THE STATE OF FOOD AND AGRICULTURE 1968

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

THE STATE OF FOOD AND AGRICULTURE 1968

CL/51/2

THE STATE OF FOOD AND AGRICULTURE 1968

WORLD REVIEW AND OUTLOOK

RAISING AGRICULTURAL PRODUCTIVITY
IN DEVELOPING COUNTRIES
THROUGH TECHNOLOGICAL IMPROVEMENT

IMPROVED STORAGE AND ITS
CONTRIBUTION TO
WORLD FOOD SUPPLIES

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1968

The statistical material in this publication has been prepared from the information available to FAO up to 15 July 1968

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 Food and Agriculture Organization of the United Nations concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

Printed in Italy

CONTENTS

Annex tables

Figures

FOREWORD

In contrast to the poor results of the two previous years, there was a large increase in food production in each of the developing regions in 1967. According to FAO's preliminary estimates, food production rose by about 3 percent in the world as a whole and by almost 6 percent in the developing regions. These regions were therefore able to make up much, though not all, of the loss in production per caput suffered in 1965 and 1966.

Much of the increase in food production in 1967 was the result of better weather. But other factors were also important. A number of governments have in the last few years been placing greater emphasis on agriculture in their development planning, stimulated in part by the disastrous harvests of 1965 and 1966 and the depletion of the North American grain stocks. At the same time, long years of patient activity in such fields as research, extension, trials and demonstrations, and long-term investments in water development, agricultural institutions, and other infrastructure are at last beginning to bear fruit. As a result, farmers in several countries are taking much more rapidly than before to the use of fertilizers and other improved practices, and governments are making greater efforts to ensure that the necessary supplies are available to them. The introduction into a number of Asian countries of the so-called "high-yielding varieties" of cereals has coincided most opportunely with these developments and contributed to the good harvests of 1967.

Thus the world food and agriculture situation is now in a stage of transition and hope. After a long period (prior to the setbacks of 1965 and 1966) in which food production per caput in the developing countries was rising so slowly as to present a most unfavorable prospect for the future, it now seems that the potential exists for a much more rapid increase. The high-yielding varieties of cereals represent a major technological breakthrough. If used with suitable combinations of other inputs, in particular fertilizers, water and pesticides, they are capable under favorable conditions of raising yields severalfold in wide areas of the developing regions where hitherto only low-yielding indigenous varieties were available. In the areas to which they are suited they can transform the production situation by greatly raising the yield ceiling for the profitable application of fertilizers and other inputs. They could therefore bring a rapid increase in food production in many of the developing countries, and make it possible for agriculture to contribute much more positively to their economic development.

It would be a mistake, however, to jump to the conclusion that the world food problem has been solved either temporarily or permanently. Realizing the new potential will not be easy, and it is still too early to see how many countries will be able to take full advantage of it or how quickly they will be able to do so. The good results in 1967 were heavily influenced by the weather and by the high farm prices caused by shortages in previous years. Not all countries can benefit equally from the recent breakthroughs; in some of them cereals do not provide the basic food, and in others natural conditions are not suitable for using the high-yielding varieties. Any lasting solution of nutritional problems depends on consumer purchasing power and thus on progress in the nonagricultural sectors of the economy as well.

Following the customary review of the current situation in Chapter II of this report, Chapter III examines the problems of raising agricultural productivity in developing countries by means of technological improvement. From this it is clear that the simultaneous action required on many fronts will place a severe strain on both the administrative capacity of developing countries and their resources of finance and trained manpower. Efficient organizations are needed for the production and distribution of pure seeds. Greatly increased supplies of fertilizers and pesticides must be obtained either from domestic production or imports (involving large expenditures of scarce foreign exchange), and channeled to the farmer through improved and expanded transport, distribution and storage facilities.

Credit facilities too will have to be greatly expanded. Research services will have to be equipped to bring forward a continuing pipeline of new varieties if disastrous outbreaks of disease are to be avoided. Extension services will have to cope with unexpected problems. Price policies will need to be adapted to maintain adequate incentives to producers without encouraging unsalable surpluses. The progress made with high-yielding varieties of cereals must be repeated with other crops and with livestock.

Because of the great possibilities they offer, I have selected the high-yielding varieties of cereals as one of the five priority areas for the work of FAO. Another is the protein gap, which is undoubtedly the most serious of the nutritional problems with which we are faced. Here the high-yielding varieties of cereals can themselves make a significant contribution if appropriate measures can be devised to take advantage of the new possibilities of releasing land from cereals to the production of protein-rich crops, and of lowering cereal prices sufficiently for them to be fed to livestock.

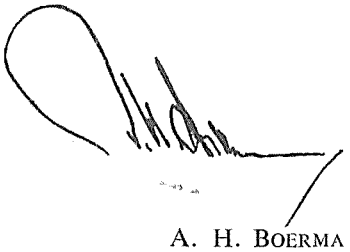
A further priority area I have selected is the reduction of waste in all forms and at all stages of agricultural production and marketing. In this respect improvements in storage can make a substantial contribution, and this forms the subject of Chapter IV of the present report. Most studies of storage deal primarily with the technical and engineering aspects, but this chapter makes a tentative examination of the economic aspects as well and of the role of storage in the marketing chain from producer to consumer.

A fourth area to which I am proposing to give priority in the Organization's program is that of the institutional and other measures needed for the development of rural populations. Action in this respect is particularly urgent because of the long time needed for measures to take full effect in such fields as land tenure and the development of cooperatives and other rural institutions. These aspects have received much stress in earlier issues of The state of food and agriculture. *Many of them are emphasized again in this year's chapter on raising agricultural productivity.*

The fifth priority area concerns the foreign exchange resources of the developing countries, which depend so heavily on earnings from their exports of agricultural products. Here developments during the year under review have been much less encouraging than those in the sphere of food production. The agricultural export earnings of the developing countries declined in 1967 for the second year in succession. Among recent measures to improve the foreign trade situation may be cited the new international agreements for grains and coffee, but on a more general plane progress at the second session of the United Nations Conference on Trade and Development was most disappointing.

More enlightened trade policies on the part of the developed countries are still a basic essential for more rapid economic progress in the developing countries, and thus ultimately for improvements in the food consumption and levels of living of their populations. International assistance to agriculture is also more than ever necessary to support the efforts of the developing countries to take advantage of the new opportunities. At the same time there are much better possibilities that such assistance will produce concrete results.

If the opportunities now offered can be seized, there is real hope of a much more rapid improvement in the food situation than has hitherto been possible, and of the achievement of a proper equilibrium between population and food supplies. Continued uncontrolled population expansion could, however, still cause these hopes to be dashed. It is necessary, therefore, to redouble efforts to slow down the growth of population, for if this chance is missed demand could quite soon begin to outstrip supplies once again.



A. H. BOERMA
Director-General

Chapter I. - SUMMARY

Chapter II. - World review and outlook

Agricultural production

World food production is estimated to have increased by about 3 percent in 1967. In the developing regions, after the poor harvests of the two preceding years, there was an increase of 6 percent. This was the largest rise in these regions for many years, and on a per caput basis it made up much, though not all, of the ground lost in 1965 and 1966. The excellent production results in the developing regions in 1967 were to a large extent due to much better weather, but other factors also contributed, including the high-yielding varieties of cereals.

In the individual developing regions the increases in food production in 1967 ranged from 4 percent in the Near East to 5 percent in Latin America and 6 percent in Africa and in the Far East, excluding China (Mainland). In the developed regions the course of production was less uniform, and there were declines both in eastern Europe and the U.S.S.R. and in Oceania.

The increase in total agricultural production in 1967 was mainly accounted for by larger grain production. The biggest increases were in the production of groundnuts, coffee, and rice, and there were declines in the production of citrus fruit, copra, wheat, cotton, cottonseed, and oats. The rapid expansion of fishery production continued with an increase of 5 percent in 1967, but forest production failed to expand for the second year in succession.

Crop prospects for 1968 are still liable to substantial changes as a result of weather conditions later in the season. In general harvests seem likely to be large, but there have been serious droughts in a number of areas, especially the Balkan countries and parts of Latin America and of central and southern Africa.

Changes in stocks

After declining for the past three years, the overall level of stocks of major agricultural products hardly changed during 1967/68. Wheat stocks rose to restore a more adequate level of reserves and stocks of coarse grains increased, but stocks of rice remained small. World cotton stocks were drawn down to a minimal level, while those of wool, especially of the coarser grades, continued to be excessive. Stocks of fats and oils rose; butter stocks reached surplus proportions, and soybean stocks again increased sharply. Stocks of coffee, sugar, natural rubber, and tobacco all continued large.

Economic activity and the demand for agricultural products

With few exceptions, the annual rates of growth in the developed market economies fell short in 1967 of those attained during 1966, although expansion had generally been resumed by the end of 1967. Most of the developing countries, in contrast, appear to have at least maintained their 1966 rate of economic growth during 1967, and many of them to have exceeded it, partly because of the recovery of agricultural production.

The slackening in the rate of economic growth in most of the developed market economies does not appear to have had significant adverse effects on the demand for food generally. Demand for industrially-used raw materials, however, was adversely affected by the slower rate of economic growth as well as by increased competition from synthetics.

Food supplies and consumption

In the developing countries as a whole food production per caput averaged about 3 percent less in 1965-67 than in the preceding three-year period. Although the combined net export of food of these regions was reduced by some 30 percent on a per caput basis, there was still a decline of almost 3 percent in their per caput food supplies. The biggest changes in food supplies between 1962-64 and 1965-67 were

in the Far East, where (in spite of a 50 percent rise in net imports per caput) supplies per caput appear to have fallen by about 5 percent.

International trade in agricultural products

Preliminary data for 1967 indicate that, for the first time since 1958, world trade in agricultural, fishery and forest products failed to increase. For agricultural products, a decline both in the quantities exported and in prices reduced earnings to their 1964-65 level. Earnings from fishery products remained at the high level of 1966 and those from forest products increased.

The economic difficulties in the main industrialized countries caused a decline in the import demand for raw materials, and earnings from exports of these products fell back to the depressed level of 1958-59. Earnings from exports of foods and feedstuffs were somewhat reduced, as the better harvests in many developing countries in 1967 began to affect their level of imports.

While both the developed and the developing regions suffered a decline in earnings, the impact on the latter was somewhat greater because of their position as the main supplier of raw materials. The combined earnings of the developing regions fell by more than 2 percent for the second year in succession.

Intensive discussion has continued on many aspects of international trade policies, especially in connection with the second session of the United Nations Conference on Trade and Development. With the main exception of new commodity agreements for wheat and coffee, however, progress has continued to be limited.

Foreign assistance for agricultural development

After having failed to increase significantly in 1966, the net flow of financial resources from the member countries of the Development Assistance Committee (DAC) to the developing countries is estimated to have risen by 8 percent in 1967. About 9 percent of the total official commitments of the DAC countries have in recent years been for assistance for agricultural development. The Food Aid Convention negotiated in August 1967 as part of the International Grains Arrangement provides for annual shipments of 4.5 million tons of food grains as aid to developing countries.

Agricultural production requisites

A major feature of the recent agricultural situation has been a much more rapid increase in many developing countries in the use of production requisites such as fertilizers, improved seeds, farm machinery, and pesticides. The only comprehensive statistics are for fertilizers and tractors. The increase in fertilizer consumption in the developing countries was almost twice as fast in 1966/67 as the year before, and there was also a substantial rise in tractor numbers.

Farm prices and incomes

Increases in prices received by farmers were less widespread in 1967 than in most recent years. Mainly because of large harvests, these prices remained stable or declined in almost half of the countries for which indices of prices received are available. Very few developing countries publish indices of prices received by farmers, but the limited available data indicate continuing price increases in many instances. Few of the increases in farm prices in 1967, however, were greater than the increase in the overall cost of living. In real terms, therefore, farm prices fell in many countries. In most of the countries where data are available, the increase in prices paid by farmers outweighed the change in prices received.

Information on farm income for the year under review is available, as in previous years, only for a few developed countries. In spite of the generally larger harvests, farm income in 1967 in these countries tended to be more or less unchanged from the year before.

Consumer prices

As a result of the generally better harvests in 1967, the increase in consumer prices appears to have slowed down in a good many countries. The increase in food prices outstripped that in overall prices in less than a third of the countries for which data are available, which is somewhat less than in most recent years.

Agricultural policies and development plans

Few new development plans were introduced during the period under review, and agricultural policies in general continued along the lines of recent years, although with some important changes in emphasis.

Unfavorable economic conditions caused a number of countries, particularly in Africa and Latin America, to revise the targets set earlier in their development plans. On the other hand, in some of the latest plans there is a significant increase in investment in agriculture, both in absolute terms and in

relation to total investment. Another major trend in developing countries is toward increased emphasis on the use of improved seeds, fertilizers, crop protection chemicals, and other inputs. Credit schemes are also being increasingly used in developing countries as a means of stimulating production in chosen sectors and are particularly important in connection with the adoption of new varieties and the increased use of fertilizers. Direct incentives to farmers in the form of price and market guarantees of various kinds are being more widely applied.

In the U.S.S.R. and eastern Europe planning methods are under revision, and prices of agricultural commodities and of production requisites are being brought more closely into line with their costs of production. In western Europe the further accumulation of butter stocks, both within the European Economic Community (EEC) and elsewhere, has led several governments to introduce measures to discourage milk production or to encourage meat production.

As from 1 July 1968, the common market for both agricultural and industrial goods is virtually complete for the EEC countries. There is little progress to report from the various regional economic cooperation schemes in other parts of the world, although a number of new groupings have been formed in Africa.

Chapter III. - Raising agricultural productivity in developing countries through technological improvement

In a number of developing countries there are signs of a substantial acceleration in the rate of application of modern technology to agricultural production. Long years of patient activity in research, extension, trials and demonstrations, and long-term investments in water development, agricultural institutions, and other infrastructure are at last beginning to show results. Many governments have become aware of the need for a package of improved practices, including improved seeds, chemical fertilizers, better water use, crop protection, improved implements and generally higher standards of farming, if production is to be increased sufficiently rapidly. Farmers in many areas also show a new awareness of the possibilities of obtaining higher yields per hectare by the use of purchased inputs such as better seeds, fertilizers and pesticides. The recent sharp spurt in fertilizer availability and use in many developing countries is perhaps the most striking indication of the changes that are taking place.

Attention has recently been focused on the rapid increases in productivity promised by the so-called high-yielding varieties of cereals, in particular the varieties of wheat developed in Mexico and those of rice issued by the International Rice Research Institute in the Philippines. These varieties have begun to be introduced on a large scale in several Asian countries, where their arrival has coincided most opportunely with the upsurge in the use of fertilizers and other improved practices.

Increases in agricultural production in developing countries have hitherto come mainly from extension of the cultivated area. In many of these countries, however, the remaining untilled land is either of poor quality or can be brought into production only after heavy investment. The needed increases in agricultural production can in many cases be obtained much more cheaply and rapidly by raising yields on existing farms. At the same time, higher productivity per person engaged in agriculture is a principal requirement if incomes and levels of living are to be raised for the farm families who constitute one half to three quarters of the total population in most developing countries.

In the developed countries, stages in the historical development of agricultural production have tended to be characterized by differing combinations of inputs. Such changes reflect primarily the changing structure of the economy and the successive advances that have been made in agricultural technology. In developing countries this slow evolution, dependent on successive waves of technological advance, can to some extent be bypassed. In fact it is essential that technological improvements should no longer be introduced piecemeal in developing countries but as a package.

Role of science and technology

In the main part of the chapter the technological possibilities are reviewed in turn for each of the main aspects of crop production (crop improvement, water use, fertilizers, crop protection, machinery and implements) and of livestock production. Although each of the main fields is dealt with separately, it is stressed that they have full impact only when combined in a suitable package.

Organizational and institutional requirements

Ensuring that the necessary package of inputs is available to farmers and that they have both the possibility and the incentive to purchase and use them involves numerous problems in developing countries. Organizing the necessary services over wide areas will place a severe strain on the administrative capacity and financial resources of many governments.

This section of the chapter discusses the main requirements in respect of research, extension and training, seed production, input supply services, finance and credit, and incentives for farmers.

Strategy for technological improvement

In the final section of the chapter some suggestions are made as to the overall strategy needed to promote technological improvement in agriculture in the developing countries.

Perhaps the basic element in a strategy of technological improvement is the package approach itself. There is ample demonstration of the complementarity of the various inputs for agricultural production (in particular improved seeds, fertilizers and water) and of the need to introduce them in an integrated rather than a piecemeal fashion. But it is also clear that the same approach is needed to the numerous services involved in agricultural development: research, extension, seed production, input supplies, marketing, storage, credit, and so on. In all these fields the government's role is crucial in most developing countries, and rapid technological improvement in agriculture implies giving a high priority to this sector in national development plans.

The appropriate strategy will clearly differ according to the stage that has been reached in a country's development. Also related to a country's stage of development is the appropriate mix of foreign aid for agriculture, as between financial aid, technical aid, food aid, or production requisites. With the rapid increase in the use of purchased inputs, especially fertilizers, now occurring in so many developing countries, it is likely that aid in the form of production requisites will assume special importance in the immediate future.

Even with maximum use of foreign aid in all its forms, however, the burden of providing a suitable package of inputs and services is bound to put a heavy strain on the financial and administrative resources of governments. For this reason they will almost always be faced with the choice of either spreading measures to promote technological improvement thinly over the whole country or concentrating on the more favored areas or more progressive producers. Another major strategy decision is whether sufficient technological progress can be achieved within the framework of the small farms prevalent in most developing countries, or whether it is necessary to devise new forms of land holding enabling land to be worked in large units.

For a strategy of technological improvement to succeed on a sustained basis, it must include plans to cope with the consequences of its success. Careful study is needed of the changes that occur in the economics of crop production as technology improves. The problem is essentially one of planning. Questions of interrelations and of timing are of basic importance. Improved varieties of noncereal crops must be available in time to take advantage of the land released from cereal production. If the large and cheap supplies of cereals that may be expected in some developing countries are not to be wasted, the necessary livestock base must be available to take advantage of them. Such measures are essential if recent technological improvements are to raise the quality as well as the quantity of the diet.

Chapter IV. - Improved storage and its contribution to world food supplies

The slow increase in per caput food production in the developing countries has focused attention on the possibility of obtaining at least part of the needed increase in food supplies through more efficient use of the existing production. Improved storage is one of the principal approaches to making better use of what is produced.

The contribution of improved storage to the expansion of world food supplies has two main aspects. The more obvious one is the avoidance of losses of food that has been produced and could be consumed if it were adequately protected. The other vital aspect is the basic function of storage in the marketing chain from producer to consumer.

Role of storage

The staple food requirements of a country remain more or less constant throughout the year, regardless of price or the availability of other products. The supply of staple foods, on the other hand, is subject to numerous variations, of which

the largest is in the seasonal availability of local crops. Changes in yield, area planted, regional production, and the proportion of harvests actually sold all introduce elements of uncertainty and alter the conditions of supply. The role of storage is to absorb these variations in supply, so that produce may be channeled to consumers as they require it and at a reasonable price.

Storage problems in developing countries

Storage problems are not confined to developing countries. But it is in these countries that better storage is particularly needed and can make the greatest impact on world food supplies. Moreover, because of the scarcity of resources in these countries, investments in storage facilities, like any other investments, must be planned with the utmost care and the facilities operated in the most efficient manner possible.

This section of the chapter therefore discusses some of the storage problems encountered in developing countries. It begins with an account of the food losses that result from inadequate storage. The need for adequate preparation of products for storage and the difficulties involved in ensuring this under the conditions existing in the developing countries are then reviewed. This is followed by an account of the problems posed by the changing demand for storage and some of the special difficulties of storage planning in developing countries.

Storage of durable products

This section deals first with storage structures for durable products and with methods of preventing and controlling losses due to storage pests. It then discusses the improvement of storage at successive stages from producer to final consumer. Particular attention is given to economic aspects, since in the developing countries, with their scarce resources, these must always be kept in mind; they may well point to other solutions than those first apparent on the basis of experience elsewhere.

Storage of perishable products

Products such as fruit, vegetables, fish and meat, being subject to rapid deterioration (especially under tropical conditions), can be stored in their natural state for any appreciable length of time only at artificially maintained low temperatures. Although the basic storage function remains the same as for other food products, the technical and marketing problems of refrigerated storage are of a different order and require separate treatment. A brief section on refrigerated storage and its alternatives therefore follows the more detailed discussion of the storage of durable products.

Storage policy

Technical considerations taken into account, the final decision as to what storage methods and facilities to use, how to operate and where to locate them is an economic one. This must be so because it involves the use of financial resources, and the benefits to be derived from the adoption of any particular form of storage and mode of operation must be weighed against the alternative use of these resources. No standard answer is to be expected. Each set of circumstances calls for an analysis designed to determine what is most advantageous, taking into account the size and nature of the available funds, the comparative urgency of competing claims, and the level of development.

In planning the location, size and type of storage facilities in any country or area, it is important to determine just how they will fit into the marketing system. Objective study of the prevailing methods and organization of marketing must necessarily precede decisions on storage construction. Only within this framework can realistic estimates be made of the extent to which new storage will be used.

A major conclusion for international programs of technical and financial assistance is the need to maintain an objective approach in their assistance to countries seeking help in the financing of additional storage, and to furnish advice which takes full account of differences in marketing and handling procedures and in the relative scarcity of capital and labor. Too many of the misplaced or wasteful investments in storage in the developing countries reflect efforts to sell a specific storage design, recommendations based on engineering concepts of efficiency suited to countries where large volumes of grain are handled in bulk, and credits tied to purchases from a predetermined source.

Chapter II. - WORLD REVIEW AND OUTLOOK

Agricultural production

In the developing countries there was a large increase in agricultural production in 1967 after the poor harvests of the two preceding years. In the world as a whole changes were smaller, and according to FAO's preliminary estimates the combined production of crops, livestock, fishery and forest products rose by about 3 percent (Table II-1). The rapid expansion of fishery production continued with an increase of 5 percent in 1967. Crop and livestock production (by far the largest categories) increased by 3 percent, but forest production failed to expand for the second year in succession.

For agricultural production proper (crops and livestock), and in particular for food production, 1967 was highly favorable in each of the developing regions (Table II-2). In this group of regions as a whole the increase of 6 percent in food production was the largest for many years, and on a per caput basis made up much, though not all, of the ground lost in 1965 and 1966. In the Far East, excluding China (Mainland), food production is estimated to have increased by about 6 percent in 1967, following a decline in 1965 and a very small increase in 1966. Food production also rose by about 6 percent in Africa, where there had been virtually no increase in either of the two previous years. In Latin America an increase of about 5 percent followed a very small increase in 1966. In the Near East, where there had been little setback in 1965 and 1966, food production rose by about 4 percent in 1967.

The excellent production results in the developing regions in 1967 were to a large extent due to much better weather than in the two previous years. But other factors also contributed. A number of development plans now place more emphasis on agriculture than in the past, while in some cases long-term investments in agricultural infrastructure under earlier plans are now beginning to give concrete results. The scarcity prices of 1965 and 1966 increased farmers' incentives to produce more. In some countries, especially in Asia, fertilizer use has increased

TABLE II-1. – INDICES OF WORLD [1] PRODUCTION OF AGRICULTURAL, FISHERY AND FORESTRY PRODUCTS

	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, average 1952-56 = 100															
TOTAL PRODUCTION	...	97	99	103	107	107	113	116	119	121	125	128	131	133	137	141
Agriculture	87	98	99	103	107	107	114	117	120	121	126	129	132	133	138	142
Fisheries	85	96	100	104	108	110	112	116	121	127	134	138	144	152	159	167
Forestry	...	95	100	105	106	105	106	111	112	111	113	115	120	123	123	123
POPULATION	93	98	100	102	104	106	108	110	112	114	117	119	122	124	126	129
PER CAPUT PRODUCTION	...	99	99	101	103	101	105	106	107	106	107	107	108	107	109	109
Agriculture	93	100	99	101	103	102	106	106	107	106	108	108	109	107	109	109
Fisheries	92	98	100	102	105	104	104	105	108	111	115	116	119	123	126	129
Forestry	...	96	100	103	102	100	98	101	100	97	97	97	99	99	97	95

NOTE: For details of the methodology and coverage of these indices, see the explanatory note to the Annex tables.
[1] Excluding China (Mainland).

