port	Sandakan
					PAKISTAN
Quayside for bagging & subsequent removal in waggons	Bulk: 4,500 (D)	Godowns	n.a.	It is planned to construct a new port, with bulk grain handling facilities, at port Qasim, 60 km E. of Karachi.	Karachi
					PHILIPPINES
Silo	n.a.	Silo	n.a.	-	Batangas
Silo	n.a.	Silo & warehses.	n.a.	-	Cebu
Silo	n.a.	Silo	n.a.	-	Hondagua
Silo	n.a.	Silo	n.a.	-	Iligan
n.a.	n.a.	Warehse	n.a.	23 berths for ocean-going vessels. Discharge into barges subject to spillage in bad weather. Insufficiency of barges and lighters, berths, stevedoring equipment and storage facilities.	Manila
					REPUBLIC OF KOREA
n.a.	400 (H)	Silos	83	A new grain handling facility with annual throughput of 2 m. tons.	Busan
n.a.	800 (H)	Silos	330	Serves the capital, Seoul, which lies 30 km inland.	Inchon
					SAUDI ARABIA
Flour mill, or elevators, thence lorries, railcars.	Bulk: 400 (H) Bags: 1,000-1,500 (D)	Silo	80	Large number of berths.	Dammam

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
SAUDI ARABIA (cont'd)					
Jeddah	Red Sea, 70 km W. of Mecca.	1983:2,505	11.0	40	Suckers.
Jubail	On the Gulf, 80 km N. of Dammam.	n.a.	14.0 (entrance channel)	n.a.	Bulk cereals discharged into silo vessel (30,000 ton capacity) at anchorage.
SRI LANKA					
Colombo	W. coast.	n.a.	11.3	n.a.	Pneumatic installation and belt conveyor.
Trincomalee	Natural harbour on N.E. coast.	n.a	13	35-50	Bulk.
SYRIAN ARAB REPUBLIC					
Lattakia	At N. end of Mediterranean coastline.	n.a.	8.2	about 25	n.a.
Tartous	70 km S. of Lattakia.	n.a.	10.1	n.a.	n.a.
TURKEY					
Iskenderun	On Gulf at N.W. corner of Mediterranean.	n.a.	9.1	40	Portable pneumatic elevators.
Istanbul	On channel (Bosphorus) between Black Sea and Sea of Marmara.	n.a.	9.1	40	AS FOR ISKENDERUN.
Izmir	W. coast, on inlet of Aegean Sea.	n.a.	9.1	40	AS FOR ISKENDERUN.
Mersin	E. end of Mediterranean coast.	n.a.	8.8	40	AS FOR ISKENDERUN. Has also conveyor system.
Samsun	Midway along N. (Black Sea) coast.	n.a.	8.8	40	AS FOR ISKENDERUN.
Trabazon	E. end of Black Sea coast.	n.a.	8.8	40	AS FOR ISKENDERUN.
VIETNAM					
Danang	Midway along the E. coast.	n.a.	13 at anchorage 4.9 in harbour	n.a.	Discharge into barges. No specialised facilities.
Haiphong	Red River Delta, 100 km S.E. of Hanoi.	n.a.	7.6	n.a.	Lighters, using ship's gear.
Ho Chi Minh City	At S. end of country, 50 km up Saigon River.	n.a.	9.1	n.a.	n.a.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
					SAUDI ARABIA (cont'd)
Elevators, thence lorries and railcars.	Bulk:400 (H) Bags: 1,000-1,500 (D)	Silo	120	-	Jeddah
n.a.	n.a.	n.a.	n.a.	-	Jubail
					SRI LANKA
Flour mill	100-200 (H)	n.a.	n.a.	-	Colombo
Flour mill	n.a.	n.a.	n.a.	-	Trincomalee
					SYRIAN ARAB REPUBLIC
n.a.	Bulk: 3,000 (D) Bags:750 (D)	Silo	45	8 deep-water berths.	Lattakia
n.a.	600 (H)	Silo	100	11 berths for general cargo vessels. New port under construction.	Tartous
					TURKEY
Silos, or direct onto lorries or rail waggons.	2,000 (D) (effective loading rate is 300 (H).)	Silo	20	Port handles goods for Iran and Iraq. Suffers severe congestion at times.	Iskenderun
AS FOR ISKENDERUN	2,000-2,500 (D)	Silo	49	Largest city and principal port of Turkey. Vessels of over 8.5 m. have to be lightened Very little room for port improvements.	Istanbul
AS FOR ISKENDERUN	2,000-2,500 (D)	Silo	32	-	Izmir
AS FOR ISKENDERUN	2,000 (D) (loading rate 2,500 (D).)	Silo	100	Largest harbour in Turkey. Transit port for Iran and Iraq. Delays commonly experienced.	Mersin
AS FOR ISKENDERUN	1,000-1,500 (D)	Silo	34	Handles traffic for Iran.	Samsun
AS FOR ISKENDERUN	1,000-1,500 (D)	Silo, also warehouses	10	-	Trabazon
					VIETNAM
n.a.	n.a.	Warehouses	n.a.	Anchorage unsheltered during winter monsoon or typhoons.	Danang
n.a.	n.a.	Open storage area	n.a.	Suffers from considerable silting.	Haiphong
n.a.	Bulk:1,500(D) Bags:1,000(D)	Silo	n.a.	Connected to a network of waterways in the Mekong River Delta.	Ho Chi Minh City