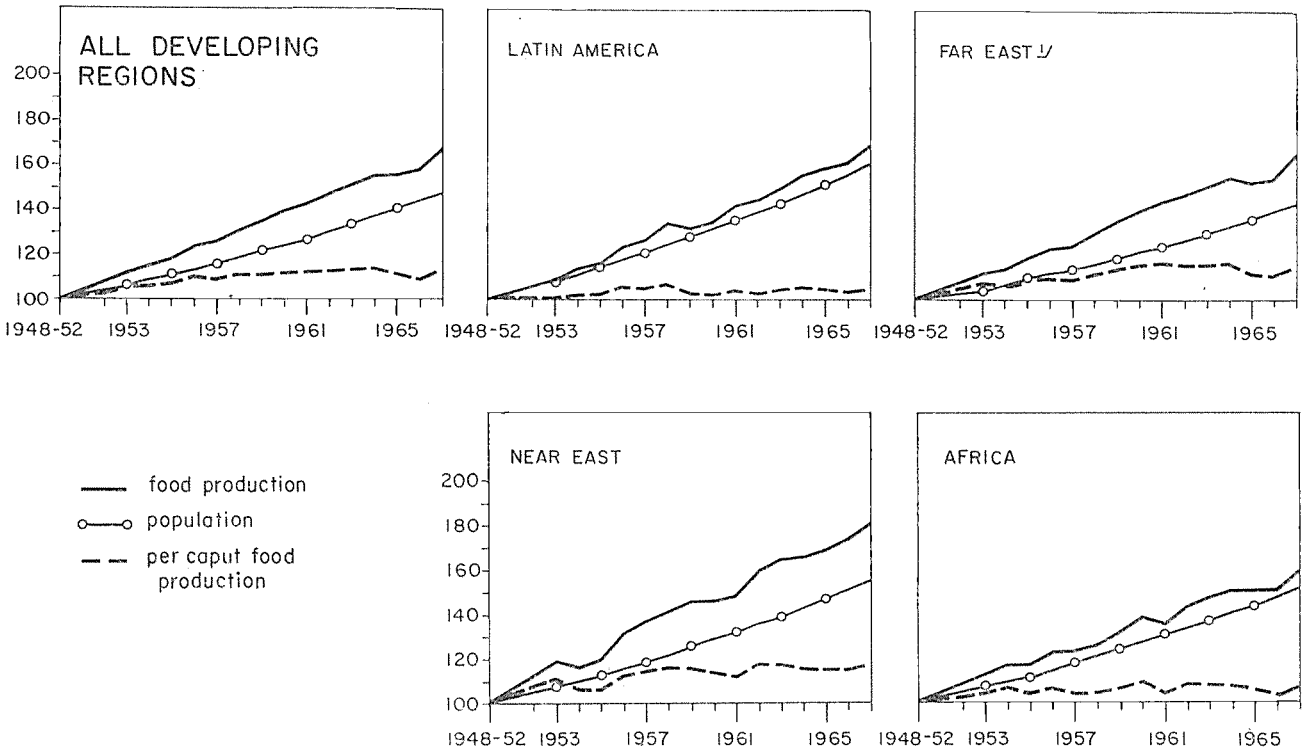
TABLE II-2. – INDICES OF WORLD [1] AND REGIONAL AGRICULTURAL PRODUCTION IN RELATION TO POPULATION

	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, average 1952-56 = 100															
Total production																
ALL AGRICULTURAL PRODUCTS																
Western Europe	84	101	101	102	103	106	109	112	119	118	126	128	129	130	133	141
Eastern Europe and U.S.S.R.	82	94	96	105	115	118	128	130	132	135	138	133	145	148	165	164
North America	93	99	97	101	103	98	106	107	110	109	112	119	117	119	120	122
Oceania	90	97	97	104	106	102	117	119	123	125	133	137	142	135	151	140
Four above regions	87	98	98	103	107	106	113	116	119	119	124	126	130	131	138	140
Latin America	88	95	100	103	107	111	119	118	121	128	131	133	135	141	140	145
Far East [1]	87	97	100	104	107	108	112	117	121	126	129	131	135	133	135	143
Near East	84	99	98	100	110	115	119	123	124	124	136	140	143	146	149	154
Africa	86	97	101	102	107	107	110	115	122	119	127	131	134	135	135	143
Four above regions	87	97	100	103	108	110	114	118	122	125	130	133	136	137	138	145
ALL ABOVE REGIONS	87	98	99	103	107	107	114	117	120	121	126	129	132	133	138	142
FOOD PRODUCTS ONLY																
Western Europe	84	101	101	102	103	106	110	113	119	119	126	128	129	130	133	142
Eastern Europe and U.S.S.R.	83	94	96	104	114	118	129	131	133	137	140	134	146	149	167	165
North America	92	98	97	101	104	101	109	109	111	110	114	121	120	122	127	130
Oceania	92	100	98	104	101	99	117	115	123	123	135	138	145	137	158	140
Four above regions	87	98	98	103	107	107	115	117	120	121	126	127	131	132	141	144
Latin America	88	95	100	102	109	112	117	116	118	125	126	132	137	140	141	148
Far East [1]	87	98	100	104	107	108	113	118	123	127	129	132	136	134	135	144
Near East	84	100	98	100	110	115	119	122	123	124	134	138	139	141	145	151
Africa	87	98	102	101	106	106	108	113	120	117	124	128	130	130	130	138
Four above regions	87	98	100	103	108	109	114	117	121	124	128	132	136	136	137	145
ALL ABOVE REGIONS	87	98	99	103	107	108	115	117	121	122	126	129	133	134	140	144
Per caput production																
ALL AGRICULTURAL PRODUCTS																
Western Europe	87	101	101	102	102	104	106	108	113	112	118	118	118	118	119	125
Eastern Europe and U.S.S.R.	87	96	96	103	111	113	120	121	120	122	123	117	126	127	141	139
North America	99	101	97	99	100	93	98	98	98	96	98	102	99	99	99	99
Oceania	99	100	98	101	101	95	107	106	107	107	111	112	114	106	117	106
Four above regions	92	99	98	101	104	102	108	108	110	109	112	112	114	114	119	119
Latin America	98	98	100	101	102	103	106	103	102	105	104	104	102	103	100	101
Far East [1]	94	99	100	102	103	102	104	106	107	109	109	108	109	105	104	108
Near East	93	101	98	98	105	107	107	109	107	104	111	111	110	110	109	110
Africa	94	100	102	100	102	100	100	102	105	100	104	105	105	103	100	104
Four above regions	94	99	100	101	103	103	105	105	106	107	108	108	108	106	104	107
ALL ABOVE REGIONS	93	99	99	101	103	102	106	106	107	106	108	108	109	107	109	110
FOOD PRODUCTS ONLY																
Western Europe	86	102	101	101	102	104	106	108	114	112	118	118	118	118	120	126
Eastern Europe and U.S.S.R.	87	96	96	103	111	113	122	122	122	123	124	118	127	128	142	140
North America	99	100	97	100	101	96	101	100	100	98	99	104	101	102	104	106
Oceania	102	103	98	101	97	92	107	103	107	105	113	113	116	107	122	106
Four above regions	91	99	98	101	104	103	109	109	111	110	113	113	115	115	122	123
Latin America	98	98	100	100	103	103	105	101	100	103	101	102	103	103	101	103
Far East [1]	94	100	100	102	103	102	104	107	108	109	109	109	110	105	104	108
Near East	93	103	98	98	105	107	108	108	105	104	109	110	107	106	107	108
Africa	95	100	102	99	101	99	98	100	103	99	102	103	102	100	97	100
Four above regions	94	100	100	101	104	102	104	105	106	106	107	107	108	105	103	106
ALL ABOVE REGIONS	93	100	99	101	103	102	106	106	108	107	108	108	109	108	111	112

NOTE: For details of the methodology and coverage of these indices, see the explanatory note to the Annex tables.

[1] Excluding China (Mainland).

FIGURE II-1. – TRENDS IN FOOD PRODUCTION AND POPULATION IN DEVELOPING REGIONS



[1] Excluding China (Mainland).

rapidly and high-yielding varieties of cereals are beginning to be introduced on a large scale.[1]

In the developed regions, the course of production was less uniform in 1967. There was an increase of about 6 percent in food production in western Europe and of about 3 percent in North America, though in the latter region the increase in total agricultural production (including nonfood crops) was somewhat smaller because of the decline in United States cotton production. Production in eastern Europe and the U.S.S.R. fell slightly below the record level of 1966. In Oceania also production had reached a record level in 1966, but the Australian drought brought a considerable decline in 1967.

Tables II-1 and II-2 exclude data for China (Mainland), for which there are still no official statistics of production. While food production in China (Mainland) may have fallen slightly in 1966, all indications point to a large increase in 1967.

Food production and population in developing countries

As is well known, the statistics of agricultural production in most developing countries leave much to be desired. They also tend to become available only after a considerable time lag, and to be subject to substantial revision. Thus the preliminary index numbers of production published each year in this report often have to be revised in the next issue.

For this reason, too much significance should not be attached to small percentage changes in the index numbers. At the same time, however, it is clear from an examination of the series over many years that they provide a broadly consistent picture of the overall changes in production in the main regions of the world.

Figure II-1 shows the course of food production in relation to population in the developing regions since shortly after the second world war. In the early part of this period, when there was still an element of recovery from the wartime setback, food production increased a good deal faster than population growth in each of the developing regions. This was followed, however, by a long period in which the increase in food production was only very slightly ahead of population growth.

There was a sudden change in this situation in 1965 and 1966. Food production in the developing regions failed to increase in 1965, and rose in 1966 by less than 1 percent. With the population of these regions growing by 2.5 percent a year, per caput food production fell by 4 percent over these two years from the peak level reached in 1964 to the lowest since 1957.

It seemed likely that a long time would be needed to make up this lost ground, but the preliminary

[1] See Chapter III for a detailed account of these varieties and related developments.

TABLE II-3. – AVERAGE ANNUAL CHANGE IN FOOD PRODUCTION, POPULATION, PER CAPUT INCOME, AND TOTAL DEMAND FOR FOOD IN INDIVIDUAL DEVELOPING COUNTRIES, 1952-56 TO 1962-66

	Food production	Population	Per caput income [1]	Estimated total demand for food [2]
	Average annual percentage change [3]			
Food production increased				
4.0 PERCENT OR MORE				
Venezuela	5.9	3.6	2.2	4.5
Mexico	5.7	3.4	2.9	4.4
Libya	5.6	3.5	...	—
Korea, Rep. of	4.7	2.6	3.3	4.2
Malaysia, West	4.6	3.1	...	—
Thailand	4.6	3.0	2.8	4.2
Brazil	4.5	3.0	2.3	3.7
Panama	4.2	2.9	3.4	4.0
3.0 TO 3.9 PERCENT				
China (Taiwan)	3.8	3.4	3.7	5.1
United Arab Republic	3.7	2.5	3.7	4.4
Turkey	3.4	2.9	1.4	3.7
Guatemala	3.3	3.1	2.2	4.0
Ethiopia	3.3	1.7	...	—
Ceylon	3.2	2.5	0.2	2.6
Honduras	3.1	3.1	0.7	3.4
Philippines	3.1	3.2	1.6	4.2
Iran	3.1	2.4	...	—
2.0 TO 2.9 PERCENT				
Burma	2.8	1.9	2.4	3.1
Colombia	2.7	3.2	1.3	3.7
Peru	2.7	2.7	2.7	4.0
India	2.4	2.2	1.4	3.2
Pakistan	2.4	2.4	1.5	3.5
Chile	2.2	2.4	1.3	3.0
Syrian Arab Republic	2.2	3.1	0.5	3.3
Morocco	2.0	2.8	—0.9	2.3
0 TO 1.9 PERCENT				
Iraq	1.8	3.0	4.9	5.8
Cyprus	1.8	1.2	2.0	1.7
Argentina	1.7	1.7	1.4	1.9
Indonesia	1.5	2.2	...	—
Tunisia	1.1	1.8	2.3	3.1
Uruguay	0.2	1.5	...	—
Cuba	0.1	2.1	...	—
Food production declined				
Algeria	—1.4	1.8	1.6	2.5

[1] Per caput real product 1952-56 to 1963-65 (from Organization for Economic Cooperation and Development, *National accounts of less developed countries*. Research Division, Development Center, Paris, February 1967 (preliminary), p. 9-12. – [2] Calculated on basis of demand elasticities used in FAO. *Agricultural commodities - projections for 1975 and 1985*. Rome, 1967, Vol. II, p. 28-33. – [3] Compound rate; minus sign denotes decrease.

data for 1967 indicate that it has been possible to recover more than half the loss in a single year. In each of the developing regions per caput food production in 1967 was only 1 to 2 percent below the highest levels of recent years, although in both Africa and Latin America the shortfall from an earlier isolated year of particularly good harvests was nearer 3 percent.

The FAO index numbers of food and agricultural production for individual countries are not yet available for 1967. Data up to 1966 for both developed and developing countries are shown in Annex tables 1 and 2, and indicate the wide variations in individual countries that tend to be concealed by the regional indices discussed above. These country data were examined in some detail in last year's report.

In most of the individual developing countries food production has been increasing faster than population in recent years, as indicated by the data given in Table II-3 regarding the 33 such countries for which production index numbers are calculated by FAO. In 11 of these countries (or a third of those for which there are data), however, food production failed to keep pace with population growth in the period 1952-56 to 1962-66.

The growth of population, which ranges up to 3.6 percent per year in the countries shown in Table II-3, is still the main component of the increase in the demand for food in the developing countries. In spite of the disappointingly slow pace of economic development in recent years, however, there has also been some increase in per caput incomes in most of these countries. In the absence of actual figures of demand and consumption, the last column of Table II-3 shows estimates of the increase in total demand for food that may be expected to have resulted from both population and income growth in those countries for which data are available for real product and for the income elasticity of demand. This rough calculation indicates that food production has kept up with demand in only 8 of the 26 countries for which these data are available.

Regional agricultural production in 1967

The 1967 agricultural production situation in each of the main regions is reviewed in more detail below. Statistics of regional production of the principal commodities are shown in Annex table 3.

WESTERN EUROPE

Harvests in western Europe were generally large in 1967 as a result of favorable weather, and production in the region as a whole increased by about 6 percent over the previous year. The expansion was especially pronounced in Belgium, France, Greece, the United Kingdom and central Europe. Elsewhere increases were smaller, and in Finland, Norway and Yugoslavia production declined.

Grain production, particularly of wheat and barley, rose sharply in 1967, with increases of 20 to 30 percent in some countries. In southern Europe, however, the increases were generally smaller. The large harvests of coarse grains were important for feed, as the dry summer weather adversely affected

supplies of roughage and hay in a number of countries. Potato production rose by about 5 percent as a result of high yields, and a trend toward a renewed increase in production and supplies for human consumption appears to have been established. Sugar beet harvests varied considerably from country to country, but the total regional production of sugar rose by 5 percent. Fruit and vegetable production increased in most countries, although the production of some fruits declined in Italy, Spain and the United Kingdom. Total wine production increased and the quality was generally good.

Output of livestock products continued to rise in 1967 in almost all countries. In Italy swine fever had some effect on production, and in the United Kingdom the foot-and-mouth epidemic was one of the largest experienced. The increase in meat production (especially beef and veal) was larger than in recent years. For the third year in succession milk production (and particularly deliveries to dairies) rose faster than consumption, and marketing problems continued in many countries. Butter stocks increased further; only the Netherlands and the Scandinavian countries were able to reduce their butter production by diverting more milk to the production of cheese.

Eastern Europe and the U.S.S.R.

After increasing by 12 percent in 1966, agricultural production in eastern Europe and the U.S.S.R. was slightly lower in 1967.

Although the U.S.S.R. cereal harvest, at 147.6 million tons (including pulses), was well below the record 171.2 million tons of 1966, it exceeded the 1962-66 average by 7 percent. The small production of rice (894,000 tons) was 25 percent more than in 1966. Cotton production was unchanged, but there were large increases for potatoes and vegetables. There was a further increase in the production of sunflowerseed. Most livestock products increased by 4 to 6 percent.

Grain production rose in each of the eastern European countries except Bulgaria and Romania. For both potatoes and sugar beet there were large increases in Eastern Germany and Poland, but production declined elsewhere. Partly because of ample feed supplies from the previous year, livestock production generally increased faster than crop production in 1967.

North America

Total agricultural production in North America in 1967 is estimated to have exceeded the 1966 level by about 2 percent, despite severe drought in large parts of the Canadian western plains and a further sharp curtailment of cotton production in the United States. These reductions were more than offset by increased production of other products in the United States. As in most recent years, the increase in North American food production was greater than in nonfood production, mainly because of developments in United States cotton production.

As compared with the exceptionally high 1966 level, the Canadian 1967 wheat harvest (16.1 million tons) was lower by 28 percent, and barley, oats and rye by about 20 percent. The maize harvest, however, reached a record 1.8 million tons. Flaxseed production was less than half the 1966 crop as a result of sharp reductions in both acreage and yield; rapeseed production was slightly above the 1966 level as the effect of lower yield was more than offset by increased acreage.

In the United States, 1967 crop production is estimated to have been about 5 percent above the 1966 level, with the main increases in wheat (16 percent) and feed grains (11 percent), for which government programs had been adjusted to encourage greater output. Record crops of soybeans and rice were also harvested. For the second consecutive year cotton production was reduced sharply, in accordance with the government program designed to eliminate surplus stocks of this commodity.

Livestock production was also higher during 1967, with notably greater output of pork and poultry in both countries. A slight increase in United States beef and veal production was more than sufficient to offset a small decrease in Canadian production. Milk production continued at approximately the 1966 level in both countries, although United States butter production increased by more than 10 percent.

Oceania

Because of severe drought during the latter part of 1967 in most of the southeastern part of Australia, agricultural production in Oceania during 1967 fell 11 percent below the exceptionally high level of the previous year. It was nevertheless slightly higher than the annual average for 1963-65.

Australian wheat and barley harvests were lower by about 40 percent, oats by 60 percent and rice by 15 percent. Cereal production in New Zealand increased, however, by about 10 percent. Cotton production in Australia again increased sharply, for the first time exceeding domestic requirements, and sugar production continued at approximately the 1966 level.

Australian livestock numbers had promised to complete recovery of losses incurred during the 1964-66 drought period, but the return of drought conditions during 1967 is reported to have again reduced sheep

numbers in the seriously affected area. The wool clip was, however, slightly higher in 1967/68 than in 1966/67 in Australia and higher by about 5 percent in New Zealand. Except for Australian beef and veal, meat production increased in both countries during 1967. Milk production approximated the 1966 level in both countries, with a slight increase in butter production in New Zealand and a slight decrease in Australia.

Latin America

Food production rose by about 5 percent and total agricultural production by about 4 percent in Latin America in 1967.

Cereal production increased substantially, large increases in the production of wheat (especially in Argentina) and of rice more than outweighing a decline in maize production. For most other major crops the preliminary data indicate only small changes in 1967. Coffee production recovered by about 13 percent but remained less than in 1965; in Brazil the increase in production was about 30 percent in 1967. Sugar production declined sharply, with a severe reduction in Cuba, where the crop suffered from drought after heavy cutting in the previous season. There were also notable declines in the production of groundnuts, linseed and cotton. Meat production increased only slightly.

Far East

In the Far East, excluding China (Mainland), agricultural production increased by 6 percent in 1967, after making no progress in the two previous years. Much better weather was a main factor, but the high-yielding varieties of cereals, introduced on about 9 percent of the total cereals area in India and Pakistan and about 10 percent of the rice area in the Philippines, also contributed substantially. India's food-grain output in the 1967/68 crop season was expected to exceed 95 million tons, in comparison with 76 million tons in 1966/67 and 72 million tons in 1965/66. Pakistan expects a food-grain output of about 24.0 million tons (21.7 million tons in 1966/67).

Rice production increased by about 12 percent (in spite of declines in Indonesia, Malaysia, Thailand and the Republic of Viet-Nam), but was only about 3 percent more than the previous record in 1964. Wheat production also recovered but remained considerably less than in 1965. Among the major crops the biggest gain was in groundnut production, which was 26 percent above the low crop of 1966 and set a new record. There was also a large increase in sugar production, but for most other crops there were only small changes in 1967.

China (Mainland)

New FAO estimates for China (Mainland) of the production of "food grains" (including potatoes and sweet potatoes, converted to grain equivalent, in line with Chinese practice) were introduced in last year's issue of this report. These estimates are based on the assumption of a realistic trend in per caput consumption in line with general reports on the food situation, and on a population estimate of 780 million in 1966. On this basis food-grain production is tentatively estimated as 215 million tons in 1967, in comparison with 206 million tons in 1966 and 208 million tons in 1965. The excellent harvest in 1967 was officially attributed both to favorable weather and to progress in irrigation, drainage, and related capital works. Apart from some disruption of the transport of fertilizers and other inputs, the cultural revolution does not seem to have interfered with agricultural production.

Near East

In contrast to the other developing regions, agricultural production in the Near East has continued to increase fairly steadily in recent years, and in 1967 there was a further rise of 4 percent. The increase was entirely in food products, however, and (mainly because of the stagnation of cotton production) the output of nonfood products remained below the high level of 1965.

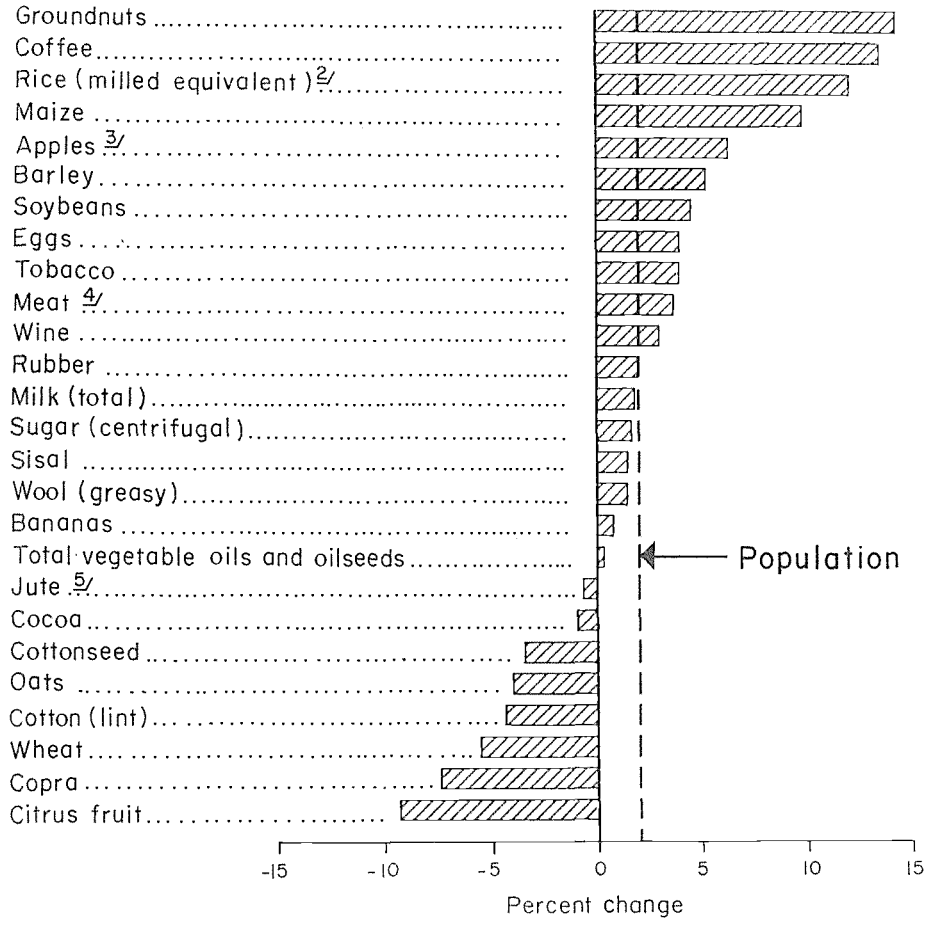
Grain production increased sharply as a result of favorable weather almost throughout the region. There were large crops of wheat and barley in Iran, Jordan, Syrian Arab Republic, and Turkey; in Turkey some 200,000 hectares (2 percent of the total wheat area) were under Mexican varieties of wheat. The United Arab Republic harvested a large crop of rice as a result of the greater availability of irrigation water. Rice production also increased considerably in Iraq, with some shift of area from barley as a result of higher rice prices. The region's cotton crop was about the same as in 1966; there was some decline in the Syrian Arab Republic as a result of bad weather during the picking season, but a further large increase in yields and production in the Sudan.

Africa

The increase of 6 percent in agricultural production in Africa in 1967 was the first substantial expansion for two years.

Grain production recovered sharply from the very low levels of 1966. The wheat crop was a record in South Africa, there was a good recovery in Algeria and Morocco, and good crops in Ethiopia and Kenya. South Africa harvested 9.9 million tons

FIGURE II-2. – CHANGES IN WORLD [1] PRODUCTION OF MAIN AGRICULTURAL COMMODITIES IN 1967 IN RELATION TO 1966



[1] Excluding China (Mainland). – [2] Paddy converted at 65 percent. – [3] Excluding the U.S.S.R. and China (Mainland). – [4] Beef and veal, mutton and lamb, pork, poultry meat. – [5] Including allied fibers.

of maize in 1967 as compared with 5.1 million tons in 1966, and its sorghum crop nearly trebled. The 30 percent increase in sugar production in 1966 was followed by only a moderate rise in 1967, largely because the Rhodesian crop was halved. Groundnut production rose by 12 percent to a new record; in Senegal production was 50 percent above the drought-affected 1966 crop, and in South Africa the crop was doubled, but in Nigeria there was a slight decline. There were considerable reductions in the production of palm oil and palm kernels, mainly because of developments in Nigeria. Cocoa production declined slightly, a 12 percent increase in Ghana being offset by a fall from the previous year's record in Ivory Coast and a further decrease in Nigeria. Mainly because of a good crop in Ivory Coast, coffee production increased by 10 percent and almost recovered the 1965 level. The production of cotton was unchanged, and that of tea and tobacco declined.

Production of main agricultural commodities [2]

World [3] production of the main agricultural commodities in 1967 showed in general only moderate changes from the previous year's level (Figure II-2 and Annex table 3). The increase in total production was mainly accounted for by larger grain production. There were increases of 14 percent for groundnuts, 13 percent for coffee and 12 percent for rice. The principal declines in production were for citrus fruit, copra, wheat, cotton, cottonseed, and oats.

Although wheat production fell by 5 percent, it was substantially higher than in any year before the record 1966 harvest. There was also a decline of 4 percent in the production of oats, continuing

[2] For a detailed account of the commodity situation, see FAO, *FAO Commodity Review 1968*, Rome, 1968.
[3] Excluding China (Mainland).

the long-term downward trend. Apart from the big increase for rice already mentioned, output of maize increased by 10 percent and of barley by 5 percent. For all three crops 1967 was the largest harvest on record. Both acreage and yields of rice increased in the developing countries, particularly in Ceylon, India, Pakistan and the Philippines.

After the bumper crop of citrus fruit in 1966 there was a decline of 9 percent in 1967, but production was still above that of any earlier years. Banana production was again virtually unchanged, but the apple crop increased by 6 percent to reach the highest level since 1960. There was a particularly good apple harvest in the Federal Republic of Germany and to a lesser extent in Canada and France.

Total output of vegetable oils and oilseeds showed almost no change compared with 1966. Soybean production again increased, though less sharply than the previous year. The growth of groundnut production, at 14 percent, was much stronger and is accounted for mainly by a record crop in South Africa and a sharp recovery in Senegal. There was, however, a fall in production of vegetable oils and oilseeds for the developing countries as a whole, largely as a result of reduced output of palm oil and olive oil in Africa and of copra and coconut oil in Asia.

Coffee, which in 1966 showed the largest percentage decrease and in 1965 the largest percentage increase of any crop, continued its wide fluctuations with an increase in output of 13 percent; the Brazilian crop was up by about 30 percent. Tea and cocoa, on the other hand, showed little change. Tea production was at the highest level recorded and only in 1964 was cocoa output larger than in 1966 and 1967. There was a 3 percent increase for wine but this still did not quite bring production up to the 1964 and 1965 levels. Tobacco production was up 4 percent, the main increases being in Asia and North America. The output of cigar leaf declined, however, as a result of reduced plantings and lower yields in Brazil, Colombia, Dominican Republic and the Philippines.

The performance of the main fiber crops was variable but no large variations from last year's levels were recorded. Cotton production declined a further 4 percent from last year's level, which was already the lowest since 1961, and there was a slight fall in jute production. Wool and rubber, on the other hand, showed gains of 1 to 2 percent. Cotton production in the United States fell by 20 percent as a result of diversion of acreage and partly unfavorable climatic conditions, but this was largely offset by expansion in the developing countries.

Production of the main livestock products continued to increase. For meat, the increase was strongest for pigmeat and poultry meat and least for mutton and lamb. For all livestock products the main increases have been in the developed and the centrally planned economies, which produce far more of these commodities than the developing countries.

Fishery production

The upward trend in fishery production, unbroken since the end of the war, continued in 1967. World catches [4] were in the neighborhood of 54 million tons (Table II-4 and Annex table 4). On a price-weighted basis, production was 5 percent above the preceding year.

The fisheries of most centrally planned and developing countries made substantial gains, and only a few of the major fishing countries caught less fish than the year before. Reduced production in some of these fisheries was explained by such factors as scarcity of fish on traditional grounds, bad weather, regulatory provisions of other countries, and structural changes in the industry.

The five leading fish-producing countries, Peru, Japan, China (Mainland), U.S.S.R., and Norway, all caught more fish and, together with South and South West Africa, accounted for the bulk of the increase in the world catch. Peru's catch of about 10 million tons provided raw material for the production of 1.8 million tons of fish meal, about one sixth more than in 1966, as well as increased supplies of fishery products for the domestic market. Japan, which ranked next after Peru, produced 7.7 million tons of fish, registering a gain about three times as large as the year before. Most of the Japanese fish production is for direct human consumption.

Norway's fish production has expanded faster in recent years than that of any other major fishing country. Its catch of over 3 million tons was about double the quantity taken in 1964. Several times in the course of the year Norwegian catches of fish-meal raw material exceeded the capacity of reduction plants, and fishing operations were temporarily suspended and delivery quotas instituted. Huge supplies of fish meal and oil forced down prices paid to the fishermen. This, together with a decrease in the production of higher priced bottom fish, accounted for the fact that the record landings had a lower value than the smaller catch of 1966.

Good catches were reported by the centrally planned countries, which continued to give emphasis to fisheries in developing their food economies. Further investments in high seas operations and rationalization of methods made it possible for the U.S.S.R. to surpass its production target of 5.7 million tons,

[4] Excluding China (Mainland).

TABLE II-4. – ESTIMATED WORLD [1] CATCH OF FISH, CRUSTACEANS AND MOLLUSKS

	1938	Average 1948-52	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons															
Western Europe	5.64	6.31	7.43	7.59	8.02	7.59	7.45	7.85	7.72	7.96	8.23	8.48	9.16	10.24	10.85	11.00
Eastern Europe and U.S.S.R.	1.62	1.94	2.50	2.74	2.87	2.82	2.90	3.08	3.40	3.63	4.02	4.47	5.05	5.72	6.00	6.50
North America	3.11	3.50	3.84	3.79	4.13	3.80	3.76	3.98	3.78	4.00	4.15	4.01	3.91	4.04	3.92	3.70
Oceania	0.08	0.09	0.10	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.14	0.14	0.15	0.16	0.17	0.20
Latin America	0.30	0.64	0.91	0.99	1.12	1.35	1.86	3.23	4.73	6.63	8.63	8.79	11.40	9.42	11.56	12.70
Far East [1]	8.44	6.85	8.47	9.05	9.30	10.30	10.60	10.91	11.80	12.44	13.04	13.36	13.67	14.40	15.02	16.00
Near East	0.31	0.35	0.40	0.38	0.41	0.30	0.38	0.38	0.38	0.40	0.42	0.47	0.48	0.51	0.50	0.50
Africa	0.58	1.20	1.71	1.74	1.85	1.98	2.02	2.15	2.20	2.37	2.50	2.63	2.91	2.98	3.04	3.40
WORLD [1]	20.10	20.90	25.30	26.40	27.80	28.40	29.10	31.70	34.20	37.60	41.10	42.40	46.70	47.50	51.00	54.00

[1] Excluding China (Mainland).

with an increase of about 8 percent over 1966. Large factory ships — operating as virtually independent industrial units at great distances from home bases — accounted for a growing proportion of total production.

In contrast, the results of other major fish-producing countries, including the United States, Chile, Canada, Iceland and the United Kingdom, were somewhat disappointing. United States landings of fish and shellfish were the lowest in 25 years. Of the principal species in the country's catch, only shrimp and tuna were produced in larger quantity than in 1966; there were particularly pronounced decreases in the valuable salmon fisheries and those for menhaden (raw material for fish meal and oil). A record production of shrimp, which has been the leading money earner in the United States fishery industry in recent years, partially offset the impact of these reductions on the total value of the catch.

Substantially reduced Pacific Coast salmon catches were the principal reason for the decline in Canada's production. In the Canadian Atlantic Coast fisheries, low market prices for bottom fish products curbed fishing for some of the species processed primarily into frozen fillets and blocks; scarcity of resources and crew shortages contributed to the difficulties of this industry. The Atlantic Coast herring fishery for reduction raw material had a record production but, because of the weakness of world markets for fish meal and oil, the prices paid to fishermen were low, and the value of the landings was only slightly above the 1966 level.

Iceland's fisheries also faced cost and marketing problems. The bulk of the country's production is processed into reduction products and into fillets and other products based on bottom fish raw material. Bad weather and reduced availability of herring and related species used primarily for reduction purposes brought catches nearly 30 percent lower than in 1966. Accumulated stocks of frozen bottom fish products caused fish freezing plants to stop accepting raw material from 1 January 1968.

Chile, which depends on the southernmost part of the large Pacific Coast anchoveta resource (principally exploited by Peru) for supplying its fishmeal and oil industry with raw material, experienced great difficulties in the fishery for this species. Structural changes in the industry, with many firms discontinuing operations or amalgamating with other producers, contributed to the sharp decline in the raw material fishery. Total fish production in Chile was nearly a quarter lower than in 1966, although trends in other fisheries than that for anchoveta were upward.

Trends were generally favorable in shrimp fisheries, which together with fisheries for reduction purposes are the major source of foreign exchange earnings for fisheries in developing countries. The leading shrimp exporter, Mexico, reported substantial increases in production and shipments to foreign markets. India and other important shrimp fishing countries in the Far East continued to expand their production. Only in some of the Near East countries, where production had increased very rapidly in recent years, was there a significant decline. Disappointing catches in the Persian Gulf were reflected in lower exports, most conspicuous being a sharp falling-off of Iranian exports to the United States.

Through the introduction of improved equipment and fishing methods, a number of countries in the

Far East with important fishery industries expanded catches of food fish for domestic consumption as well as their production of export products such as shrimp and tuna. Countries in other regions of the world with relatively small catches also made substantial progress in 1967. Algeria, for example, increased its catches by one fourth, and Tunisia by one sixth.

Forest production

In 1966, the latest year for which reasonably complete data are available, world roundwood removals, including estimates for unrecorded removals, amounted to some 2,050 million cubic meters, only fractionally higher than in 1965, but still a record (Table II-5 and Annex table 5). Removals of fuelwood fell slightly, while those of industrial roundwood continued to expand. Few indications are yet available concerning removals in 1967. Given the levels of demand from the wood-processing industries in North America, removals are not expected to have shown significant changes from the 1966 levels, although in certain regions, such as British Columbia, where pulp production expanded, pulpwood fellings also rose.

European removals, including those from storm-damaged forests in central Europe, may have been slightly above the 1966 levels. An estimated 30 million cubic meters were damaged by storms in the winter and spring of 1966/67. Strenuous efforts were made to clear as much timber as possible before the bark beetle population could build up to epidemic proportions, and the bulk of the accessible timber was cleared by the end of 1967. Roundwood prices therefore fell sharply in several countries. Some countries, however, were able to restrict normal fellings, at least in state forests, and a better balance between supply and demand was apparent by the end of 1967. Fellings in the U.S.S.R. in 1967, excluding those from state farms, decreased by 2 percent.

With a more or less constant level of domestic and overseas demand compared with 1966, fellings and extraction of roundwood in Africa appear to have been about the same in 1967 as in the previous year, although Ivory Coast produced more and Nigeria, where internal conflicts disrupted operations, produced less. In southeast Asia strong export demand, together with increased demand from domestic industries in some countries, raised removals of tropical roundwood above the 1966 levels.

Among the main forest products, world production of sawn softwood rose slightly in 1967 to an estimated 288 million cubic meters, but remained below the peak level reached in 1965. Output in North America began to recover toward the end of 1967, but remained below the 1966 level. Production in Europe fell for the second year in succession, but Japanese production from domestic and imported sawlogs rose appreciably. Sawn hardwood output leveled out at about the 1966 volume of 85 million cubic meters after having increased without interruption over the previous decade. Production in the United States, the largest producer, fell by 6 percent, but there were increases in southeast Asia, Japan, and Europe.

After climbing at an average of 9 percent per annum between 1960 and 1965, world plywood production (including blockboards) rose by 5 percent in 1966 and still more slowly in 1967 to reach approximately 26.6 million cubic meters. United States production, which accounts for well over half the total, rose only slowly in both years. In Europe, output recovered in 1967 to the record 1965 level. It continued to expand strongly in several Asian

TABLE II-5. – INDICES OF WORLD [1] ROUNDWOOD PRODUCTION

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, average 1952-56 = 100															
Saw and veneer logs	90	95	101	107	106	103	108	115	118	116	120	121	128	132	130	131
Pulpwood and pitprops	94	89	96	106	115	114	107	112	119	121	122	121	132	137	142	144
Other	107	87	101	98	107	112	103	108	99	92	92	97	98	95	99	98
Industrial wood	93	93	100	106	108	106	107	114	116	114	117	118	125	128	129	129
Fuelwood	99	99	101	101	100	102	101	102	100	101	101	105	106	105	105	104
TOTAL ROUNDWOOD	95	95	100	105	106	105	105	111	112	111	113	115	120	123	123	123

[1] Excluding China (Mainland).

countries, including Japan, Republic of Korea, China (Taiwan), the Philippines, Malaysia and Singapore. Out of an estimated world production of 7.4 million tons of particle board in 1967 (12 percent more than in 1966), Europe accounted for 4.6 million tons. Despite a slackening in demand, the world's leading producer, the Federal Republic of Germany, raised its output by 13 percent although, as in several other European countries, capacity was underutilized.

World production of fibreboard in 1967 remained at about the 1966 level of 6.2 million tons. Output in North America declined for the second year in succession, but in Europe there was a recovery to 2.6 million tons, slightly above the 1965 peak. Output continued to rise in other regions, notably the U.S.S.R. Many countries report stagnant or even declining trends in production of noncompressed fibreboard, with compressed boards accounting for virtually all the growth in recent years.

In 1967 there was a check to the strong long-term upward trend in the production of woodpulp, paper and paperboard, mainly because of a drop in North American output during the first half of the year. Subsequently production turned upward and by the end of 1967 was running at a record annual rate. The rate of growth in western Europe slowed down in line with overall economic developments. In Japan, on the other hand, production of paper and paperboard rose strongly to keep pace with the booming economy, while elsewhere, including the U.S.S.R., eastern Europe and a number of developing countries, production continued upward.

Preliminary estimates show a 2 percent gain in world woodpulp output to over 85 million tons and a similar growth rate of total paper and paperboard to over 105 million tons. This modest performance has to be set against the very considerable capacity expansions that took place during 1967, particularly in North America and northern Europe. North American chemical pulp capacity, for example, rose by some 3.8 million tons, while there was only a small rise in output. In western Europe, capacity rose by half a million tons, mostly in the Scandinavian countries, while output in the region as a whole remained more or less constant.

With potential availabilities outstripping requirements, the international chemical pulp market came under increasing strain during 1967. Both in the Scandinavian countries and in North America steps were taken to limit production, and there will be further limitations on capacity operating ratios during 1968. At a recent FAO meeting[5] it appeared, from data on capacity up to 1971 provided by countries, that the world excess capacity in the pulp sector (which on earlier reckonings had seemed likely to weigh on the international market for four or five years to come) could give way to a more balanced situation somewhat earlier, provided that economic growth rates were maintained. In the meantime, strenuous efforts would be required to maintain the stability of the market and to improve the currently inadequate return on capital in the pulp and paper industry.

With regard to newsprint, preliminary figures point to a marginal increase in world output in 1967 to just over 18 million tons. After three years of rapid growth, North American production declined slightly, in spite of a rise of 9 percent in the United States. Newsprint capacity operating ratios declined in 1967 and with new capacity coming on stream in 1968, especially in the United States, they could fall still further this year.

World production of other paper and paperboard rose faster in 1967 than newsprint, but the rate of growth was well below both the previous year's 6 percent and the long-term average. North American output was little changed compared with 1966 but, in contrast to newsprint, Canadian output of other paper and paperboard rose strongly, while that of the United States declined slightly. Production fell by 2 percent in the United Kingdom (Europe's leading producer) which faced, at least until the sterling devaluation in November, strong competition from imports, notably from the European Free Trade Association countries of northern Europe.

Production outlook for 1968

At the time of writing (early July) only scanty indications are available of the probable level of agricultural production in 1968. Crop prospects are still liable to substantial changes as a result of weather conditions later in the season. In general harvests seem likely to be large, but there have been serious droughts in a number of areas, especially the Balkan countries and parts of Latin America and of central and southern Africa.

In western Europe the wheat acreage of the EEC countries has risen by about 6 percent, following a decline in 1967. Given normal weather conditions during the rest of the season, wheat production should again total about 30 million tons, or 3 million tons more than the Community's domestic requirements. Crops in Greece, Italy, and Yugoslavia were affected by drought in early summer. In the United Kingdom the growth of spring cereals (particularly barley) was checked by poor growing conditions.

[5] Eighth session of the FAO Advisory Committee on Pulp and Paper, Rome, May 1968.

In Spain changes in price policies have brought a shift in acreage from wheat to coarse grains.

In eastern Europe wide areas in the Balkans have suffered from severe drought, and in Hungary the drought was reported as the worst of the century. Subsequent rainfall has brought some improvement but this is unlikely to benefit grain crops other than maize. The production of grains, sugar beet and vegetables has been particularly affected, while the shortage of fodder crops will reduce livestock production. In the U.S.S.R. some southern regions (especially the Ukraine) had droughts in the spring, but for the country as a whole grain production may be expected to be about the same as in 1967 if there are normal weather conditions in Kazakhstan and Siberia.

The United States wheat acreage is down by 8 percent from the 1967 level, but average yields will be higher because of more favorable growing conditions and 1968 production is expected to approximate the record 1967 level. The Canadian wheat acreage is estimated to be about 2 percent lower than in 1967; although the drought in the western plains, which reduced 1967 yields, has generally been broken, it is unlikely that subsoil moisture reserves have been fully restored, so that yields in 1968 are heavily dependent upon current rainfall. The United States feed-grain acreage is less than in 1967, with declines of 8 percent for maize and 12 percent for grain sorghums and increases of 3 percent in both barley and oat acreages; growing conditions are, however, more favorable than a year ago and higher yields appear likely. The United States cotton acreage is expected to be 17 percent larger than in 1967; more favorable growing conditions and less insect damage would tend to restore normal yields and bring a more than corresponding increase in production. The United States soybean acreage is again expected to increase by 3 percent.

Grain acreage in Australia is likely to be above the 1967 level. Despite favorable rains in much of the area stricken by drought during 1967, further improvement in moisture conditions will be required if yields are to be restored to normal levels.

Severe droughts have affected some areas of Latin America, particularly Chile, Ecuador, Peru, and Uruguay. In Argentina the 1968 maize harvest was about 20 percent less than in 1967, but recent rains have improved sowing conditions for wheat.

In the Far East, rice production should continue the long-term upward trend that was interrupted in 1965 and 1966. In a number of countries the high-yielding varieties as well as high prices have made rice growing more attractive. The rains have arrived in time in most parts of India and Pakistan, and the prospects for grain production are therefore favorable. Malaysia expects a better rice crop than in 1967. In Japan little change is likely in the production of wheat and rice, in spite of a further decline in the wheat area. It is reported that in Indonesia some 270,000 hectares (roughly 3 percent of the total rice area) are to be sown to high-yielding varieties of rice (mostly IR-8) in 1968.

Turkey, the main grain producer in the Near East, suffered a bad winter, followed by the drought that was experienced throughout the Balkans. Turkey's production of grains, grapes and cotton have been particularly affected. In Iraq the rice harvest will be affected by the heavy floods during the planting season. During 1968 Afghanistan planned to distribute about 15,000 tons of high-yielding varieties of wheat (mostly Mexican), or sufficient for about 6 percent of the total wheat area.

As a result of abundant rainfall, prospects for cereal crops in northwest Africa are generally favorable. A record cereal harvest is expected in Morocco. A number of areas in central and southern Africa, however, have been affected by drought. South Africa's maize crop is estimated as 45 percent less than in 1967.

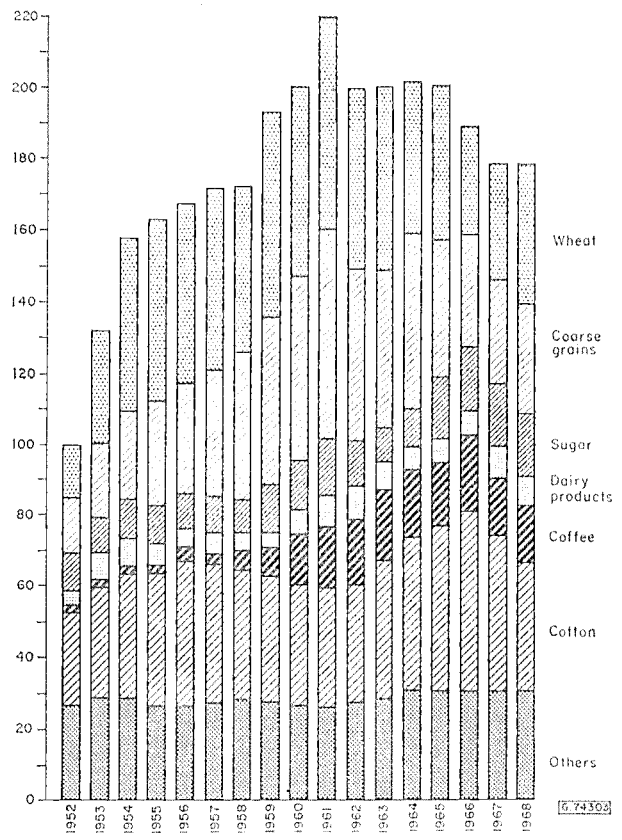
For fishery production, trends during 1968 so far have been mixed. Raw material catches for Peru's fish meal industry have been larger than in the corresponding period last year, and there is every indication that the full quota of 9.5 million tons will be taken by the end of the season. Record catches are predicted for South West Africa's fish meal raw material fishery, and production in Chile is showing a good recovery from the disappointing 1967 season. However, the Norwegian winter herring fishery was very poor, and Icelandic catches were also lower than in 1967.

At the beginning of 1968, low prices for roundwood everywhere in Europe, as well as the existence of large stocks of timber salvaged from the forests in central Europe damaged by storms in the winter and spring of 1966/67, were restricting forest production. A modest improvement in demand and the elimination of excess stocks during the first half of 1968 appear, however, to be bringing a slight increase in prices which could lead to increased fellings later in the year, so that on balance total fellings in Europe in 1968 may remain at about the 1967 level. In North America, log production is higher, following some shortages of logs along the west coast in the latter part of 1967 due to restrictions on logging during the late summer fire season. From trends in demand for tropical hardwood in the main consuming areas, it appears that a slight improvement in demand and prices in Europe could lead to some increase in production, but that a marked slow down in imports of timber in Japan could cause a leveling out in forest production in southeast Asia in 1968.

After declining for the past three years, the overall level of stocks of major agricultural products hardly changed during 1967/68 (Figure II-3 and Annex table 6). There was no clear pattern in the changes that occurred for individual commodities, although United States supply management programs had an important influence on several of them. Wheat stocks rose to restore a more adequate level of reserves, and stocks of coarse grains increased, but stocks of rice remained small. World cotton stocks were drawn down to a minimal level, while those of wool, especially of the coarser grades, continued to be excessive. Stocks of fats and oils rose; butter stocks reached surplus proportions and soybean stocks again increased sharply. Stocks of coffee, sugar, natural rubber, and tobacco all continued large.

Wheat stocks in the five major exporting countries are expected to have increased by about 6 million tons during the 1967/68 season. The expected carryover into the 1968/69 season, about 38 million tons, is generally considered ample but not excessive; it will be approximately 10 million tons less than the average carryover during the first half of the 1960s. In most of the importing countries 1967/1968 wheat harvests reached record levels, and demand for wheat imports was reduced, so that the level of international trade in wheat was lower during 1967/68 for the second consecutive season.

FIGURE II-3. – CHANGES IN STOCKS OF MAJOR AGRICULTURAL PRODUCTS
(Indices, 1952 = 100) [1]



[1] Price-weighted indices of the stocks shown in Annex table 6 (excluding forest products).

The expected increase of about 3 million tons in United States wheat stocks is not considered cause for alarm. The anticipated carryover of about 15 million tons is not excessive, and corresponds to the level of wheat reserves desired by the United States Government. The acreage allotment was reduced for the 1968 harvest to avoid further increase in stocks. Canadian stocks, however, which are expected to account for about half of the anticipated carryover for the five major exporters, are disproportionately large. They have now shown a substantial rise in two successive seasons and are only slightly below the record level reached in 1957. Australian stocks are expected to have been drawn down to a minimal level by the end of the 1967/68 season; production was reduced by drought, while the general level of exports has been at least maintained. Stocks in the U.S.S.R., which undoubtedly increased as a result of the record 1966 harvest, are also expected to have been reduced, perhaps substantially, during the 1967/68 season; as compared with the preceding season, production was lower while exports have increased.

Rice supplies continued to be very short during 1967. Although the world rice harvest reached a record level, most of the production increase was in importing countries and supplies available for export have remained relatively small. Import requirements have continued to exceed available supplies and there was some further depletion of the already small stocks.

Stocks of coarse grains in the five major exporters are expected to have increased during the 1967/68 season. In contrast to wheat, the anticipated increase is relatively small (approximately 2 million tons or 5 percent) and may be attributed entirely to the higher level of United States stocks. The anticipated carryover into the 1968/69 season, about 44 million tons, restores approximately the volume carried over into the 1966/67 season and amounts to only about 60 percent of the average carryover during the first half of the 1960s. In view of the widespread increasing demand for livestock products, the expected carryover of feed grains is not excessive. The 4 million ton increase in United States stocks, mostly maize, restores the level carried over

into the 1966/67 season; United States programs have nevertheless been adjusted to reduce coarse grain acreage for the 1968 harvest.

Milk production has continued to outpace consumption, and stocks of most dairy products again increased during 1967. Butter consumption in most of the developed countries has continued to decline. Available supplies clearly exceed demand and butter surpluses of substantial proportions overhang domestic and export markets. Butter stocks in western Europe, North America and Oceania rose by about 30 percent (to approximately 450,000 tons) in 1967 and have continued to increase during the early part of 1968. Supplies in the U.S.S.R. and eastern Europe have also apparently increased notably.

For the second consecutive season, United States stocks of soybeans and soybean oil increased sharply during 1967/68. Although domestic and export demand has continued to expand, the increase in the United States production has been even greater. The carryover into 1968/69 is expected to amount to more than 1 million tons (oil equivalent). Sunflowerseed stocks are likely to have increased substantially in the U.S.S.R. as a result of the large harvest.