PORT DETAILS - A

COUNTRY AND PORT	LOCATION	TONNAGE OF GRAIN UNLOADED '000 tons	DRAUGHT LIMIT metres	USUAL GRAIN CARGO SIZE '000 tons	UNLOADING METHODS
YEMEN ARAB REPUBLIC					
Hodeidah	Midway along W. (Red Sea) coastline.	1982: 203 1983: 282	9.2	20	Bulk, using suckers.
Mokha	S. end of coastline.	n.a.	7.1-9.8 at anchorage	n.a.	Lighters.
Salif	80 km N. of Hodeidah.	1982: 68 1983: 94	8.5-9.1	20	Bags.
YEMEN (PEOPLES' DEMOCRATIC REPUBLIC)					
Aden	At S. tip of Arabian Peninsular. Large, well protected, deep-water harbour.	n.a.	12.5	n.a.	Lighters.
EUROPE					
Malta					
Valetta	Natural harbour on N.E. coast.	1982: 115 1983: 111	9.0	5-12	Bulk, using suckers. Some cereals imported in bags.

PORT DETAILS - B

DISCHARGE INTO	NORMAL DISCHARGE RATE tons per day (D) or per hour (H)	PORT STORAGE TYPE	PORT STORAGE CAPACITY '000 tons	OTHER INFORMATION	COUNTRY AND PORT
					YEMEN ARAB REPUBLIC
Lorries, which take grain to elevators.	20 (H) for 12-hour day	Silo	30	Serves the capital, San'a which lies 150 km inland. New conveyor system to be constructed allowing discharge at 400 tons/day.	Hodeidah
n.a.	n.a.	n.a.	n.a.	Long-term expansion planned.	Mokha
n.a.	n.a.	n.a.	n.a.	Mooring facilities for vessels of up to 50,000 tons.	Salif
					YEMEN (PEOPLES' DEMOCRATIC REPUBLIC)
n.a.	n.a.	n.a.	n.a.	Only 1 deep-water berth presently available for general cargo. Additional grain berth planned.	Aden
					EUROPE
					MALTA
Elevators. Bags out into lorries .	1,000 (D)	Silo	13	New 86,000 tons silo under construction will incorporate mechanical ship unloader. Bulk carriers of 60-80,000 tons will be able to discharge at 1,100 tons/hour, while 20,000 ton coasters can load at 1,250 tons/hour.	Valetta