World cotton stocks again decreased sharply during the 1967/68 season. World production contracted as the second consecutive sharp reduction in the United States crop more than offset increases in production in developing countries and centrally planned economies. World consumption set a new record and cotton stocks were drawn down by perhaps 1 million bales (220,000 tons). The carryover into the 1968/69 season may be the equivalent of less than 3½ months' consumption. With the 1967/68 season, liquidation of the United States cotton "surplus" has been completed in two years instead of four as originally foreseen. The United States carryover into the 1968/69 season of about 1.5 million tons approximates the level sought by the Government, and its cotton program has been adjusted to increase 1968 production to a level in line with expected domestic and export requirements during the 1968/69 season. The decline in United States cotton stocks was so great that it more than offset the increases in stocks of grains and soybeans, and the total investment of the United States Commodity Credit Corporation was 10 percent lower on 30 April 1968 than a year before (Annex table 7).

The 1967/68 wool season opened with producers' stocks at the highest level since 1949; crossbred and carpet wools accounted for 85 percent of the total. With increased production and continued keen competition from synthetic fibers, no substantial reductions in stocks are expected by the end of the 1967/68 season.

World production and consumption of sugar were again in reasonably close balance during 1967. There were consequently only marginal reductions in the large stocks that were initially accumulated during the 1964/65 season. Beet sugar production in Europe and the U.S.S.R. approached record levels, thereby lowering import requirements for cane sugar. Cane sugar production is expected to be significantly lower, especially in Cuba, and other Latin American exporters with large stocks have attempted to restrain sugar production.

Available information concerning tobacco stocks shows small reductions in the United Kingdom and the United States with increases in most of the other producing countries. The reduction in the United Kingdom stocks was mostly of Rhodesian tobacco. The lower level of Rhodesian exports served also to facilitate United States exports of flue-cured tobacco.

Surpluses arising from clearances of storm-felled timber in central Europe were an important feature of western European markets for coniferous logs, roundwood and pulpwood during 1967. Although some of this pressure was carried over into 1968, the general recovery in the level of economic activity has facilitated absorption of remaining excess stocks.

Economic activity and the demand for agricultural products

Except for a few industrially used raw materials, the demand for agricultural products tends to be little affected by short-term variations in the level of economic activity, as measured by changes in Gross National Product (GNP), industrial production, employment, and so on. For food products, demand tends mainly to be affected by longer term trends in population growth and economic development, as reflected by changes in the structure of the economy, in the level of productivity and per caput incomes, and in the degree of urbanization.

Thus the slackening in the rate of economic growth in most of the developed market economies, lasting roughly from mid-1966 to mid-1967, does not appear to have had significant adverse effects on the demand for food generally. While import demand

for food products was somewhat weakened in these countries, this was primarily the result of increased domestic supplies.

In the developing countries, demand for food products has continued to be limited chiefly by the level of productivity and per caput incomes. In most cases, demand at least kept pace with supplies and in many cases continued to outpace it, as demonstrated by the continued increases in consumer prices reviewed later in this chapter.

Demand for industrially used raw materials was adversely affected by the slower rate of economic growth in most of the developed countries during 1966-67, as well as by increased competition from synthetics. There was a sharp reduction in wool consumption in the developed market economies and smaller reductions in the consumption of cotton and natural rubber. Consumption of all three of these raw materials continued to increase in the developing countries, and of cotton and wool in the centrally planned economies. Demand for forest products was also adversely affected, with the main exception of the Japanese market.

As of mid-1968 it does not appear that the international financial crisis that erupted during November 1967 has had important direct effects on the level of economic activity in the developed market economies generally. It is as yet perhaps too soon for the effects to have become evident of the devaluations in November 1967 and of the stringent monetary and fiscal measures taken in the United Kingdom. Devaluation has, however, already affected the prices of some agricultural products in world trade, and the competitive position and export earnings of some countries. The balance of payments measures adopted by the United States have related primarily to capital movements, and their direct effects on economic activity and growth cannot be expected to become evident until perhaps the later months of 1968. Similarly, the effects of measures adopted since last November to tighten domestic monetary and credit conditions, especially in Canada, Japan, the United Kingdom, and the United States, are not yet clearly apparent.

Developed countries

With few exceptions, the annual rates of growth in the developed market economies fell short in 1967 of those attained during 1966. Comparison of the annual rates of growth, however, obscures the shift that occurred during 1967 in most of these countries. Whereas at the end of 1966 the rate of growth was generally slowing down, by the end of 1967 expansion had been resumed. The renewed expansion followed the relaxation of restrictive monetary and fiscal measures imposed earlier to check inflationary pressures and reduce balance of payments deficits. In several cases these measures became effective rather slowly.

Although the international financial crisis had little substantive effect on the level and trend of economic activity during 1967, it may prove to have important effects during the course of 1968. This crisis brought about the devaluation of sterling and certain other currencies [6] in mid-November, additional foreign exchange controls by the United States Government at the beginning of January and de facto demonetization of gold in mid-March, and it would seem quite unrealistic to consider the crisis as having yet been fully resolved. Widespread uncertainty continues as to the effects on economic activity of measures adopted by the United Kingdom "to make devaluation succeed" and by the United States "to defend the dollar." There are also uncertainty and continuing speculation with respect to the likelihood that the measures adopted by these countries may attract countermeasures from other governments.

In the United States, real GNP increased by only 2.6 percent from 1966 to 1967, as compared with 5.8 percent from 1965 to 1966. Although public expenditure continued to increase, private domestic demand responded only slowly to reflationary monetary and credit measures, and only began to show signs of revival in the second half of the year. Industrial production showed a slight increase during the second half of 1967, and the 1967 total exceeded the 1966 level by about 1 percent. Upward pressure on prices continued throughout 1967, however, and consumer prices increased by about 3 percent. Imports increased slightly more rapidly than exports; the net trade surplus narrowed while there was a sharp increase in the overall balance of payments deficit, largely as a result of capital outflows in connection with the international financial crisis.

Following the November devaluations, the United States dollar came under increased pressure. In January 1968 a program was announced of measures to defend the dollar by reducing the balance of payments deficit. In addition to further controls over foreign loans and investments, the program included restrictions on foreign travel, reductions in government expenditure abroad, and further improvement of the visible trade balance. A system of drawbacks on exports and equalization levies on imports has also been proposed. Except for measures affecting

[6] Other countries whose currencies were devalued at that time include Ceylon, Cyprus, Denmark, Guyana, Iceland, Ireland, Israel, Jamaica, Malawi, Malta, New Zealand, Sierra Leone, Spain, Trinidad and Tobago, and most of the United Kingdom overseas territories.

foreign loans and investments and export credits, measures to implement the other elements of this program have not yet been established, nor has the necessary legislative authority been obtained. Meanwhile, the domestic economy continues to expand rapidly, with increasing symptoms of overheating. A tightening of domestic monetary and credit policies became effective in mid-April, however, and anti-inflationary fiscal and budgetary measures were enacted in late June.

Trends in economic activity in Canada continued generally to parallel those in the United States during 1967. Following the devaluation of sterling and other currencies, domestic monetary policies were tightened and anti-inflationary fiscal measures were introduced during December. Although special arrangements were made between the two governments to minimize the effects on the Canadian financial situation of the United States balance of payments measures announced in January 1968, economic expansion in Canada has lagged behind that in the United States during 1968.

The rate of economic growth during 1967 was also lower than in 1966 in the European Economic Community (EEC). Real GNP increased by only 2.5 percent from 1966 to 1967, as compared with 3.9 percent from 1965 to 1966. The rate of growth increased in Luxembourg and the Netherlands, but declined in Belgium, France and Italy. In the Federal Republic of Germany, the real GNP was 0.5 percent below the 1966 level.

It was only after the middle of 1967 that there was a gradual revival in the pace at which the EEC economy generally was growing. Although export demand continued to show a high rate of growth (8.0 percent from 1966 to 1967 as compared with 8.5 percent from 1965 to 1966), domestic demand in the Community as a whole grew much less than from 1965 to 1966. The growth in private consumers' expenditure fell from 7.8 percent in 1966 to about 5.5 percent in 1967. Public expenditure for goods and services remained generally unchanged, and gross fixed capital formation showed little or no growth. Imports from nonmember countries increased by only 2 percent, as compared with 7 percent from 1965 to 1966. With exports continuing to expand more rapidly, the Community's balance of visible trade with nonmembers showed a surplus of about 900 million units of account, as compared with a 1966 deficit of about 1,300 million.

The economic revival in the Community has not only continued but seems to have gained momentum during 1968. Internal demand has responded vigorously to reflationary measures, especially in the Federal Republic of Germany and France, and export demand has continued to show considerable strength. At the time of writing, however, the economic repercussions of the political events in France remain uncertain.

In the United Kingdom, the slight revival in economic activity in the second half of 1967 brought an increase in real GNP of only about 1.2 percent from 1966 to 1967, as compared with 1.7 percent from 1965 to 1966. Although public spending continued to expand, all other important components of demand remained weak throughout the first half of the year, despite the relaxation of restraints imposed during the preceding year. Export demand also continued to be weak because of a number of factors, including the rate of exchange, the international business situation, and the Near East crisis. Exports declined and the deficit from visible trade mounted. Sterling came under speculative attack and was devalued on 18 November 1967. The effect on the level of economic activity of the monetary and fiscal measures adopted since then has not as yet become clearly evident.

The Australian economy showed signs of revival toward the end of 1967, with a sharp rise in the index of industrial production in the last two months of the year. The decision not to follow sterling into devaluation highlighted the rapidly increasing importance of Asian and North American markets for Australia's traditional agricultural exports. With heavy mining investment and lower export prices (especially for wool and dairy products), the trade deficit continued to widen.

In contrast to the other developed market economies, that of Japan has continued to grow exceptionally rapidly. Real GNP increased by 12 percent from 1966/67 to 1967/68. The index of mining and manufacturing production was 19 percent higher in 1967 than in 1966. Symptoms of overheating appeared during the third quarter, however, and restrictive monetary and fiscal measures were applied in September. A strong upward swing in consumer spending and private investment during the last quarter of 1967 led to a further tightening of monetary and credit policies in January 1968. The effect of these policies has been gradually felt on a wide front, but domestic demand both for investment and private consumption has nevertheless continued strongly. Imports increased during 1967 by 23 percent, while exports rose by only 6 percent. The trade surplus narrowed, and the overall balance of payments showed a deficit of U.S.$571 million in 1967, compared with a surplus of $68 million in 1966.

The U.S.S.R. and other centrally planned economies of eastern Europe again expanded rapidly in 1967. Increases in national income ranged from 9 percent in Bulgaria to 5 percent in East Germany and Hungary. Industrial production rose by 13 percent in Bulgaria and Romania, 10 percent in the U.S.S.R., and 9 percent in Hungary.

Developing countries

In contrast to the developed countries, most of the developing countries appear to have at least maintained their 1966 rate of economic growth during 1967, and many of them to have exceeded it. In most of the developing countries in the region covered by the Economic Commission for Africa and the Far East (ECAFE), growth was notably faster than in 1966. In Latin America, the 1967 rate of growth for the region as a whole was slightly higher than in 1966. In the Near East, where economic activity has been disrupted by military and political events, the situation continues to be obscured by instability and uncertainty.

Export earnings of the developing countries registered an increase of only slightly more than 2 percent in 1967, as compared with over 7 percent in 1966.[7] Latin American exports, however, showed no increase in value in 1967. Imports generally increased, except in the Near East where there was a notable decrease. Although the foreign exchange reserves of the developing countries as a whole increased during 1967 at a rate slightly greater than in 1966, this mainly reflected increases in the reserves of Argentina and the petroleum-exporting countries.

These higher rates of growth have resulted in large part from the recovery in agricultural production. Although rates of increase in industrial production have continued considerably higher than those for the agricultural sector, there had been a distinct slackening in the rate of growth in manufacturing during the years around 1965, with the notable exception of the Republic of Korea. Incomplete data indicate some recovery in the rate of manufacturing growth during 1967, especially in the export-oriented manufacturing sector of China (Taiwan) and in India and Pakistan.

For the developing ECAFE countries as a whole, trade data for the first half of 1967 show increases of 2.4 percent in exports and 21.5 percent in imports. The resulting aggregate trade gap was small, however, and was more than covered by international transfers. These countries as a group continued to accumulate reserves, and the net addition during the first three quarters of 1967 amounted to $140 million.

In Latin America, the total regional GNP at constant prices increased by 4.4 percent (1.5 percent per caput) in 1967. As compared with a decrease in total GNP of 0.5 percent during 1966, Argentina registered an increase of 2.0 percent in 1967. Uruguay switched in the reverse direction, from an increase of 2.6 percent in 1966 to a decrease of 5.0 percent in 1967. GNP was higher in 1967 than in 1966 by more than 8 percent in Costa Rica and Panama, and by 5 to 8 percent in Bolivia, Brazil, Ecuador, Mexico, Paraguay, Peru, and Venezuela.

In comparison with 1966, the value of Latin American commodity exports was down by 1.8 percent in 1967, while the value of commodity imports rose by 2.6 percent. Although the trade surplus was thereby narrowed, the balance of payments surplus improved, and aggregate foreign exchange reserves increased by U.S.$320 million ($178 million excluding Venezuela).

Excessive inflationary pressure continued in Argentina, Brazil, Chile and Uruguay. Chile maintained a system of flexible foreign exchange rates, whereas the currencies of the other three countries were devalued.

Conventional measures of the level of economic activity are available for very few African countries. The general picture, however, is of continued economic growth, stimulated in part by the large 1967 harvests. Export earnings increased only slightly, partly because of the slackening in demand in the developed countries, while imports continued to increase at about the same rate as in 1966.

Food supplies and consumption

Estimates of per caput food supplies and their calorie and nutrient content, based on food balance sheet data, are shown for 82 countries in Annex table 8. For developing countries the latest food balance sheet estimates are generally for 1965 or earlier, but from the rough calculations for the main regions shown in Table II-6 it is possible to obtain some idea of the effect on food supplies and consumption of the widespread poor harvests of 1965 and 1966.[8]

In the developing regions as a whole food production per caput averaged about 3 percent less in 1965-67 than in the preceding three-year period. Although the combined net export of food of these

[7] As discussed later in this chapter, the earnings of these countries from exports of agricultural products declined in 1967.

[8] Difficulties in obtaining reliable estimates of food supplies and consumption in the developing regions include the lack of information on stocks and the problem of matching production and trade seasons, but such difficulties are less serious when (as in Table II-6) averages for several years are considered.

regions was reduced by some 30 percent on a per caput basis, there was still a decline of almost 3 percent in their per caput food supplies.

Trends in both production and net trade varied substantially among the different regions. In Latin America and the Near East the reduction in per caput food production was only slight. Latin America's net exports of food increased sharply, however, with the result that per caput supplies are estimated to have fallen by about 3 percent between 1962-64 and 1965-67. In the Near East net imports increased and there was a slight decline in per caput supplies. In Africa per caput production dropped by 3 percent but, because of a reduction of about 30 percent in net exports per caput, the decline in per caput supplies appears to have been limited to about 1 percent.

The biggest changes in food supplies between 1962-64 and 1965-67 were in the Far East.[9] Per caput production fell by as much as 6 percent and, in spite of a 50 percent rise in net imports per caput, supplies per caput still appear to have fallen by about 5 percent.

TABLE II-6. – INDICES OF PER CAPUT FOOD PRODUCTION, NET TRADE AND SUPPLIES IN DEVELOPING REGIONS

	Average 1959-61	Average 1962-64	Average 1965-67
	Indices, average 1955-58 = 100		
LATIN AMERICA			
Production	98	100	99
Net export	100	83	112
Supplies	98	101	98
FAR EAST [1]			
Production	106	107	101
Net import	164	194	294
Supplies	104	108	103
NEAR EAST			
Production	101	104	103
Net import	188	180	195
Supplies	104	107	106
AFRICA			
Production	101	103	100
Net export	83	103	70
Supplies	103	103	102
All above regions			
Production	100	104	101
Net export	61	52	37
Supplies	101	106	103

[1] Excluding Japan and China (Mainland).

International trade in agricultural products

Preliminary data for 1967 indicate that, for the first time since 1958, world trade in agricultural, fishery, and forest products failed to increase (Table II-7).[10] For agricultural products, a decline both in the quantities exported and in prices reduced earnings to their 1964-65 level. Earnings from fishery products remained at the high level of 1966, and those from forest products increased.

The economic difficulties in the main industrialized countries caused a decline in the import demand for raw materials, and earnings from exports of these products fell back to the depressed level of 1958-59. Earnings from exports of foods and feedstuffs were somewhat reduced as the better harvests in many developing countries in 1967 began to affect their level of imports.

Overall prices for agricultural exports are estimated to have fallen by a little over 1 percent in 1967. There were, however, substantial decreases for many commodities, including most vegetable oils and oilseeds, dairy products, coffee, and raw materials (except cotton). Rice and cocoa prices continued to increase, and those of cotton recovered from the depressed level of 1966. The volume of shipments of some commodities, particularly of cereals, many vegetable oils and oilseeds, and wool, also declined substantially.

While both the developed and the developing regions suffered a decline in earnings, the impact on the latter was somewhat greater because of their position as the main supplier of raw materials. The combined earnings of the developing regions fell by more than 2 percent for the second year in succession to a level about 4 percent below that attained in the peak year 1965. Because prices of manufactured goods did not increase in 1967 (for the first time since 1960), the purchasing power for manufactured goods of the agricultural exports of the developing countries also fell by 2 percent. However, their purchasing power for cereals, the major food import, declined considerably because of an increase in the average prices of cereals compared with the previous year.

These developments are discussed in more detail below. Statistics of the main aspects of international trade in agricultural, fishery and forest products are shown in Annex tables 9 to 15.

[9] Excluding Japan and China (Mainland).

[10] For fishery and forest products the indices discussed here exclude China (Mainland). For agricultural products, eastern Europe and the U.S.S.R. are also excluded, since reasonably complete data for these countries are available only until 1966.

TABLE II-7. – INDICES OF THE VOLUME, UNIT VALUE AND TOTAL VALUE OF WORLD [1] TRADE IN AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	Change 1966 to 1967
	Indices, average 1957-59 = 100													*Percent*
VOLUME OF EXPORTS	90	96	99	97	104	111	117	120	127	134	137	140	141	+ 1
Agricultural products	89	97	99	97	104	110	117	119	125	130	133	136	135	— 1
Fishery products [2]	83	90	91	100	109	112	118	132	135	150	153	157	174	+ 11
Forest products [2]	95	94	97	96	106	118	122	126	137	153	158	168	172	+ 2
AVERAGE EXPORT UNIT VALUE	106	105	105	100	95	98	95	94	99	103	102	102	100	— 2
Agricultural products	108	105	106	100	94	98	95	93	100	104	102	101	100	— 1
Fishery products [2]	91	99	100	100	99	100	101	106	107	111	120	126	116	— 8
Forest products [2]	102	103	104	99	98	97	96	94	94	96	98	97	97	—
TERMS OF TRADE [3]	112	107	105	100	96	97	93	92	96	99	96	94	93	— 1
Agricultural products	114	107	106	100	94	97	92	91	97	100	96	94	93	— 1
Fishery products [2]	97	100	100	100	100	99	98	104	104	107	113	116	108	— 7
Forest products [2]	109	105	103	99	98	96	93	92	91	92	92	90	90	—
VALUE OF EXPORTS IN CURRENT PRICES	94	99	103	96	101	108	111	112	125	137	139	143	142	— 1
Agricultural products	94	100	104	96	100	106	109	110	123	134	134	137	134	— 2
Fishery products [2]	76	88	92	101	108	109	115	135	138	157	175	190	190	—
Forest products [2]	98	96	101	95	104	115	116	118	129	147	155	164	167	+ 2
REAL VALUE OF EXPORTS [4]	00	102	103	96	101	105	107	108	120	129	126	127	125	— 2
Agricultural products	100	102	103	96	101	105	107	108	120	129	126	127	125	— 2
Fishery products [2]	81	90	91	101	108	108	112	132	134	151	164	176	176	—
Forest products [2]	103	99	100	95	104	113	114	115	125	141	146	152	155	+ 2
AVERAGE EXPORT UNIT VALUE OF MANUFACTURED PRODUCTS [5]	94	98	101	100	99	101	102	102	103	104	106	108	108	—
Total value of world trade [6] (agricultural and nonagricultural)	85	94	101	97	102	114	119	125	136	153	166	182	191	+ 5

[1] Excluding eastern Europe, U.S.S.R. and China (Mainland). – [2] Excluding China (Mainland) only. – [3] Average export unit value deflated by the United Nations index of export prices of manufactured goods. – [4] Value of exports deflated by the United Nations index of export prices of manufactured goods. – [5] United Nations index adjusted to 1957-59 base. – [6] United Nations data, expressed in index form.

Earnings from agricultural exports

In the following discussion agricultural products proper, fishery products and forest products are dealt with separately.

AGRICULTURAL PRODUCTS

The 2 percent decline in agricultural export earnings in 1967 was primarily caused by sharp drops in receipts from exports of raw materials (except cotton), wheat and many coarse grains, most vegetable oils and oilseeds, and coffee (Table II-8). For cereals, the smaller volume of exports was largely responsible; their unit value increased by 4 percent. For vegetable oils and oilseeds and for wool both the quantity exported and the unit value declined. The volume of coffee and rubber exports increased, but this was more than offset by a decline in the average unit value.

Substantially higher earnings were obtained from rice, sugar, dairy products (except eggs), cocoa, tea, tobacco, and cotton. Both quantity and price were higher in most cases, with the notable exceptions of rice (where prices were higher but shipments fell) and dairy products (where the larger volume of exports more than offset lower prices).

Some of the factors underlying these changes in export earnings for the main commodities are further discussed below in connection with price trends in international markets. But first their impact on the different regions of the world is examined.

Developed regions

The increases in the agricultural export earnings of western Europe and Oceania in 1967 were insufficient to offset the decline in those of North America and Japan. The earnings of all developed regions together therefore fell slightly (Table II-9).

The sharp decrease in North American earnings was almost entirely due to a much lower volume of exports. Shipments of grains (except rice), which provide over half of the region's total earnings from agricultural products, declined by 20 percent. Ex-

TABLE II-8. – INDICES OF THE VALUE OF WORLD[1] EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY MAIN COMMODITY GROUPS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	Change 1966 to 1967
	Indices, average 1957-59 = 100													*Percent*
Agricultural, fishery and forest products	94	99	103	96	101	108	111	112	125	137	139	143	142	— 1
AGRICULTURAL PRODUCTS	94	100	104	96	100	106	109	110	123	134	134	137	134	— 2
Food and feedstuffs	87	97	100	97	102	108	116	120	139	155	159	165	162	— 2
Cereals	88	107	101	98	101	108	127	134	155	183	184	199	186	— 7
Sugar	86	88	117	97	86	101	107	96	138	141	114	109	120	+ 10
Vegetable oils and oilseeds	86	100	100	94	106	109	108	115	125	135	148	151	140	— 7
Fruit	85	88	103	100	97	105	109	120	119	127	142	152	152	—
Meat	80	83	90	101	109	115	119	128	152	170	183	195	197	+ 1
Dairy products	96	103	98	91	111	107	105	103	115	126	134	134	144	+ 7
Beverages and tobacco	101	103	103	101	94	96	96	96	101	111	107	108	110	+ 2
Coffee	107	119	110	98	92	91	88	89	95	113	105	111	105	— 5
Cocoa	112	85	86	106	108	104	93	91	98	101	100	87	93	+ 7
Agricultural raw materials	103	104	113	88	99	111	107	100	109	109	103	102	96	— 6
Wool	99	104	122	83	95	98	104	102	118	120	105	108	94	— 13
Cotton	100	109	119	94	87	116	111	97	109	111	105	104	111	+ 7
Rubber (natural)	115	99	95	83	122	122	99	97	92	88	93	81	71	— 12
FISHERY PRODUCTS[2]	76	88	92	101	108	109	115	135	138	157	175	190	190	—
FOREST PRODUCTS[2]	98	96	101	95	104	115	116	118	129	147	155	167	168	+ 2
Roundwood (excluding fuel)	96	95	98	96	107	131	153	156	174	193	216	240	264	+ 10
Processed wood	110	97	103	95	102	116	112	115	125	142	144	143	144	+ 1
Panels	81	76	88	92	120	117	120	137	157	187	211	229	244	+ 7
Pulp and paper	93	99	102	96	101	111	112	110	118	135	141	153	151	— 1

[1] Excluding eastern Europe, U.S.S.R., and China (Mainland). – [2] Excluding China (Mainland) only.

ports of wheat and wheat flour from the United States fell by almost 25 percent, and those of coarse grains by almost 20 percent. Canadian exports of the same products fell by 35 percent and 25 percent respectively. Canadian shipments of wheat to the U.S.S.R. and China (Mainland), which in 1966 totaled 7 million tons (nearly two thirds of the total export), were smaller in 1967, reflecting competition from the United States and Australia and smaller purchases by the U.S.S.R. Higher earnings were obtained from only a few commodities: the value of soybeans and soybean oil exports increased despite lower prices, as did that of rice, tobacco, and cotton.

The higher earnings of western Europe and Oceania were entirely due to a larger volume of shipments. In western Europe, the higher value obtained from increased shipments of wheat flour, coarse grains, and rice, in most cases at higher prices, more than offset the almost 30 percent drop in earnings from wheat. Receipts from exports of all cereals combined increased by almost 7 percent. Earnings were higher for almost all of the region's other agricultural exports, except for poultry and eggs, for which production in importing countries is increasing rapidly.

Despite the 10 percent decline in receipts from wool, which accounts for 40 percent of Oceania's export earnings from agricultural products, a larger volume of shipments of other commodities provided a 20 percent increase in receipts, with the result that total earnings from agricultural exports were 6 percent larger in 1967. This increase occurred despite a 5 percent decline in the unit value of the region's exports.

Data on the 1967 trade of eastern Europe and the U.S.S.R. are still extremely limited. The record 1966 grain crop in the U.S.S.R. made it possible for this country, which in 1964 became a net importer of cereals, to increase its exports and decrease its imports in 1967. For wheat, it is estimated that the U.S.S.R. has once more become a net exporter. Exports of meat and meat products from Poland are estimated to have increased by more than 10 percent in 1967. Hungary's exports of cattle and poultry are estimated to have increased by about 12 percent each, whereas those of pigs declined by almost 70 percent from the peak level of 1965-66.

Developing regions

Preliminary data for 1967 indicate that the agricultural export earnings of the developing regions fell for the second year in succession. The decline was about 2 percent, roughly the same rate as in 1966, and brought the level of earnings below that

obtained in 1964. As in the previous year, there were only small changes in the quantities exported by the individual regions, and changes in prices played the major role in most cases. Lower prices for some of the main commodities exported by the Far East, Africa, and Latin America reduced the earnings of these regions. In the case of the Near East, a sharp increase in prices raised earnings substantially.

Among the developing regions, the decline in earnings was greatest in the Far East (excluding Japan), where receipts from all but one of the region's seven leading agricultural exports fell sharply. These decreases ranged from 8 percent for rice, to 11-18 percent for sugar, copra, jute and kenaf, and rubber, and 34 percent for coconut oil. The volume shipped of all these commodities, except rubber, was smaller.

African earnings are estimated to have fallen by about 4 percent. Receipts from vegetable oils and oilseeds, which provide roughly one fifth of the total, are estimated to have decreased by more than 20 percent. Average prices were slightly lower, but reduced production and the hostilities in Nigeria caused a decline of almost 20 percent in the volume exported. Receipts from coffee were maintained by a 5 percent increase in volume despite a fall in prices of roughly the same magnitude, while earnings from cocoa, sugar, and oranges were higher. In the case of cocoa, increased earnings followed the increase in world prices.

Although Latin American earnings from exports of sugar are estimated to have increased by almost 20 percent in 1967, and those from wheat and maize by about 12 percent, lower receipts from many of the other most important exports brought the total down slightly. Cuban sugar exports (which account for about half of the region's total exports of this commodity) increased sharply, following the resumption of shipments to the U.S.S.R. Mexican exports of grains were up substantially from the reduced levels of the previous year, and the bigger crop in Argentina brought increased exports of maize. Earnings from meat, cotton, and wool, however, were all down considerably because of a slightly smaller volume and lower prices. The value of coffee exports fell by 7 percent, reflecting the decline in prices. Receipts from bananas remained unchanged, with an increase in prices offsetting a decline in volume caused by lower production in some countries and a slower growth of North American demand.

Earnings in the Near East from agricultural exports are estimated to have risen by 9 percent, despite a slight decline in the volume of shipments. Re-

TABLE II-9. – INDICES OF THE VALUE OF AGRICULTURAL EXPORTS, BY REGION

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	Change 1966 to 1967
	Indices, average 1957-59 = 100													*Percent*
Western Europe	89	91	101	98	100	111	116	120	139	151	162	166	179	+ 8
North America	76	102	107	96	97	115	123	119	135	159	153	171	151	— 12
Commercial	75	92	103	98	99	115	126	123	141	171	171	191	167	— 13
Oceania	96	99	110	85	105	102	112	113	135	148	135	132	140	+ 6
Japan	114	95	105	72	123	135	137	139	124	93	82	76	65	— 14
Total developed regions	85	98	106	94	100	111	118	118	136	154	152	160	158	— 1
Commercial	86	93	104	95	101	111	119	120	139	157	158	166	165	— 1
Real value of exports [1]	91	96	104	95	102	109	116	117	135	151	149	154	153	— 1
Latin America	104	106	105	99	96	99	100	102	112	119	125	125	124	— 1
Far East [2]	108	101	101	93	106	109	103	103	112	114	115	104	95	— 9
Near East	95	100	109	91	99	103	97	103	115	114	122	126	137	+ 8
Africa	95	96	99	103	99	99	102	104	112	118	113	114	110	— 4
Total developing regions	102	102	103	98	100	102	101	103	112	117	119	116	114	— 2
Real value of exports [1]	108	104	102	98	100	101	99	101	109	112	112	108	106	— 2
ALL ABOVE REGIONS	94	100	104	96	100	106	109	110	123	134	134	137	134	— 2
Commercial	95	98	103	96	100	106	109	110	124	134	136	138	136	— 1
Real value of exports [1]	101	101	103	96	101	105	106	108	120	129	128	128	126	— 2
Eastern Europe and U.S.S.R.	75	71	93	89	118	114	138	143	148	126	147	161	...	...
WORLD [3]	93	98	103	96	101	107	111	112	125	134	135	138	...	...

[1] Deflated by United Nations index of export prices of manufactured goods. – [2] Excluding Japan and China (Mainland). – [3] Excluding China (Mainland).

ceipts from each of the three major exports (cotton, tobacco, and citrus fruit), which provide roughly two thirds of the earnings from agricultural exports, rose by more than 10 percent. Prices were higher for all of these products with the exception of lemons. Larger quantities of citrus fruit and tobacco were exported, but shipments of cotton declined. Cotton exports from the United Arab Republic are estimated to have fallen by more than 10 percent, and those from the Syrian Arab Republic by 15 percent.

Fishery products

The average unit value of exports of fishery products fell by 8 percent in 1967, offsetting a comparable increase in the volume of trade and keeping earnings unchanged at the high level reached in 1966.

The volume of shipments from Japan, the world's most important exporting country, fell in 1967 as in every year since 1964. This trend is in part a result of increased competition from developing countries.

Norway, Peru, South Africa, and South West Africa, four of the leading exporters of fish meal, which constitutes just under 20 percent of total trade in fishery products, considerably expanded shipments in 1967. Exports declined from the other three leading exporters, Angola, Iceland, and particularly Chile.

Exports of marine oil are estimated to have risen by 7 percent to their highest level since 1962, primarily because of increased production, particularly of fish body oils. For whale oils both production and trade continued to decline.

Trade in shrimp continued to expand in 1967, much to the benefit of the many developing countries which derive important foreign exchange earnings from the export of this high value item. The leading exporting country, Mexico, was able to increase the value of its shrimp exports by over one fifth. Other Latin American and Asian shrimp-exporting countries, notably India, also sold record quantities in foreign markets, and only Iran and Kuwait had to reduce their shipments because of poor fishing results in the Persian Gulf.

Forest products

Export earnings from forest products increased by 2 percent in 1967, reflecting increased receipts from roundwood and to a lesser extent from panels. Earnings from processed wood remained roughly the same and those from pulp and paper were slightly lower. The average unit value of all forest products combined remained unchanged, but prices for a number of key products, such as sawn softwood and chemical pulp, were below the average 1966 levels. The earnings of the Far East and Oceania rose considerably (by 6 percent and 11 percent respectively), those of North America by 3 percent, and those of Latin America by a little over 1 percent. The receipts of western Europe and the Near East remained unchanged, whereas those of Africa fell by 3 percent.

In western Europe, the two-year decline in exports of sawn softwood from the boom levels of 1964 was arrested in 1967. Swedish exports rose by 11 percent to the third highest volume on record, partly at the expense of Finland whose exports fell for the third year in succession to the lowest level since 1957. Exports of sawn hardwood, fibreboard, and wood pulp were also smaller.[11]

North American earnings from forest product exports increased by 3 percent in 1967, despite smaller receipts from a number of the most important products including newsprint, mechanical pulp, fibreboard, pulpwood, and broadleaved sawnwood. Canadian exports to the United States of both sawn hardwood and newsprint fell. For the region as a whole the declines were offset by a 45 percent increase in earnings from roundwood (except pulpwood), a 9 percent increase in those from coniferous sawnwood, and larger receipts from a number of other individual products. United States exports of coniferous logs, largely directed to Japan, rose by 42 percent.

The 6 percent increase in the earnings of the Far East was to a large extent the result of increased receipts from broadleaved logs, which provide almost half of the total. The growth in intra-Asian trade in these logs was particularly rapid. Exports of sawnwood were up by almost 4 percent, with an increase in Malaysian exports of sawn hardwood to western Europe offsetting a decline in those to North America. Plywood export receipts were 5 percent higher. Japanese exports to the United States fell sharply, particularly on account of increased domestic demand and also because of the strong competition from the Philippines (whose shipments increased by 19 percent) and from other Asian developing countries

African export earnings from forest products declined by 3 percent in 1967, in part because hostilities in Nigeria disrupted production and trade. The region's exports of broadleaved logs declined by about 14 percent below the peak achieved in 1964 when European imports were extremely large. Ivory Coast, however, continued its so far uninterrupted growth in log exports to consolidate even further

[11] More detailed reviews of recent developments in the European forest products market, including imports from other regions, can be found in Supplements 3, 7, and 8 to the FAO/ECE. *Timber Bulletin for Europe*. Vol. 20. Geneva, 1967/68.

TABLE II-10. – INDICES OF WORLD[1] AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	Change 1966 to 1967
	Indices, average 1957-59 = 100													*Percent*
Agricultural, fishery and forest products	106	105	105	100	95	98	95	94	99	103	102	102	100	— 2
AGRICULTURAL PRODUCTS	108	105	106	100	94	98	95	93	100	104	102	101	100	— 1
Food and feedstuffs	101	101	102	99	99	97	96	97	106	109	108	109	109	—
Cereals	108	104	102	100	98	96	97	103	103	105	104	109	113	+ 4
Sugar	92	93	112	96	92	89	88	87	129	132	96	94	96	+ 2
Vegetable oils and oilseeds	98	103	101	98	101	97	95	91	97	98	109	106	101	— 5
Fruit	92	101	106	104	90	92	95	97	102	98	99	103	104	+ 1
Meat	98	97	95	101	104	107	105	101	106	119	127	133	129	— 3
Dairy products	108	109	104	92	104	103	96	96	103	104	114	111	105	— 5
Beverages and tobacco	110	103	104	104	92	89	84	81	84	94	92	91	91	—
Coffee	120	117	114	103	83	80	76	73	72	94	90	86	81	— 6
Cocoa	114	81	79	118	103	83	66	63	68	70	55	56	59	+ 5
Agricultural raw materials	120	114	118	99	84	108	101	96	101	102	96	92	88	— 4
Wool	108	109	126	89	85	92	90	89	103	113	92	88	86	— 2
Cotton	120	110	110	101	88	94	97	92	92	91	93	88	92	+ 5
Rubber (natural)	118	106	101	87	112	126	93	88	84	82	83	76	61	— 20
FISHERY PRODUCTS[2]	91	99	100	100	99	100	101	106	107	111	120	126	116	— 8
FOREST PRODUCTS[2]	102	103	104	99	98	97	96	94	94	96	98	97	97	—
Roundwood (excluding fuel)	109	104	103	100	97	105	106	107	106	107	111	110	111	+ 1
Processed wood	106	105	104	98	98	98	96	95	96	99	101	102	100	— 2
Panels	104	103	102	99	99	96	94	96	97	93	94	95	95	—
Pulp and paper	99	101	104	99	97	95	93	90	89	92	93	92	91	— 1

[1] Excluding eastern Europe, U.S.S.R., and China (Mainland). – [2] Excluding China (Mainland) only.

its position as the leading African supplier, and also increased its exports of sawn hardwood. There was a sharp drop in exports of both logs and sawnwood from Nigeria. The Democratic Republic of the Congo also exported a smaller amount of sawnwood to Europe.

Prices in international markets

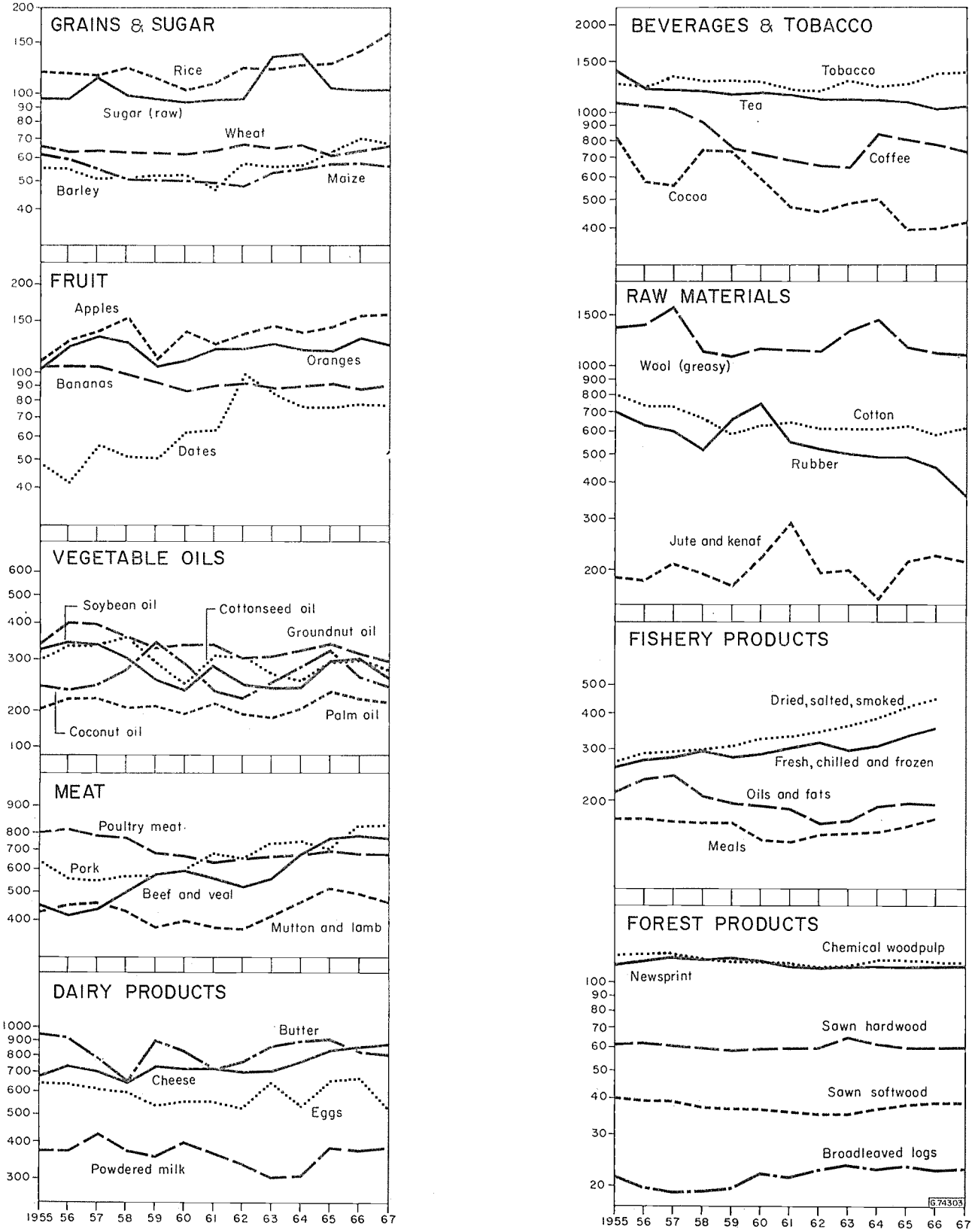
The overall level of international prices for agricultural, fishery, and forest products fell by about 2 percent in 1967 (Table II-10). The decline in average prices which had begun in some cases as early as 1964, continued through most of the year, but data for the first months of 1968 indicate some tendency toward stability in the overall price level.

Price changes varied considerably between each of the main commodity groups. Average prices for forest products remained unchanged, those for fishery products fell sharply, and those for agricultural products were a little lower. The slight fall in the overall index for agricultural products resulted from offsetting price movements, many of which were quite large, for individual commodities (Figure II-4 and Annex table 13). In the food and feedstuffs group, unit values were higher for wheat, rye, rice, and sugar, but there were sharp drops in those of meat and of virtually all vegetable oils, oilseeds, and dairy products. In the case of beverages and tobacco, the 6 percent decline in the unit value of coffee exports was offset by the higher prices received for the other commodities in the group. Among the raw materials, only the cotton export unit value increased. That of wool has been declining since 1965, sisal since 1964, and rubber since 1961 (with the exception of a slight rise in 1965).

AGRICULTURAL PRODUCTS

The average unit value of exports of cereals was amost 4 percent higher in 1967. Although prices for wheat and most coarse grains fell during nearly all of 1967, the overall unit values still averaged higher for the years as a whole. Prices began falling in the first quarter as the ample crops from the Southern Hemisphere began to reach the market, and continued to decline for the rest of the year and into 1968, reflecting good harvests almost everywhere. Despite the decline, prices for wheat did not fall below the International Wheat Agreement minimum, which has been inoperative since August 1967. They were, however, on several occasions below the minimum level of the new International Grains Arrangement which came into effect on 1 July 1968. Rice prices rose for the seventh successive year in 1967 (except for a fall of 0.5 percent in 1963)

FIGURE II-4. – AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS
(U.S. dollars per metric ton,[1] semilogarithmic scale)



[1] U.S. dollars per cubic meter for sawn softwood, sawn hardwood and broadleaved logs.

reflecting the continued heavy pressure of demand on limited supplies. Most of the increase was in prices ruling in private trade, but government contract prices also rose appreciably, ending the relative stability which had been maintained during the past decade. The unit value of rice exports is estimated to have increased by over 15 percent, compared to 10 percent in 1966. The improvement in the 1967 crop has eased the shortage somewhat, but the strong demand for both current consumption and stock building kept prices rising until March 1968. Since then they have fallen slightly, but the FAO export price index (based on a combination of private trade and bilateral contract prices) was in May still more than 5 percent above the December level.

The drop of 3 percent in the unit value of total meat exports in 1967 reflected increased supplies of most products. The decline in prices was particularly marked for pork and pork products because of the marked cyclical increases in production which occurred in North America and a number of western European countries in 1967. The market for poultry meat was also heavily affected by increases in production in both producing and importing areas, and by more difficult access to the major importing countries in the European Economic Community and more intense competition for the remaining smaller markets. Prices for dairy products were also considerably lower in 1967, mainly reflecting a large increase in egg production, particularly in the importing countries of western Europe. Butter prices also fell as competition for markets in developing countries increased and stocks in the United States and France grew larger.

There was a decline in the average unit value of exports of all of the individual vegetable oils and oilseeds in 1967, with the single exception of olive oil which registered a 4 percent increase. The decline reflected the continuing increase in the production of most commodities in this group. With the exception of copra and palm kernels and their oils, whose prices rose in the second half of the year and in early 1968 because of severe shortages, prices of many of the major oils and oilseeds were by the end of 1967 at or near their lowest levels in the postwar period.

Although the balance between world production and consumption of sugar was relatively good in 1967, the pressure of stocks built up in the 1964/65 season kept world market prices low. The average unit value of sugar exports increased by almost 2 percent, largely because of speculative demand associated with the Near East crisis and the devaluation of sterling. Prices in the first two months of 1968 remained stable, but have since weakened somewhat as a result of less favorable estimates of the 1967/68 supply balance.

The average unit value of cocoa exports increased by 5 percent in 1967, with prices strengthened in the early part of the year by the smaller (although still large) 1966/67 crop, and later by speculative buying in anticipation of devaluation and because of forecasts of the 1967/68 crop which indicated that there was likely to be a deficit for the third consecutive year. The export unit values for both tea and tobacco were only slightly above the 1966 levels. Tea prices had improved somewhat during 1967, supported by reports of smaller crops early in the year and later by the interruption to supplies which resulted from the dock strike in the United Kingdom, but the increased offerings in the new year brought prices to a new low in March 1968.

The unit value of coffee exports declined in 1967 by 6 percent, which is slightly more than in the preceding year. The decrease in Arabica prices was particularly marked — Robusta prices fell only slightly — and resulted in intensified competition between the two types. Prices fluctuated during the year and in early 1968 in response to changes in the quotas set by the International Coffee Organization. Dock strikes and the threat of a strike in the container industry in the United States led to a price increase in December, and this rise was reinforced by the successful negotiation of a new International Coffee Agreement.

The decline in prices of cotton, which for some varieties began as early as mid-1964, was halted at the end of 1966 when a marked reduction in the world crop and rising consumption in Japan combined to strengthen the market. The result was an increase of 5 percent in the unit value of all cotton exports combined for the year as a whole. Prices weakened somewhat in the early months of 1968, however, in response to a slackening in demand in importing countries and the prospects of a substantially larger 1968/69 crop in the United States.

Unit values for other raw material exports were lower. After stabilizing in the first half of 1967, wool prices resumed their decline and for the year as a whole the average export value was about 2 percent below the 1966 level. Prices of coarse crossbreds in mid-November 1967 were at their lowest levels since 1949. Prices of the finer wools recovered after the devaluation of sterling and strengthened further in early 1968, but those of coarse wool remained weak.

The average export unit values received from exports of other fibers also fell. The fall in jute prices began in May 1967, when the Pakistan Government made a downward adjustment in the prices which it maintains under its export price control system. The unit value of sisal exports fell by 19 percent in 1967. The basic oversupply position of hard fibers in relation to stagnant or declining demand was

worsened by destocking in importing countries, the presence of a heavy volume of uncut fiber in nearly all producing countries, and a continuation of the United States stockpile releases, and these factors combined brought sisal prices to their lowest level in the postwar period.

The halt to the decline in natural rubber prices which took place in early 1967 proved to be only temporary, and the average unit value of exports for the year as a whole fell by 20 percent. Prices had responded favorably to reports of increased purchases by the U.S.S.R. and China (Mainland), and some increase occurred during the Near East crisis and following the announcement of a reduction in United States stockpile releases. This strengthening proved to be only temporary, however, and the fall was resumed at an even faster rate during the second half of the year and continued into 1968.

Fishery products

Record catches and high levels of stocks as well as relatively slack demand tended to depress prices of many fishery products in 1967, causing the unit value of exports to fall by 8 percent in comparison with 1966. Abundant supplies of fish meal and oil kept prices at low levels throughout the year and affected returns from the raw material fisheries, although these improved in early 1968.

Large stocks also played a part in reducing prices for food fish products in some countries. In the United States, factors influencing the downward trend in the food fish industry included the removal of restrictions on meatless Fridays and, in some instances also, lower prices for competing products, such as meat and eggs. Average prices obtained by the fishermen were generally lower than in 1966, particularly for species used as raw material for fish meal and oil. Prices of the principal bottom fish varieties, such as cod and plaice, were much lower in the United Kingdom market, especially during the summer. Reduced demand was to some extent attributed to unusually warm weather. Prices of fish at some of the major ports during the last months of the year were higher because a surcharge was imposed to compensate for the increase in fuel costs brought by the closure of the Suez Canal.

Forest products

For the second year in succession average unit values for forest products as a whole entering international trade declined slightly in 1967. This was largely due to a downward tendency in prices in a few key commodities and regions, notably sawn softwood and chemical woodpulp in Europe. The strength of Japanese import demand for coniferous and broadleaved logs resulted in prices sufficiently higher to raise the world average prices. Prices for sawlogs and veneer logs moved upward in North America in the latter part of 1967, as a result partly of the recovery in demand and partly of the shortages arising from the limitations on logging activities in the late summer due to the above-average fire hazard. For most other commodities, changes in world export unit values were not marked.

Prices for sawn softwood and plywood in North America, which had fallen steeply in the second half of 1966, recovered during 1967 and had regained or even surpassed previous peak levels by the early months of 1968. In Europe, prices for sawn softwood, with the exception of top quality redwood, were lower in 1967. Prospects for a modest improvement in demand during 1968 have brought some stability, although at price levels which leave little profit to the producers.

Prices for European hardwoods remained stable during 1967, although the differential continued to widen between the better and lower qualities. The market for African hardwoods remained generally dull, with prices reasonably stable at levels somewhat below those of recent years. Prices c.i.f. in Europe for sawn hardwood from the Far East were generally firm, partly owing to increased freight costs arising from the closing of the Suez Canal. In the United States there was a weaker trend for hardwoods which, however, appeared to be stabilizing toward the end of 1967.

With potential world availabilities outstripping requirements during 1967, the international market for chemical woodpulp came under increasing strain. Prices for paper and paperboard were generally stable. In North America an upward tendency was noticeable toward the end of the year, in line with overall inflationary trends. The sterling devaluation created some uncertainties in the European market. United Kingdom paper producers raised their prices by about 10 percent to cover the increased cost of imported pulp. Scandinavian exporters to the United Kingdom raised their prices by a similar amount in terms of sterling, resulting in a decline in receipts in terms of their own currencies.

Imports of agricultural products

The volume of world imports of agricultural products[12] failed to increase in 1967 for the first time since 1958. The imports of both the developed regions, which account for about 80 percent of the total, and the developing regions remained at about the

[12] Excluding eastern Europe, U.S.S.R. and China (Mainland).

TABLE II-11. – INDICES OF THE VOLUME AND VALUE OF AGRICULTURAL IMPORTS BY REGION

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	Change 1966 to 1967
	Indices, average 1957-59 = 100													*Percent*
Volume														
Western Europe	89	96	100	97	103	107	109	114	116	118	122	127	125	— 2
North America	92	95	95	97	108	101	106	115	113	104	107	112	113	+ 1
Japan	89	98	98	95	108	120	138	132	155	168	183	203	207	+ 2
Oceania	101	93	98	102	100	101	104	95	105	110	119	117	109	— 7
Total developed regions	90	96	99	97	104	107	110	115	118	118	123	129	128	— 1
Latin America	92	89	99	102	99	103	108	116	122	134	132	136	138	+ 1
Far East [1]	71	89	103	98	98	121	117	117	132	143	148	148	149	+ 1
Near East	73	86	94	96	110	121	133	137	142	146	152	163	143	— 12
Africa	87	97	99	94	107	119	128	127	117	122	128	140	146	+ 4
Total developing regions	79	90	100	98	102	116	120	122	129	137	141	146	145	— 1
ALL ABOVE REGIONS	88	95	99	97	104	109	112	116	119	122	126	131	130	— 1
Eastern Europe and U.S.S.R.	79	81	94	95	111	117	129	129	134	166	166	157	...	...
WORLD [2]	87	94	99	97	104	109	113	117	121	126	130	133	...	...
Value														
Western Europe	94	101	106	96	98	104	102	108	116	124	128	133	129	— 3
North America	102	102	101	97	102	95	93	97	102	101	98	104	103	— 1
Japan	101	107	110	93	97	113	130	120	154	174	181	201	202	+ 1
Oceania	114	97	101	99	100	100	97	88	101	110	113	111	102	— 8
Total developed regions	97	101	105	96	99	102	102	106	116	122	125	131	128	— 2
Latin America	101	91	103	102	96	101	101	112	121	136	128	135	138	+ 2
Far East [1]	74	90	108	98	95	114	111	110	128	149	146	149	151	+ 1
Near East	78	88	103	93	104	112	123	123	137	155	146	157	139	— 12
Africa	90	98	102	96	101	112	118	114	110	123	129	134	137	+ 2
Total developing regions	84	92	105	98	98	110	112	114	125	142	139	144	144	—
ALL ABOVE REGIONS	94	100	105	96	99	104	104	107	117	126	127	134	131	— 2
Eastern Europe and U.S.S.R.	83	85	99	94	107	115	122	120	133	173	164	156	...	...
WORLD [2]	93	98	105	96	99	105	106	109	119	130	131	136	...	...

[1] Excluding Japan and China (Mainland). – [2] Excluding China (Mainland).

same level as in 1966. Lower prices for many agricultural commodities caused the value of imports to fall slightly, with the developed countries benefiting somewhat more than the developing countries. The value of the imports of the former countries fell slightly more than their volume.

As can be seen from Table II-11 there were considerable variations between regions. In Oceania and the Near East the volume imported fell by 7 percent and 12 percent respectively. In the three largest importing regions — North America, western Europe, and the Far East (excluding Japan) — and in Latin America, the change was only 1 or 2 percent. Imports into Africa rose by 4 percent.

DEVELOPED REGIONS

In the developed regions, the almost unchanged volume of agricultural imports resulted from a decline in raw material imports and a failure of the other commodity groups to increase appreciably. The fall in raw material imports — which amounted to 6 percent in western Europe and 4 percent in North America — was associated with the lower rate of increase in economic activity in a number of industrial countries and continuing competition from synthetic materials. Trade in cotton and wool was severely affected by the decline in textile activity in the United States and western Europe and by repeated reductions

in synthetic fiber prices. Rubber imports appear to have expanded slightly despite a decline in consumption. Substantial quantities were imported for additions to stocks in consuming countries, and releases from the United States strategic stockpile declined. Imports of fishery products into the main importing countries were also larger.

In North America there was also a 3 percent drop in the volume of beverage and tobacco imports, which reflected a decline in United States imports of coffee, cocoa, and tobacco. The region's imports of virtually all foods and feedstuffs were higher; the volume for the group as a whole was 5 percent larger than the previous year. Imports of cereals increased by more than 20 percent, sugar by 11 percent, and meat and dairy products by 8 percent. United States imports of fish meal were a record and those of most other fishery products were higher than in 1966.

In western Europe the reverse occurred: imports of all beverages and tobacco (except wine) were larger, whereas imports of foods and feedstuffs fell fractionally. Imports of meat of all kinds, dairy products (except eggs), and many oils and oilseeds were larger, but the volume of trade in most other foods and feedstuffs fell, reflecting better harvests (particularly for grains) in 1966 and 1967. Imports of both cereals and refined sugar fell by 10 percent.

The sharpest decreases occurred in Oceania, where the volume of imports of all of the major commodity groups fell by 5 to 6 percent. With the exception of rubber and cocoa, whose imports increased by 5 percent and 19 percent respectively, trade in most of the important individual commodities either declined or remained virtually unchanged.

Except for beverages and tobacco, which fell sharply from the record level of 1966, Japanese imports of almost all agricultural commodities continued to expand in 1967.

Developing regions

The level of imports of agricultural products into the developing regions in 1967 mainly reflects an unchanged volume of food and feedstuffs imports, which account for over 80 percent of the total. The poor harvests in 1965 and 1966 had caused imports of food, and especially grains, to rise to peak levels in 1966, and between 1955-57 and 1964-66 imports of food and feedstuffs had increased by about 65 percent, and those of cereals had more than doubled. As a result of the large increase in production in 1967 imports of food and feedstuffs began falling during the second half of the year, and for the year as a whole the total was no larger than in 1966. Imports of cereals, which comprise almost 60 percent of the total food imports, declined slightly from the record 1966 level. The quantity of sugar imported remained unchanged and that of fruit, live animals, and meat declined. Imports of vegetable oils and oilseeds, and of dairy products, were larger.

Insofar as the individual regions are concerned, food imports remained at the previous year's level only in the Far East (excluding Japan). In this region cereal imports, which amounted to about 65 percent of the total, remained unchanged. Imports of both wheat and rice are estimated to have fallen slightly. For rice the decline was due to a drastic reduction of supplies in exporting countries resulting from a series of poor crops and depleted stocks. Many importing countries were unable to obtain the needed quantities of rice and had to increase their imports of other cereals. Imports of vegetable oils and oilseeds (and particularly soybeans, and soybean and coconut oil) increased, in part because of lower production of coconut oil in the region. Imports of most other food products seem to have fallen somewhat.

For the other regions only partial data are available for 1967. In the Near East these would seem to indicate a sharp decline in food imports, which fell to their lowest level since 1962. Imports of grain, which constitute almost half of the total food imports, are estimated to have declined sharply from the peak level of 5.6 million tons reached the previous year. Sugar imports also appear to have fallen.

In Latin America and Africa, on the other hand, imports appear to have increased, although somewhat more slowly than the previous year. Imports of grain, which in 1967 constituted roughly 45 percent of total food imports in Africa and 56 percent in Latin America, reached record levels in Brazil and Peru, two of the major Latin American importers, and increased sharply in northwest Africa.

Table II-12 summarizes the position of the developing regions insofar as their net trade in cereals is concerned. It shows that cereal imports of these regions combined increased from an average of 14.0 million tons in 1955-57 to 29.9 million tons in 1964-66. At the same time exports rose from 12.8 million tons to 19.7 million, reaching a peak in 1965 when shipments amounted to almost 21.2 million tons. The result was an almost tenfold increase in net imports: from 1.2 million to 10.2 million tons. The rise was particularly sharp in 1966, when the effect of the exceptionally bad harvests of 1965 appeared: both an increase in imports and a decrease in exports occurred and net imports rose from 7.9 million to 14.1 million tons. The partial data available for 1967 seem to indicate that this level has been maintained.

Of the four developing regions, only Latin America has been able to maintain, and even improve,

TABLE II-12. – NET TRADE[1] IN CEREALS IN DEVELOPING REGIONS

	Average 1955-57	Average 1964-66	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons											
LATIN AMERICA												
Imports	3.9	6.8	4.6	4.3	4.7	4.8	5.6	6.1	6.9	6.4	7.2	7.5
Exports	5.5	12.1	5.7	6.1	6.7	4.0	7.4	6.1	10.2	13.7	12.5	12.5
Net	— 1.6	— 5.3	— 1.1	— 1.8	— 2.0	0.8	— 1.8	—	— 3.3	— 7.3	— 5.3	— 5.0
FAR EAST [2]												
Imports	6.4	15.0	9.1	8.8	11.2	10.0	9.5	12.5	13.9	15.0	16.0	16.0
Exports	3.9	5.3	3.6	4.0	4.6	4.6	4.3	5.2	5.6	5.3	4.9	3.9
Net	2.5	9.7	5.5	4.8	6.6	5.4	5.2	7.3	8.3	9.7	11.1	12.1
NEAR EAST												
Imports	2.4	4.9	2.7	3.5	4.6	5.0	4.6	5.1	4.4	4.8	5.6	4.8
Exports	1.3	1.0	1.3	0.9	0.6	0.6	1.3	1.3	1.2	1.1	0.8	0.6
Net	1.1	3.9	1.4	2.6	4.0	4.4	3.3	3.8	3.2	3.7	4.8	4.2
AFRICA												
Imports	1.3	3.2	1.2	2.2	2.3	3.0	2.9	2.4	2.6	2.9	4.2	4.2
Exports	2.1	1.3	2.4	1.5	1.5	1.9	3.1	3.3	2.1	1.0	0.7	1.5
Net	— 0.8	1.9	— 1.2	0.7	0.8	1.1	— 0.2	— 0.9	0.5	1.9	3.5	2.7
Total developing regions												
Imports	14.0	29.9	17.5	18.9	22.9	22.8	22.5	26.3	27.9	29.1	32.9	32.5
Exports	12.8	19.7	13.0	12.6	13.4	11.1	16.0	15.9	19.2	21.2	18.8	18.5
Net	1.2	10.2	4.5	6.3	9.5	11.7	6.5	10.4	8.7	7.9	14.1	14.0

[1] Minus sign denotes net export. – [2] Excluding Japan and China (Mainland).

its position as a net exporter of cereals. Between 1955-57 and 1964-66 this region's gross cereal exports (95 percent of which come from Mexico and Argentina) grew from an average of 5.5 million to 12.1 million tons. Imports increased from 3.9 million to 6.8 million tons over the same period, and net exports more than tripled. Cereal imports have constituted a relatively stable proportion of the total cost of agricultural imports over this period — remaining at about 43 percent. Their cost has increased by about 75 percent, which is less than in the other developing regions.

Africa moved from being a net exporter of cereals in 1955-58 to a net importer in subsequent years and, although it regained this position briefly in 1962 and 1963, this was the result of exceptionally good harvests in northwest Africa which permitted exports to be increased substantially. Imports, on the other hand, have grown fairly steadily, particularly into some northwest African countries and Nigeria. Between 1965 and 1966 the region's net imports increased by almost 90 percent as a result of both a sharp fall in exports and a sharp rise in imports. Although net imports seem to have declined in 1967, this has been the result of a sharp increase in exports, rather than a fall in imports. Gross imports remained at, if not above, the peak level of 1966 — over 4 million tons. The imports of the major northwest African importers also continued to increase in 1967. On the basis of partial data, it would seem likely that Moroccan grain imports totaled over 800,000 tons, and those of Tunisia 400,000 tons.

Gross imports of grain into the Near East more than doubled between 1955-57 and 1964-66, rising from 2.4 million tons to almost 5.0 million tons. Given the steady decline in the region's exports (primarily wheat and barley from the Syrian Arab Republic and Iraq) the increase in net imports was even greater, and by 1966 reached a peak of 4.8 million tons. In 1967 these imports declined by almost 15 percent, reflecting the decline in both the exports and imports of most countries in the region. The United Arab Republic's gross imports of grain, which had risen from 560,000 tons in 1955-57 to

over 2 million in 1964-66, are estimated to have fallen by almost 10 percent in 1967.

The largest absolute increase has taken place in the Far East, excluding Japan and China (Mainland), where gross imports of grain increased by 8.6 million tons between 1955-57 and 1964-66. Net imports increased by 7.2 million tons during the same period. Indian imports, which accounted for roughly 50 percent of the total in 1967, have increased from an average of less than 2 million tons during the early years, to over 8 million tons in 1964-66, totaling over 10 million tons in 1966. In 1967, the region's gross imports remained at about the same level as the previous year, thanks to some improvement in production. Net imports, however, continued to increase, as in every year since 1963.

Neither the gross nor the net level of trade of China (Mainland) can be estimated with any degree of precision. For wheat, contracts for imports of 5 to 6 million tons were concluded in 1966/67, and for roughly the same amount in 1967/68.

Trade on special terms

Shipments on special terms provided a slightly smaller proportion of the food imports of the developing countries in 1967, falling from 30 percent in 1966 to 27 percent. For grains alone, the proportion fell from 17 percent in 1966 to less than 14 percent in 1967.

There was a decline in the value of United States government financed exports, which account for over 90 percent of all shipments on special terms (Annex table 15). There were sharp increases in shipments of rice (60 percent), powdered milk (70 percent), and cotton (20 percent). Soybean oil exports were 50 percent above the depressed level of 1966. These increases were, however, insufficient to make up for the 25 percent drop in shipments of wheat and wheat flour, which accounted for almost 60 percent of the total in 1966. Total government financed exports thus remained at their 1965 level, more than 10 percent below the peak in 1964.

There were larger shipments under the barter program and more donations, but there were reductions in both sales for foreign currency and long-term dollar credit sales. India continued to receive one third of the total, followed by the Republic of Viet-Nam and Pakistan with 10 percent each, and the Republic of Korea and Brazil with almost 7 percent each.

International trade policies

Intensive discussion has continued on many aspects of international trade policies, especially in connection with the second session of the United Nations Conference on Trade and Development (UNCTAD), held at New Delhi in February-March 1968. UNCTAD was established in 1964 "to serve as an agent of accelerated economic development for all countries, by means of formulating and carrying into effect new development-oriented trade policies through the combined efforts of the entire international community." [13] The second session was envisaged as a new and potentially decisive stage in the continuing pursuit of these ends. Its three main objectives, as defined by the United Nations General Assembly, were:

"(*a*) to reevaluate the economic situation and its implications for the implementation of the recommendations of the first session of the United Nations Conference on Trade and Development;

(*b*) to achieve, through appropriate forms of negotiations, specific results that ensure real progress in international cooperation for development;

(*c*) to explore and investigate matters requiring more thorough study before agreements can be envisaged." [14]

It was to "concentrate... on a limited number of fundamental and specific subjects with a view to achieving practical and concrete results." [15] It was also to serve the wider objective of providing the basis for suggesting the "appropriate means of harmonizing measures... in the preliminary framework of an international development strategy." [16] Included on the agenda were items on the access of primary commodities to markets in industrialized countries; preferences for manufactures and semi-manufactures exported by developing countries; the volume, terms and conditions of development aid; supplementary financing; trade expansion, economic cooperation, and integration among developing countries; and the world food problem.

The position of the developing countries on most of the questions under consideration had been formulated at the Algiers Meeting of the Group of 77 in October, and set down in the Charter of Algiers. The developing countries stressed the urgent need for action on a number of key problems and proposed the establishment of a timetable for agreement to be reached. They called for the conclusion of international commodity arrangements and for the international financing of buffer stocks, and proposed that developed countries allocate a fixed

[13] UNCTAD document TD/L.37, 18 April 1968, p. 21.
[14] Op. cit., p. 23.
[15] Op. cit., p. 22.
[16] Op. cit., p. 26.

share of increments in domestic consumption to imports from developing countries. They also called for agreement on at least the main elements of a general system of tariff preferences in favor of developing countries, specifically including processed and semiprocessed agricultural products, and requested the developed countries to implement immediately the concessions on products exported by developing countries agreed upon during the Kennedy Round of tariff negotiations. They requested more favorable terms and conditions for development finance, and called on developed countries to provide a minimum level of assistance of 1 percent of their GNP by the end of the current Development Decade.

The conference was able to reach agreement only in the broadest terms. Concerning agricultural commodities, its report includes recommendations that a cocoa conference be convened no later than the end of June 1968; that an international sugar agreement be concluded and in operation by the end of this year; that action be taken to improve the market situation for oilseeds, oils and fats; that the production and supply of both natural and synthetic rubber be regulated; that a formal agreement regulating the market for hard fibers be considered; that the possibility of a buffer stock scheme for jute be examined; and that appropriate studies and action be considered for bananas, citrus fruit, cotton, pepper, tea, tobacco and wine.

Member governments of UNCTAD were invited to join the existing international commodity organizations in order to strengthen their activities. The conference also called for further liberalization of the compensatory financing facilities of the International Monetary Fund (IMF). In discussing the study on commodity price stabilization being carried out by the IMF, the International Bank for Reconstruction and Development (IBRD), and the International Development Association (IDA), it emphasized the important role which these organizations could play in helping to solve the financial and development problems arising in world commodity trade. It also requested a study exploring the possibility of establishing a minimum income for agricultural producers in developing countries.

Concerning trade liberalization, the second session of UNCTAD was unable to progress beyond agreement on the desirability of a system of generalized preferences for developing countries. Agreement was not reached on the inclusion of processed and semiprocessed agricultural products important to the economies of the developing countries, which the developed countries insisted they could include only after case-by-case examination. A special Committee on Preferences will hold its first meeting in November-December 1968, with the aim of putting a suitable system into effect by early 1970.

Another important topic on the agenda of the conference was the world food problem in relation to trade and development. A declaration [17] was adopted which, *inter alia*, recognizes the primary responsibility of the developing countries to increase their food production and the need for developed countries to "cooperate fully in these efforts." It requests developing countries to pay particular attention to the agricultural sector, in view of the food situation and the important role of agriculture in overall development. Resolutions relating to aid to this sector and to the economy as a whole are discussed in the next section of this chapter.

During the past year commodity agreements have been successfully concluded for two important commodities — wheat and coffee. The Wheat Trade Convention of the International Grains Arrangement has been signed by 9 exporting and 21 importing countries and, although not ratified by all of them at the time of writing, came into force on 1 July 1968 for three years. It establishes new minimum and maximum prices (U.S.$1.73 per bushel and $2.13 per bushel) for a new "reference" or basic wheat, United States No. 2 Hard Red Winter (ordinary) f.o.b. Gulf. The new minimum is about 12 percent above that in effect under the International Wheat Agreement. The International Grains Arrangement also contains a Food Aid Convention, reviewed below in the discussion on foreign assistance.

The new coffee agreement, which will be in effect for a period of five years from 1 October 1968, is a major step forward in the attempt to create a better balance between the production and consumption of coffee. It includes two new provisions : a requirement that exporting countries set themselves production ceilings (to be approved by the International Coffee Council) in order to qualify for future increases in their export quotas ; and the creation of an economic diversification fund of U.S.$150 million to help countries overdependent on coffee. New export quotas, based on average production in 1959-66 and taking into account the volume of each country's exports and stocks during 1963-65, have been set at slightly more than 55.0 million bags (3.3 million tons) compared with 45.6 million bags (2.8 million tons) under the previous agreement. The new agreement also includes a requirement that beans used in the domestic production of instant or other processed coffee for export be valued at the same price as exported beans; any complaints of infringement would be referred to the International Coffee Council for arbitration.

Negotiations for cocoa and sugar agreements have continued. The cocoa conference was reconvened

[17] UNCTAD document TD/L.37. 18 April 1968, Annex I. p. 18.

in December under UNCTAD auspices but, despite prior accord on the basic price range within which sales quotas and buffer-stock arrangements would operate, agreement was not reached on a number of issues and talks were suspended.

A draft agreement was presented to the United Nations Sugar Conference, which met in April-May 1968, but the conference adjourned without reaching agreement.

The FAO study groups on bananas, jute, hard fibers, rice, and oilseeds, oils and fats all met during the period under review, and an *ad hoc* consultation was held on wine and vine products.[18] The indicative prices for both jute and sisal were revised following the devaluation of sterling in November 1967. In January the Consultative Committee on Jute, Kenaf, and Allied Fibers raised the recommended indicative price from the £97 ± £5 per long ton for Export Hearts f.o.b. Pakistan ports, which was agreed upon in September, to £109 ± £5 per long ton for the new grades PWD/PTD f.o.b. Pakistan ports. The consultative subcommittee of the Study Group on Hard Fibers, established in September to administer an informal consultative arrangement similar to that for jute, met for the first time in January. It confirmed the September agreement establishing an indicative price range for sisal and an informal export quota system for sisal and henequen. It also decided to raise the indicative price range for sisal by the full extent of the sterling devaluation: that is from £73.10.0 ± £5 per long ton c.i.f. Europe for East African Rejects to £85.15.0 ± £5, and to link it specifically to a United States dollar rate. The subcommittee recommended indicative price ranges for Philippine and Malaysian abaca.

The International Sultana Agreement price minima were maintained for the third successive year. It was agreed to raise the sterling price of raisins by roughly the full amount of the devaluation.

Commodity problems and their impact on developing countries also received attention at the annual meeting of the IMF and IBRD held at Rio de Janeiro in September 1967. In response to a request from the finance ministers of 15 developing countries, it was decided to prepare a study recommending solutions to the problem of stabilizing prices of primary products, if possible for consideration at the 1968 annual meeting.

The 24th Session of the Contracting Parties to the General Agreement on Tariffs and Trade (GATT) considered in some detail the trade problems of developing countries and the question of obstacles to trade in agricultural products. The session concluded that, although the results of the Kennedy Round of tariff negotiations fell short of the aims of the developing countries, the results had nevertheless been significant for these countries.[19] Disappointment was expressed at the limited action taken to implement the recommendation that tariff concessions negotiated on products of export interest to developing countries be implemented immediately, without the phasing envisaged under the general rules. Partly for this reason, it was decided to reactivate the Special Group on Tropical Products, in order to study the problem of barriers to trade in these commodities, including the incidence of internal charges.

It was also recognized at this meeting that, since the results achieved for agriculture in the Kennedy Round were rather limited, this sector should have an important place in the future work program of the organization. In order to prepare the ground for future negotiations, an Agricultural Committee was established "to explore the opportunities for making progress in the attainment of the objectives of the General Agreement in the agricultural field." The Committee's first meeting was held in January.

During the period under review GATT working parties on dairy products and on poultry (the latter newly established) also met to discuss trade problems for these commodities.

The first regular tariff cuts agreed during the Kennedy Round were made on 1 January 1968 by 13 countries, even though the instruments of agreement had not yet been ratified by all of the 34 countries. Thirteen more countries were to begin making cuts on 1 July. The cuts are due to be made at a rate of 20 percent a year, although a modification of this schedule is being considered with a view to helping the United States with its balance of payments problems.

A development which may have considerable effects on international trade policy was the decision, taken at the annual meeting of IMF at Rio de Janeiro in September 1967, to create a new type of international monetary instrument designed to increase world monetary reserves. This will take the form of "special drawing rights" (SDRs), which will be allocated among IMF members, in accordance with their respective quotas in the Fund, for use in the settlement of accounts. The scheme must now be ratified by 65 of the 107 member countries, representing 80 percent or more of the total voting power, and it is expected that it will be in operation by the end of 1968 or the beginning of 1969. As with the Kennedy Round tariff reductions, the direct

[18] For a detailed report on the activities of the various commodity study groups, as well as other international consultations on commodity matters, see: FAO, *FAO commodity review 1968*, Rome, 1968.

[19] For a general survey of tariff reductions made by the six major industrialized participants in the negotiations, see: GATT, *Summary of the results of the Kennedy Round for developing countries*, COM.TD/48/Rev. 1.

benefits from this additional liquidity will accrue mainly to the developed countries, who together hold the largest share (73 percent) of the total quotas in the Fund.[20] The indirect benefits which developing countries may expect to derive from the scheme are, however, likely to be more important than any direct benefit stemming from a gain in their own reserves. The need for corrective action which might hamper the growth of exports from developing countries or restrict the flow of capital to them should be reduced if the developed countries have timely access to the additional resources that are required to resolve their balance of payments problems.

Foreign assistance for agricultural development

After having failed to increase significantly in 1966, the net flow of financial resources from the member countries of the Development Assistance Committee (DAC) to the developing countries is estimated to have increased by 8 percent in 1967 (Table II-13). Official bilateral assistance, which accounts for more than half of the total, increased at the same rate as last year, while the flow of official funds to multilateral agencies increased sharply, reflecting the transfer of funds from the United States to the International Development Association (IDA) and the Asian Development Bank (ASDB). The volume of private assistance also increased. As a result, the downward trend seems to have been arrested in the proportion of the national income of the donor countries represented by these funds.

No new data are available to show how much of the total flow of funds has gone to the agricultural sector. As was noted last year, data supplied by the Organization for Economic Cooperation and Development (OECD) indicate that about 9 percent of the total official commitments of the DAC countries have in recent years been for assistance for agricultural development (including the manufacture of agricultural requisites).

[20] The 27 percent held by the developing countries compares with their 17 percent share of total world reserves, and reflects adjustments made in recent years to the quotas of many primary producing countries.

TABLE II-13. – TOTAL NET FLOWS OF FOREIGN ASSISTANCE [1] TO DEVELOPING COUNTRIES

	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	U.S. $ million							
MEMBERS OF DEVELOPMENT ASSISTANCE COMMITTEE (DAC) [2]								
Official bilateral	4 329	5 277	5 423	5 707	5 476	5 753	5 970	6 200
Official to multilateral agencies	601	751	526	364	379	449	536	770
Private bilateral	2 978	3 121	2 333	2 575	3 147	3 980	4 028	4 110
Private to multilateral agencies	204	91	247	— 31	138	248	28	280
Total DAC	8 112	9 240	8 529	8 615	9 140	10 429	10 562	11 360
Estimated flow from non-DAC members [3]	379	540	582	596	513	509	530	...
Net additional multilateral outflow [4]	— 550	— 648	— 403	+ 309	+ 257	+ 191	+ 459	...
Total	7 941	9 132	8 708	9 520	9 910	11 129	11 551	...

SOURCE: Organization for Economic Cooperation and Development (OECD). *Development assistance efforts and policies: 1967 review*. Paris, 1967: *Development assistance - 1967 and recent trends*. Press release, Press/A(68)34. Paris. 4 July 1968.

[1] Including private investment and export credits and the financial equivalent of technical assistance and of food aid; net of amortization payments but not of interest payments (official interest receipts by the DAC countries are estimated as about $514 million in 1967). – [2] Australia, Austria, Belgium, Canada, Denmark, France, Federal Republic of Germany, Italy, Japan, Netherlands, Norway, Portugal, Sweden, United Kingdom, United States. – [3] Including centrally planned economies. – [4] Difference between disbursements by multilateral organizations in each year (net of capital subscriptions, bond purchases and repayments, by developing countries) and total receipts in the same year, including those from non-DAC countries.

TABLE II-14. – IBRD LOANS AND IDA CREDITS

	1965/66[1]		1966/67[1]		1967/68[1]	
	Number	*$ million*	*Number*	*$ million*	*Number*	*$ million*
Livestock development	2	24.2	2	6.0	2	55.3
Irrigation	2	64.0	2	19.0	1	25.0
Agricultural credit	4	45.0	2	6.6	1	3.0
Grain storage	1	19.2	—	—	—	—
Fishing vessels	—	—	1	14.4	—	—
Land development and cooperative farming	—	—	3	41.0	6	51.1
TOTAL AGRICULTURE, FORESTRY AND FISHERY	9	152.4	10	87.0	10	134.4
Grand total all purposes	49	1 123	67	1 230.3	...	...

SOURCE: International Bank for Reconstruction and Development and International Development Association. *Annual report 1966/67*. Washington, D.C., 1967. p. 8-9; FAO/IBRD Cooperative Program.
[1] July-June.

For multilateral assistance the information on funds going to the agricultural sector is somewhat more complete. Data for the International Bank for Reconstruction and Development (IBRD) and IDA indicate that up to mid-1967 9 percent of the total loans and credits went to agriculture, forestry, and fishing. Table II-14 shows that the amount approved for this sector in 1966/67 (U.S.$ 87 million) was substantially below the $152 million approved the previous year. There is, however, every indication that the policy, announced in 1963, of paying increased attention to agriculture is to be continued. Between July 1967 and June 1968, in fact, ten more projects, totaling over $134 million, had been approved for this sector.

At the same time, it seems likely that there will be a continuation of the IBRD policy of becoming increasingly engaged in broad agricultural development programs (including agricultural inputs, processing, marketing, and credit), as opposed to the concentration on large construction projects such as flood control and irrigation which characterized its policy in earlier years. Projects of this nature received a total of $41 million during 1966/67 and $51 million between mid-1967 and mid-1968. This compares with a total of $63 million in this category up to mid-1966.

FAO has continued its assistance in the identification and preparation of agricultural projects for IBRD financing. Also important to the agricultural sector is the assistance given for the establishment of fertilizer plants in the developing countries. Fertilizer projects in which IBRD is participating through the International Finance Corporation (IFC) reached the financing stage in Brazil, India, and Senegal in 1966/67.

The 1967 lending operations of the Inter-American Development Bank (IDB) reflect its policy of placing special emphasis on agricultural development. Close to $154 million were provided to the agricultural sector, over 30 percent of the total loans granted in 1967. This compares with 27 percent the previous year and 24 percent for the period 1961-67. The support given by IDB for this sector was particularly important in 1967 in Argentina, Brazil, Colombia, and Mexico. It included a $12.2 million loan to Colombia, part of which will be used to finance credit for farmers to purchase production requisites, and a $20 million loan to Mexico to help finance a farm credit program.

The activities of the Asian Development Bank (ASDB) began late in 1967. Its first technical assistance mission was sent to Indonesia to study the problem of improving food supplies, and early in 1968 a request by the Government of the Republic of Korea for technical assistance to its Agriculture and Fishery Development Corporation was approved. Although ASDB has indicated that it will not be guided by an *a priori* emphasis on any particular sector of economic activity, but rather by "considerations relevant to a rational choice as between different investment opportunities," it was essentially the stress laid by its member governments on agricultural development that led to its carrying out a regional survey of agriculture — the Asian Agricultural Survey. The main purpose of this survey, which was completed early in 1968, was to facilitate ASDB's operations in the agricultural sector by identifying the key problems of agriculture in the region and by recommending courses of action appropriate for the bank in promoting agricultural development. The survey was also designed to provide the background against which potential donors could appraise the need for contributions to the ASDB special fund for soft loans for agricultural development.

The cooperation of FAO with all the regional banks, aimed primarily at assisting in the identification and appraisal of projects for financing by them, is being intensified. Agreements have been concluded for this purpose with both ASDB and the African Development Bank (AFDB) during the period under review, and a new understanding with IDB specifies that priority in the immediate future will be given to projects in the fields of marketing, forestry, fisheries, livestock, applied research, and agricultural extension.

In the next few years there is unlikely to be any substantial expansion in the flow of assistance to developing countries, because of the balance of payments problems of the United States and the

United Kingdom, which together supplied over 55 percent of the total assistance in 1966. In the United States the request for $2,500 million in economic aid before the United States Congress at the time of writing is the smallest in the history of the foreign aid program.[21] Nevertheless, the level of disbursements could be maintained with the carryover of uncommitted funds from earlier periods and the continuation in the flow of committed, but undisbursed, funds.[22]

The decline in the flow of aid provided by the major donors may to some extent be offset by an increase in the contribution of some of the smaller donor countries. Canada, Denmark, the Federal Republic of Germany, Japan, Netherlands, and Sweden have recently decided to increase allocations for development assistance, in some cases by as much as 25 percent annually over the next few years. It also seems likely that there will be a marked increase in disbursements to multilateral agencies during this period. For example, ASDB will be able to call on half of its subscribed capital of $1,000 million during the next five years. Agreement has also been reached for the replenishment of the funds of IDA which, if ratified by the participating countries, would provide $400 million annually over a three-year period.

The problem of the inadequate growth of assistance from the developed to the developing countries, and the need to improve the unsatisfactory terms and conditions under which it is provided, received considerable attention at the recent second session of the United Nations Conference on Trade and Development (UNCTAD). The conference recommended that the developed countries make every effort to achieve the target of 1 percent of gross national product[23] as a minimum level of assistance; that the official flow should represent a substantial portion of the total; that efforts be made to achieve, by the end of 1968, the terms and conditions of aid laid down by DAC in its resolution of July 1965;[24] that efforts be made to raise the present norms either by increasing the amount of aid given in the form of grants, by improving interest rates, maturities or grace periods, or by increasing the "grant element"[25] of the official aid commitments; and that the developed countries take whatever practical measures they can, both to reduce the extent of aid tying and to mitigate its harmful effects. The firm commitments sought by the developing countries in these respects were not, however, obtained. Few donors would commit themselves to achieving the 1 percent aid target by 1972, and they were unable to agree either on a minimum proportion for the official component of the total, or on norms for improving the terms and conditions of aid which were suggested as an improvement over those laid down by DAC in 1965.

In consultation with UNCTAD and the International Monetary Fund (IMF), IBRD was requested to prepare a study on possible improvements in techniques of lending, including conditions and schedules of repayment, for presentation at the next session of the UNCTAD Committee on Invisibles and Financing Related to Trade, to be held in February 1969. A more general study of the "consequences of twenty years of development assistance, assessing the results, clarifying the errors and proposing the policies which would work better in the future" is to be carried out under the auspices of DAC.

Food aid

The Food Aid Convention negotiated in August 1967 as part of the International Grains Arrangement provides for annual shipments of 4.5 million tons of food grains as aid to developing countries, of which a minimum of 1.9 million tons (42 percent) would come from the United States, and 1.0 million (23 percent) from the countries of the European Economic Community. Contributions may be in the form of grain or cash, and grain purchases with the latter are to be made from countries participating in the Arrangement. Not less than 25 percent of the cash contribution, or that part required to purchase 200,000 tons of grain, shall be used on purchases in developing countries. Although it is still not clear if this scheme will result in a net increase in the total volume of food aid, it will probably mean that increasing emphasis will be put on its provision through multilateral channels. Australia, Sweden, and the United Kingdom have already indicated that they would make all or part of their

[21] Assistance to improve agricultural production would, however, be increased by almost 50 percent to $746 million under the proposed legislation.

[22] Furthermore, the Foreign Assistance Act accounted for only 60 percent of the total economic assistance in 1966. The rest was provided under Public Law 480 or through the Export-Import Bank.

[23] At market prices, in terms of actual disbursements.

[24] This resolution sets out as targets for DAC members a proportion of approximately 80 percent of all commitments as grants plus loans at interest rates of 3 percent or less, and a similar proportion as grants plus loans with maturities of 25 years or more. In addition, an average grace period of 7 years was recommended. Member countries which extended 70 percent or more of their total assistance in the form of grants were exempted from the requirements on loan terms.

[25] This calculation, used to indicate the relative "softness" of a loan takes into account simultaneously the interest rate, maturity, and grace period. It involves calculating the flow of repayments to be received under the development loan agreement in terms of the amount of capital which would yield the same repayments if invested at an appropriate comparative discount rate. The difference between this capital sum and the face value of the loan is called the "grant element," often expressed as a percentage of the face value of the loan.

contributions available through the United Nations/FAO World Food Program.

The World Food Program provided $24.7 million worth of food in 1967. For the next two-year period, 1969-70, available pledges at present amount to $168 million in food, cash, and services (about $83 million per year, compared with $58 million during the current period). The future of multilateral food aid is under continued study by the United Nations and FAO, and a further joint report on this subject was prepared for the 44th Session of the Economic and Social Council (ECOSOC), held in July 1968.

As noted earlier in the discussion on international trade, United States shipments under Public Law 480 fell from $1,517 million in 1966 to $1,504 million in 1967 (Annex table 15). The amendment extending Public Law 480, which is due to expire at the end of 1968, is now before the United States Congress. Its main provisions are summarized in a later section of this chapter.

Data on bilateral food aid from other countries are available only up to 1966. For that year bilateral commitments are estimated at $103 million by Canada, $11 million by Australia, and $6 million by Japan.

Agricultural production requisites

As noted already, a major feature of the recent agricultural situation has been a much more rapid increase in many developing countries in the use of production requisites such as fertilizers, improved seeds, farm machinery and pesticides. Unfortunately, the only comprehensive statistics are for fertilizers and tractors, and these are generally available only up to 1966 or 1966/67.

Fertilizers

World consumption, excluding China (Mainland), of commercial fertilizers (NPK, in terms of nutrient content) is estimated to have exceeded 48 million tons in 1966/67 (Table II-15). The increase of almost 10 percent is about the same as the year

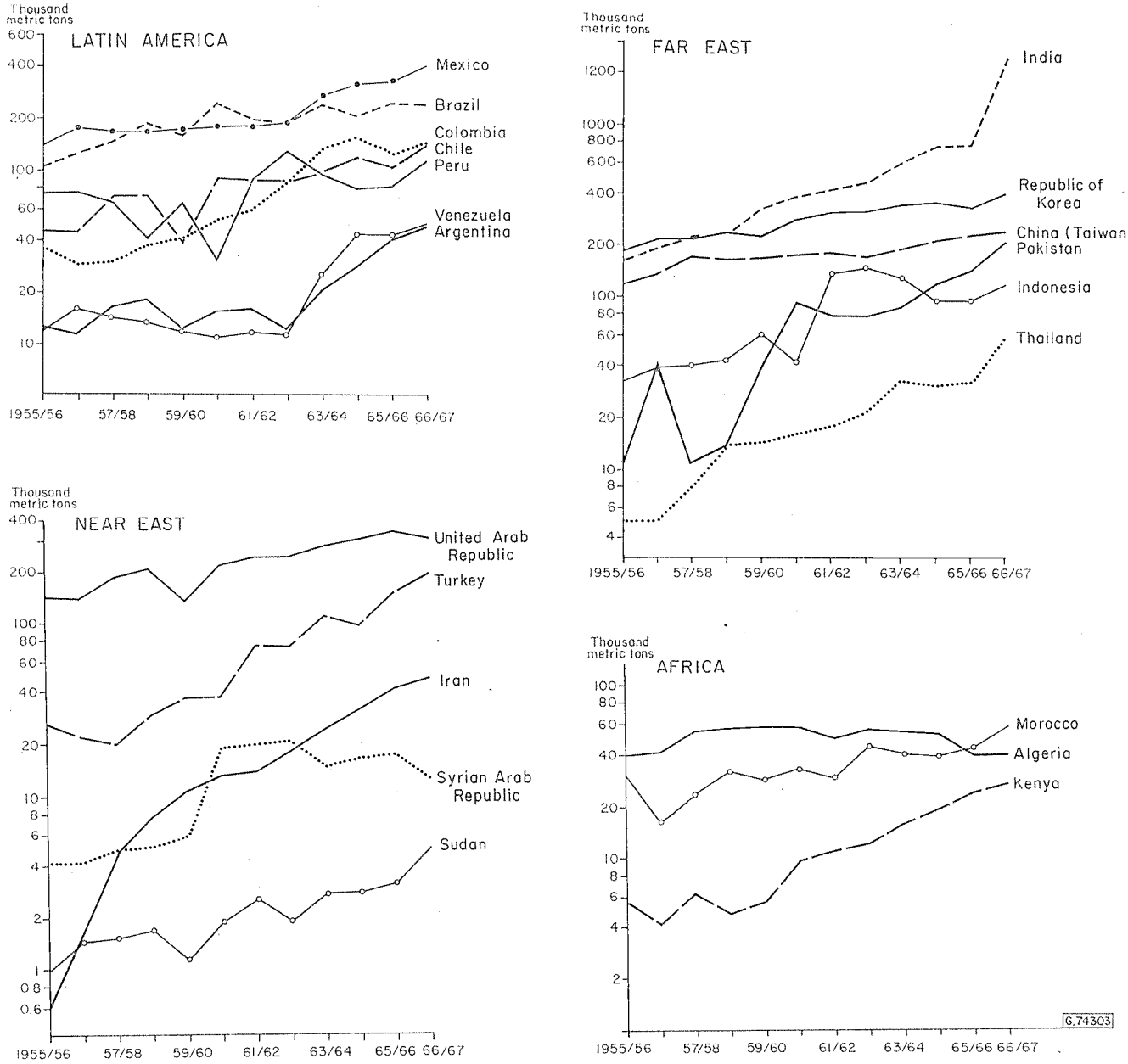
TABLE II-15. – CONSUMPTION AND PRODUCTION OF COMMERCIAL FERTILIZERS [1]

	Total consumption			Consumption per ha arable land 1966/67	Production		
	Average 1952/53-1956/57	1965/66	1966/67		Average 1952/53-1956/57	1965/66	1966/67
	Million tons			*Kilograms*	*Million tons*		
Western Europe	7.5	13.4	13.9	134	8.5	16.1	16.7
Eastern Europe and U.S.S.R.	3.5	10.2	11.2	39	4.0	11.3	12.5
North America	5.9	12.0	13.5	61	5.9	14.5	15.9
Oceania	0.7	1.6	1.6	41	0.6	1.3	1.3
Japan	1.1	1.9	2.1	350	1.0	2.2	2.5
DEVELOPED COUNTRIES [2]	18.8	39.5	42.7	64	20.2	46.0	49.5
Latin America	0.5	1.6	1.8	17	0.4	0.8	0.8
Far East [3,4]	0.6	2.0	2.7	10	0.1	0.8	0.9
Near East [5]	0.2	0.6	0.7	[6]16	–	0.3	0.3
Africa [7]	0.1	0.4	0.4	2	0.1	0.2	0.3
DEVELOPING COUNTRIES	1.4	4.6	5.6	9	0.6	2.1	2.3
World total [4]	20.2	44.1	48.3	36	20.8	48.1	51.8

[1] In terms of nutrient content (N, P_2O_5, and K_2O). – [2] Including Israel and South Africa. – [3] Excluding Japan. – [4] Excluding China (Mainland). – [5] Excluding Israel. – [6] Consumption per hectare of cropped land; because of extensive multiple cropping in the United Arab Republic and fallow in other Near East countries, consumption per hectare of arable land is only 9 kg. – [7] Excluding South Africa.

FIGURE II-5. – TRENDS IN CONSUMPTION OF FERTILIZERS[1] IN SELECTED DEVELOPING COUNTRIES

(Semilogarithmic scale)



[1] NPK (nutrient content).

before and compares with an average of 7 percent a year during the past decade.

This mainly reflects developments in the industrialized countries, which still account for almost 90 percent of total consumption. In the developing countries the rate of increase in 1966/67 was almost twice as fast as the year before. It was particularly rapid in the Far East and Latin America, which together are responsible for more than three quarters of the total fertilizer consumption in developing regions.

In the Far East, excluding Japan and China (Mainland), fertilizer consumption rose from 2.0 million tons in 1965/66 to 2.7 million tons in 1966/67. This increase of 35 percent compares with only 10 percent the year before and an average of 12 percent a year during the past decade. Trends in some individual countries are shown in Figure II-5. Increases of about 25 percent in Indonesia and the Republic of Korea, 47 percent in Pakistan, 62 percent in India, and 78 percent in Thailand reflect the new deter-

mination of governments to ensure the availability of adequate supplies. The limited available data indicate further large increases in 1967/68, for example about 35 percent in India and 85 percent in Pakistan. In China (Taiwan) the slower rate of increase is accounted for by the fact that fertilizer consumption per hectare is much higher than in the other countries shown.

The increase of 12 percent in fertilizer consumption in Latin America in 1966/67 was not as great as in some previous years and only slightly above the average for the decade. While consumption in Brazil failed to expand, increases in the other major consuming countries ranged from 16 percent in Colombia to 20 percent in Mexico and 40 percent in Chile and almost 60 percent in Mexico.

Fertilizer use in Africa rose by 15 percent in 1966/67, and in most individual countries the increase was more rapid than in the previous year. In the Near East, on the other hand, the rate of increase fell off, largely because of reduced cotton acreage in Syria and the United Arab Republic. Fertilizer consumption in Turkey increased by almost 30 percent in 1966/67, although this was considerably less than the year before.

World production of fertilizer outside China (Mainland) rose by 8 percent in 1966/67 to reach 51.8 million tons. Production in the developing countries increased by 200,000 tons or 9 percent, but these countries still account for less than 5 percent of the world total. Among developing countries, production is reported to have begun in 1967 of nitrogenous fertilizers in Cuba and Lebanon and of phosphates in the Republic of Korea.

TABLE II-16. – TRACTORS USED IN AGRICULTURE

	Average 1952-56	1965	1966	Per 1 000 ha arable land 1966
	Thousands			*Number*
Western Europe	1 580	4 293	4 536	43.7
Eastern Europe and U.S.S.R.	957	2 278	2 368	8.2
North America	4 793	5 398	5 425	24.3
Oceania	249	395	406	10.4
Japan [1]	1	24	30	5.0
DEVELOPED COUNTRIES [2]	7 665	12 589	12 976	19.3
Latin America	199	481	512	4.7
Far East [3,4]	28	87	97	0.4
Near East [5]	56	108	124	1.6
Africa [6]	58	97	103	0.5
DEVELOPING COUNTRIES	341	773	836	1.3
World total [4]	8 006	13 362	13 812	10.4

[1] The table excludes so-called garden tractors, which in Japan are the main type used in agriculture and rose from 510,000 in 1960 to 2.5 million in 1965. – [2] Including Israel and South Africa. – [3] Excluding Japan. – [4] Excluding China (Mainland). – [5] Excluding Israel. – [6] Excluding South Africa.

Farm machinery

The increase of 3 percent in 1966 in the number of tractors used in agriculture in the world excluding China (Mainland) provides a rough indication of the progress of agricultural mechanization (Table II-16).

In the developing regions, tractor numbers rose by 8 percent in 1966, which is more than twice as fast as in the developed regions. The increase ranged from 6 percent in Africa to 15 percent in the Near East.

It is estimated that in China (Mainland) tractors used in field operations in 1966 totaled over 110,000 in 15-horsepower units.

Other production requisites

Few data are available for other production requisites. For crop protection chemicals a main problem in estimating trends in their use is the highly varying content of active ingredients of the many different preparations in use. For improved seeds, some information on the high-yielding varieties of cereals is included elsewhere in this chapter both in reviewing agricultural production in 1967 and in describing agricultural policies and development plans.[26]

Prices of production requisites

Representative price series for production requisites are available chiefly for fertilizers. Wholesale price quotations for some of the main fertilizers are shown in Table II-17. In a number of cases prices have fallen in 1967, reflecting a tendency to excess capacity in the fertilizer industry. Where wholesale prices have risen (as for example in the United States) the increases have usually affected only domestic users, and export prices have remained stable.

[26] See also Chapter III of this report.

TABLE II-17. – WHOLESALE PRICES OF CERTAIN FERTILIZERS IN PRINCIPAL EXPORTING COUNTRIES

	Average 1950-52	Average 1959-61	1962	1963	1964	1965	1966	1967
	U.S.$ per 100 kilograms							
AMMONIUM SULFATE								
Germany. Fed. Rep. of	4.55	5.69	5.77	5.77	5.64	5.51	5.52	5.34
Japan	5.87	5.33	5.14	5.11	5.11	5.06	5.03	4.96
United Kingdom	3.94	5.66	5.50	5.50	5.50	5.50	5.50	5.63
United States	4.18	3.53	3.31	3.20	3.42	3.53	3.53	3.73
SUPERPHOSPHATE								
Italy	2.66	2.77	2.92	2.95	3.08	3.16	3.29	3.29
United States	1.78	1.98	1.98	2.04	2.05	2.11	2.18	2.57
MURIATE OF POTASH								
France	3.06	4.08	4.33	4.46	4.67	4.67	4.67	4.67
Germany. Fed. Rep. of	2.29	2.92	3.03	3.03	3.03	3.03	3.03	3.00
UREA								
United States	—	9.24	8.84	8.67	8.67	8.89	8.66	8.98

NOTES:

AMMONIUM SULFATE

Germany, Fed. Rep. of – Approximately 21 percent N. bulk. delivered purchaser's railway station; no deduction made for producer subsidies.

Japan – 20.6 percent N, Tokyo.

United Kingdom – For not less than 2 ton lots: average of quotations at four markets: no deductions made for producer subsidies: 1950 through 1958 20.6 percent N. 1959 20.8-21.0 percent N. from 1960 21.0 percent N: 1950 through 1962 delivered buyer's nearest station. from 1963 delivered to farm.

United States – Average bulk price, f.o.b. inland producing ovens.

SUPERPHOSPHATE

United States – Run of pile. bulk. under 22 percent P_2O_5. f.o.b. Baltimore.

Italy – 16 to 18 percent P_2O_5. warehouse, Milan.

MURIATE OF POTASH

France – Bulk. for agricultural use. f.o.r., excluding sacking and taxes; from May 1953 through April 1959. 58 percent K_2O: from May 1959. 60 percent K_2O.

Germany. Fed. Rep. of – 40 percent K_2O. bulk. delivered purchaser's railway station: no deduction made for producer subsidies.

UREA

United States – 45 percent N. agricultural. bags: producer to first buyer, carlots (30 tons) delivered East. Friday price.

SOURCES: FAO. *Fertilizers: an annual review of production, consumption and trade 1966*. Rome, 1967; data for 1967 from *Preise-Löhne Wirtschaftsrechnungen*, Reihe 9, Winter 1967/68. Statistisches Bundesamt. Wiesbaden; data for urea from United States. Department of Labor. *Wholesale prices and price indexes*, Washington, D.C., 1959-68.

Farm prices and incomes

Increases in prices received by farmers were less widespread in 1967 than in most recent years (Table II-18). Mainly because of large harvests, these prices remained stable or declined in almost half of the 23 countries (mostly developed countries) for which indices of prices received are available for 1967 or 1967/68. There were, however, large increases in some of the Scandinavian countries, where income developments in the rest of the economy have an important influence on decisions concerning farm prices. The limited available data also indicate continuing price increases in many developing countries.

Farm prices fell in Austria, Belgium, Canada, the Federal Republic of Germany, New Zealand, the United States and Yugoslavia, among the countries for which there are data. In New Zealand prices fell by 8 percent, largely because the floor price for wool was approximately halved. In the Federal Republic of Germany prices fell by 10 percent in 1967 after a decline of 4 percent the year before. In addition to the larger production in 1967, the introduction of the common market and uniform grain prices in the European Economic Community (EEC) also contributed to the lower prices, and cereal prices fell by 12 percent.

Producer prices remained fairly stable in the other EEC countries in 1967. The uniform EEC grain prices brought higher prices in 1967/68 in France, and for feed grain in Italy, but lower prices in the Federal

Republic of Germany and Luxembourg and for wheat in Italy. For 1968/69 EEC has increased the target prices for barley, rye and maize, while leaving wheat prices unchanged. The uniform orientation price for cattle will bring increases of 4 to 9 percent in national prices in 1968/69, while as a result of the recent agreement on milk and dairy products milk prices will rise in France and be reduced in Italy.

Farm prices fell by 5 percent in the United States, as a result of the record level of production in 1967. Livestock prices were on average 6 percent lower than in 1966. Grain and soybean prices were under heavy downward pressure. The situation was similar in Canada, where producer prices decreased by about 2 percent.

In Yugoslavia, in accordance with the economic reform of July 1965, the system of free price formation for all agricultural products was introduced at the beginning of 1967. In contrast to the sharp increases of recent years, the index of producer prices declined slightly in 1967.

In the United Kingdom most producer prices increased somewhat during 1967/68, and in April 1968 guaranteed prices for most products were increased for 1968/69. The greatest increases in guaranteed prices were for cattle (about 3 percent in 1967/68 and 6 percent in 1968/69).

In Finland the new price law which took effect in September 1967 already brought sharp increases in the prices of milk and beef in 1967/68. Milk prices increased by 5 percent in Norway, and there were also large price rises for beef, pork and grain.

The producer price of wheat was raised by 6 percent in Australia, because of increased costs as indicated in the annual cost-of-production survey. In Japan there was a further increase of 9 percent in rice prices, which have now almost doubled since 1960.

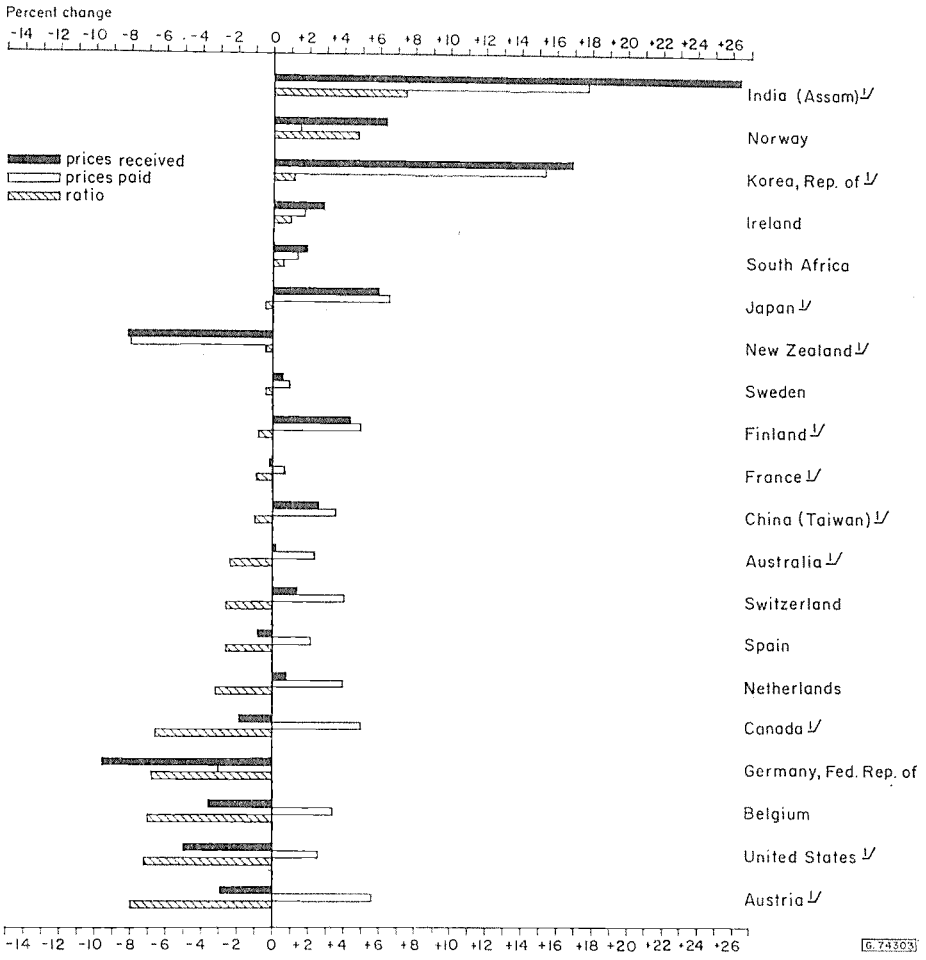
Very few developing countries publish indices of prices received by farmers. A rough indication of the development of producer prices during 1967 may be obtained, however, from the fact that many guaranteed prices have continued to move upward in these countries. Thus prices were raised in Chile by 12 to 22 percent for most main products. In Argentina and Brazil wheat prices were increased

TABLE II-18. – INDICES OF PRICES RECEIVED BY FARMERS

	At current prices					Deflated by cost-of-living index				
	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967
	Indices. average 1959-61 = 100									
DEVELOPED COUNTRIES										
Australia [1]	104	105	108	105	[2]105	101	100	99	93	[2]90
Austria [1]	105	110	117	120	[3]117	95	96	98	98	[3]91
Belgium	110	114	120	123	119	105	104	106	102	96
Canada	106	105	112	118	116	102	99	103	105	100
Denmark	114	115	116	119	...	98	95	91	87	...
Finland [4]	108	119	130	132	138	97	96	100	98	97
France	119	118	119	125	125	105	100	99	101	98
Germany. Fed. Rep. of	106	109	116	111	[5]101	98	99	102	94	[5]83
Hungary	109	113	114	124	133	108	112	111	117	125
Ireland	112	112	117	115	118	93	97	96	92	91
Israel [6]	129	119	127	133	...	105	92	91	89	...
Italy [1]	114	121	128	124	...	99	100	100	95	...
Japan [7]	125	131	145	157	167	104	105	109	112	115
Netherlands	111	115	128	132	[8]133	101	99	105	103	[8]101
New Zealand	100	109	109	110	101	94	99	96	94	82
Norway	105	111	119	122	130	96	95	98	98	100
Portugal	96	90	99	111	117	90	81	86	93	92
South Africa [1]	107	113	117	121	[9]123	103	105	105	105	[9]104
Spain	117	122	142	147	[10]146	100	97	100	98	[10]91
Sweden [4]	116	121	125	125	[8]126	105	105	104	98	[8]94
Switzerland	109	115	116	118	120	99	102	100	97	95
United Kingdom [1]	100	103	104	107	...	92	91	88	87	...
United States	101	99	104	111	106	97	94	97	101	93
Yugoslavia	141	174	250	294	286	112	123	132	126	113
DEVELOPING COUNTRIES										
China (Taiwan)	115	121	120	123	126	100	105	104	104	103
Cyprus	99	104	103	104	...	97	102	101	101	...
El Salvador [11]	105	118	116	117	...	105	117	113	116	...
India (Assam)	103	116	126	146	185	95	95	94	98	110
Korea, Rep. of	187	231	255	268	313	135	129	125	118	125
Panama [12]	99	106	109	107	...	99	103	106	103	...

[1] Crop year July-June. – [2] Two quarters only. – [3] Three quarters only. – [4] Crop year September-August. – [5] Ten months only. – [6] Crop year October-September. – [7] Crop year April-March. – [8] Eight months only. – [9] Five months only. – [10] Three months only. – [11] 1961 = 100. – [12] 1960-61 = 100.

FIGURE II-6. – CHANGES IN INDICES OF PRICES RECEIVED AND PAID BY FARMERS AND IN THE RELATION BETWEEN THE TWO INDICES
(1967 in comparison with 1966)



[1] Index of prices paid includes living expenses.

considerably. Guaranteed prices for rice were raised in Burma, Ceylon and Thailand, and in India and Pakistan for both rice and wheat. In India and the United Arab Republic the floor price of cotton was increased by 5 to 10 percent. The purchase price of cocoa was further increased in Ghana, Nigeria and Sierra Leone — in Ghana by as much as 30 percent in order to prevent smuggling to Ivory Coast and Togo. The producer price of coffee was raised in many countries.

From Table II-18 it is clear that very few of the increases in farm prices in 1967 were greater than the increase in the overall cost of living. In real terms, therefore farm prices fell in many countries.

Indices of prices paid by farmers are available for even fewer countries. In all but two countries where data are available, prices paid by farmers increased in 1967. In 15 out of 20 countries the increase in prices paid outweighed the change in prices received by farmers. Thus it was only in 5 countries that the ratio between prices received and paid by farmers improved during the year under review (Figure II-6). In the Federal Republic of Germany prices paid by farmers declined in 1967, particularly for seeds, breeding cattle and feedstuffs, and there was also a sharp fall in New Zealand.

In the United States prices paid by farmers averaged about 3 percent higher in 1967. Prices paid for purchased feed have on average been lower, and most of the rise reflects higher prices for farm machinery and equipment and increased sales of grain combines and corn heads for combines.

Farm income

Information on farm income for the year under review is available, as in previous years, only for a few developed countries. In spite of the generally larger harvests, farm income in 1967 in these coun-

tries tended to be more or less unchanged from the year before.

In the United States, realized gross farm income, amounting to $48,900 million, was the second highest on record and dropped below 1966 chiefly because the record supplies both at home and abroad weakened prices. Farm production expenses totaled about $34,400 million, about $1,100 million more than the previous year. Thus, with realized gross farm income falling slightly and production expenses continuing to rise, realized net farm income dropped by about 12 percent from a record level of $16,400 million in 1966 to around $14,500 million in 1967. Direct government payments to farmers in 1967 were $3,100 million, compared with $3,300 million in 1966. The principal reason for the decline was a sharp drop in payments under the Feed Grain Program, from $1,300 million in 1966 to around $900 million in 1967.

Because of a further decrease of 2.5 percent in the number of farms, realized gross income per farm in the United States reached the record level of $15,415, compared with $15,289 in 1966. Realized net income per farm, however, declined by almost $500 from last year's record to $4,573. Disposable personal income per caput of the farm population was down about 1.5 percent in 1967 from the record of $1,717 reached in 1966, since the lower income from farming more than offset an increase in per caput income from nonfarm sources.

In Canada farm receipts from the sale of farm products may have reached $4,400 million in 1967, compared with nearly $4,300 million realized in 1966. Farm operating expenses and depreciation charges continued to increase in 1967, mainly as a result of a general increase in the level of prices paid by farmers for goods and services used on the farm. The gain in total cash receipts in 1967 is expected to be greater than the increase in farm operating expenses, so that realized net farm income from farming operations in 1967 is estimated to be slightly above the $1,787 million in 1966 and about 17 percent more than in 1965.

In the United Kingdom net farm income was forecast at £510 million in 1967/68, an increase of £18.5 million or about 4 percent over the estimate for 1966/67. Exchequer costs are expected to be about £270 million, or about £40 million higher than in 1966/67.

Prices recovered in 1967 in Ireland, and the gross value of farm output increased substantially. Farmers paid considerably more, however, for purchased farm materials, principally feed and fertilizers. Family farm income was estimated at the record level of £148 million.

In Scandinavia total agricultural income does not seem to have changed much in Denmark and Finland, but it rose more sharply in Norway and Sweden. Estimated annual net farm income in Norway was expected to increase by about 10 percent in 1967. Part of this increase was determined during price negotiations between farmers and government representatives. In Denmark stagnation of income was due to only small changes in the total volume of production and a decline in prices, whereas in the other three countries agricultural prices rose by 3 to 5 percent. Expenses also rose markedly in Finland, but in Norway and Sweden the increase was relatively small.

In central Europe there was a pronounced expansion in production, but prices received by farmers declined in some countries while expenses continued to rise. For the Federal Republic of Germany gross returns to farmers (including equalization payment for grain price reduction), estimated at DM 28,560 million, are likely to be 4 percent higher in 1967/68 than in the previous year. This gain will be partially offset by higher expenses (including fixed capital formation and personal taxes) of roughly DM 21,560 million, also 4 percent more than the year before. Thus the balance between these two items (a rough measure of net farm income) should have increased from DM 6,560 million in 1966/67 to DM 7,000 million in 1967/68. The gap between industrial and agricultural earnings, which amounted to 34 percent in 1966/67 compared with 32 percent in 1965/66, is likely to have widened further.

In France agricultural production rose by 7 percent and the average income of farmers by 4.3 percent. In Switzerland a 7 percent expansion in production contributed to an increase in agricultural incomes, although price changes were not always in favor of farmers and expenses continued to rise.

In Italy gross marketable production is estimated to have amounted to about Lire 5,250,000 million in 1967 — an increase of 3 percent over 1966. In view of the increase in expenses, agricultural net income is not likely to have changed much. In Spain the gross domestic income in agriculture increased in 1967 by only 2.3 percent (3.3 percent if the change in livestock numbers is taken into account), while it increased in the industrial and services sector by 4 percent. In Greece agricultural income is likely to have increased because of the big expansion of agricultural production.

In Australia, as a result of the drought, it is estimated that the gross value of rural production for the crop year 1967/68 will have fallen to about A$3,400 million, a decline of 8 percent over the previous year. This loss will only be partly offset by financial aid to the drought-stricken areas, estimated at $15 million. For this reason and also because of the effects of the devaluation, total net farm income is expected to decline by about 9 percent in 1967/68.

As a result of the generally better harvests in 1967, the increase in consumer prices appears to have slowed down in a good many countries. From Table II-19 it can be seen that retail food prices increased in 1967 over the level of the previous year in all but 21 of the 110 countries for which there are data, but that in only 14 of these countries was the increase greater than 10 percent. In about half of the countries for which there are data (including all but five of the developed countries) there was a moderate increase in food prices of 4 percent or less in 1967.

The comparison between food prices and overall prices, the latter being expressed by the cost-of-living index, also reflects some change from previous years (Table II-20). In 1967 the increase in food prices outstripped that in overall prices in less than a third of the countries for which data are available, which is somewhat less than in most recent years. Food prices rose more slowly than overall prices in most of Europe and Africa in 1967. In most of the countries in the Far East and Near East for which there are data, on the other hand, food prices rose faster.

In all of the EEC countries food prices increased at a lower rate than overall prices in 1967. Food prices were fairly stable, owing to the large crops and the price measures undertaken by the Common Market. Potato prices in the Federal Republic of Germany, and meat, fruit and vegetable prices in all six countries were lower in 1967 than the year before. In the first months of 1968 the new added value tax has caused higher prices for some foods in France and the Federal Republic of Germany.

In the United Kingdom the prices and incomes policy restrained the movement of prices, which remained virtually unchanged between June 1966 and June 1967. In the first months of 1968 food prices increased again as a result of the devaluation, while meat prices were also affected by the outbreak of foot-and-mouth disease. In other EFTA countries, particularly the Scandinavian countries and Austria, the rise in food prices tended to accelerate in 1967. In some of these countries the increase is due to higher farm prices, decisions on which are influenced by changes in the income of the industrial sector.

In Denmark, where food prices increased sharply for the third successive year, the increase of 9 percent in 1967 is a result of farm price increases and the introduction in July 1967 of an added value tax. In Norway there were especially large price increases for meat and milk products. Because of the more rapid rise in prices, a price freeze was introduced in Finland in October 1967 and in Denmark in January 1968. The Danish price freeze will last until 1 November 1968 and that in Finland until the end of 1969. In Austria the main increases were in prices of grain and milk products, because of reductions in subsidies.

In Hungary, Iceland, Israel, Portugal and Yugoslavia food prices had previously increased rapidly, but the good crops eased the pressure on prices in 1967. At the beginning of 1968 a number of price changes were announced in Bulgaria, particularly for animal products.

In most recent years, retail food prices in the United States have increased by 1 to 2 percent. In 1966 there was an exceptional rise of 5 percent,

TABLE II-19. – CHANGES IN INDICES OF RETAIL FOOD PRICES AND OF THE COST OF LIVING, 1967 IN RELATION TO 1966, BY REGION

Change from 1966 to 1967	Europe	North America	Oceania	Latin America	Far East	Near East	Africa	Total
	Number of countries							
RETAIL FOOD PRICES								
Decline	—	—	—	4	2	1	8	15
No change	1	—	1	2	—	—	2	6
+ 1-4 percent	18	2	2	13	3	6	11	55
+ 5-10 percent	3	—	2	4	7	—	4	20
+ 11-20 percent	—	—	—	3	3	2	—	8
+ 21-50 percent	—	—	—	2	—	—	1	3
Over 51 percent	—	—	—	1	2	—	—	3
COST OF LIVING								
Decline	—	—	—	2	1	—	5	8
No change	—	—	—	—	—	—	2	2
+ 1-4 percent	17	2	3	18	8	7	15	70
+ 5-10 percent	5	—	2	4	5	—	3	19
+ 11-20 percent	—	—	—	2	1	2	—	5
+ 21-50 percent	—	—	—	2	1	—	1	4
Over 51 percent	—	—	—	1	1	—	—	2

TABLE II-20. – RELATION BETWEEN CHANGES IN INDICES OF COST OF LIVING AND RETAIL FOOD PRICES, 1967 IN RELATION TO 1966, BY REGION

	Europe	North America	Oceania	Latin America	Far East	Near East	Africa	Total
	Number of countries							
Food prices rose faster than cost of living	1	—	2	9	13	5	5	35
Food prices and cost of living rose at about the same rate	6	—	2	6	—	2	8	24
Food prices rose more slowly than cost of living	14	2	—	8	2	1	3	30
Food prices remained stable or declined	1	—	1	6	2	1	10	21

which was due mainly to reduced supplies of certain major commodities, combined with a sharp increase in demand. In 1967 food prices were steady at the 1966 level, and prices were lower for eggs, poultry and pork products. This stability in food prices appears to have helped substantially in holding down the overall cost of living. The index of retail food prices was also unchanged in Canada in 1967.

Food prices increased by about 3 percent in Japan. This increase is again attributed to the growing shortage of farm labor, and the substantially increased capital costs required in modern agriculture. A jump of over 7 percent in food prices in New Zealand in 1967 (in strong contrast to the lower farm prices) is mainly attributable to economic mesures taken by the Government in February and May of that year, including the removal of consumer subsidies on wheat flour and butter.

In the developing regions, food prices were stable or even declined in many African countries in 1967, largely as a result of good crops. In Niger and Nigeria, where there were increases of about 17 percent in 1966, food prices in 1967 declined by 3 percent and 10 percent respectively. In Ghana, where food prices increased by a third in 1965, the increase came down to 3 percent in 1966, while in 1967 there was a decline of 15 percent. Other countries where the increase in food prices slowed down in 1967 were Chad, Congo (Brazzaville), Ivory Coast, Kenya, Madagascar and Senegal. In Algeria, Morocco and Somalia prices declined in both 1966 and 1967.

The pattern was less uniform in other developing regions. Haiti, British Honduras, Laos and the United Arab Republic are further countries where food prices declined in 1967 after increasing in previous years. In the United Arab Republic prices were held down by the austerity program. The increase in food prices in Colombia was reduced from 23 percent in 1966 to 5 percent in 1967.

In Uganda, in contrast, a decrease in food prices in 1966 was replaced by an increase in 1967. Other countries where the increase in consumer food prices accelerated in 1967 include El Salvador, Hong Kong, Malaysia, the Sudan, and Surinam. Some Latin American countries (Argentina, Brazil, Chile, Uruguay) as well as other countries, such as the Democratic Republic of the Congo, Indonesia, the Republic of Korea, and the Republic of Viet-Nam, continued to suffer from severe inflation. In Indonesia food prices increased by 180 percent in 1967.

There was a sharp increase in food prices in Turkey in 1967, mainly because of the Near East crisis. Livestock prices increased by a third in a single month. In India the further increase in food prices was due to the continued limited supply of food products, especially wheat and rice, during the first part of 1967.

Agricultural policies and development plans

Few new development plans were introduced during the period under review, and agricultural policies in general continued along the lines of recent years, although with some important changes in emphasis. Table II-21 shows the usual summary of the main characteristics of the current development plans in the developing countries.

Unfavorable economic conditions caused a number of countries, particularly in Africa and Latin America, to revise the targets set earlier. On the other hand,

TABLE II-21. – MAIN FEATURES OF CURRENT DEVELOPMENT PLANS IN DEVELOPING COUNTRIES

	Duration	Scope	Currency	Total investment	Public investment	Share of agriculture in		Planned annual increase	
						Total investment	Public investment	GNP	Agricultural production
				..... *Million*		..... *Percent*			
LATIN AMERICA									
Argentina	1965–69	Comprehensive	Pesos [1]	[2]1 339 200	427 000	17	2	5.9	4.2
Bolivia	1962–71	”	Bolivianos [3]	12 289 324	...	...	11	7.0	6.3
Chile	1961–70	”	Escudos [1]	10 149	5 074	9	6	5.5	5.0
Colombia	1961–70	”	Pesos [3]	70 000	...	12	12	5.6	4.0
Costa Rica	1965–68	”	Colones	...	1 297	...	...	6.6	7.1
Ecuador	1964–73	”	Sucres	41 007	17 713	16	7	6.2	6.6
El Salvador	1965–69	”	Colones	...	...	...	...	6.5	...
Guatemala	1965–69	Public sector	Quetzales	...	...	...	20	5.6	...
Guyana	1966–72	”	Guy $	...	294	...	32	[4]5–6	...
Honduras	1965–69	Comprehensive	Lempiras	...	...	...	13	6.6	4.6
Nicaragua	1965–69	”	Córdobas	...	...	...	...	7.0	6.4
Panama	1963–70	”	Balboas	...	310	...	...	...	...
Surinam	1965–74	”	S. guilders	...	...	...	...	...	7.7
Trinidad and Tobago	1964–68	Public sector	£	...	63	...	13	...	...
Uruguay	1965–74	Comprehensive	Pesos [5]	56 144	18 057	14	...	4.7	4.2
FAR EAST									
Bhutan	1966/67–1970/71	Public sector	B. rupees	...	212	...	21	...	...
Burma	1966/67–1969/70	Comprehensive	Kyats	...	623	...	...	8.0	6.0
Cambodia	1968–72	”	Riels	32 000	12 240	25	...	5	...
China (Taiwan)	1965–68	”	NT $	98 534	35 282	13	...	7.0	4.1
Korea, Rep. of	1967–71	”	Won [6]	980 070	401 090	16	23	7.0	5.0
Malaysia	1966–70	”	Mal $	10 500	4 550	...	24	[7]5.0	5.5
Mongolia	1966–70	Centrally-planned economy	Tugrik	...	4 700	...	...	7	6
Nepal	1965/66–1969/70	Comprehensive	N. rupees	2 500	1 980	26	...	3.6	2.9
Pakistan	1965/66–1969/70	”	P. rupees	52 000	30 000	...	25	[8]6.9	[8]5.8
Philippines	1966/67–1969/70	”	Peso	20 300	3 413	...	14	6.2	5.5
Singapore	1966–70	”	Mal. $	2 820	1 520	5	9	5.0	...
Thailand	1966/67–1970/71	”	Baht	130 700	37 900	...	20	8.5	4.3
NEAR EAST									
Afghanistan	1967/68–1971/72	Public sector	Afghanis	...	31 800	...	25	4.3	3.5
Iran	1968–73	Comprehensive	Rials	810 000	443 000	11	...	9	5
Iraq	1965/66–1970/71	”	I dinars	821	668	23	26	8	7.5
Jordan	1964–70	”	J dinars	262	129	26	41	7.3	4.7
Lebanon	1965–69	Public sector	£ Leb.	...	1 080	16	16	...	...
Libya [9]	1963/64–1967/68	”	£ L	...	169	...	20	...	...
Sudan	1961/62–1970/71	Comprehensive	£ Sd.	565	337	21	27	4.3	4
Syrian Arab Republic	1966–70	”	£ S	4 955	3 454	28	27	7.2	6.7
Turkey	1968–72	”	T. liras	111 500	...	15	...	7	4.2
AFRICA									
Botswana	1966–69	Public sector	Rands	25	...	33	...	...	...
Cameroon	1966–71	Comprehensive	CFA fr	165 176	95 700	13	...	[4]5.8	...
Central African Republic	1967–70	”	CFA fr	36 872	...	40	...	10	...
Chad	1966–70	Public sector	CFA fr	...	47 012	...	28	...	...
Congo (Brazzaville)	1964–68	Comprehensive	CFA fr	50 347	30 347	6	...	[4]7.3	[10]4.3
Dahomey	1966–70	”	CFA fr	35 400	...	34	...	4	...
Gabon	1966–70	”	CFA fr	94 000	36 000	3	...	7.5	...
Ivory Coast	1967–70	”	CFA fr	224 000	117 000	...	30	4.8	...
Kenya	1966–70	”	£	317	102	...	26	6.3	...
Madagascar [9]	1964–68	”	MG fr	[11]165 000	69 000	12	31	5.5	5.9
Morocco	1968–72	”	Dirhams	5 050	...	46	...	5	...
Niger	1965–68	”	CFA fr	43 242	33 442	31	...	4.7	3.3
Nigeria	1962–68	”	£	1 066	677	...	14	4	...
Rwanda	1966–70	Public sector	R.fr	7 079	...	36	...	4.4	...
Senegal	1965/66–1968/69	Comprehensive	CFA fr	119 000	84 000	20	42	6.1	5.4
Tanzania	1964–69	”	£	246	130	14	28	...	7.5
Togo	1966–70	”	CFA fr	28 582	20 052	23	26	[4]5.6	3.6
Tunisia	1965–68	”	Dinar	380	149	31	45	6.5	2.8
Uganda	1966–71	”	£	...	230	...	27	6.3	[12]5.3
Upper Volta	1967–70	”	CFA fr	32 964	...	29	...	...	...
Zambia	1966–70	”	£	429	282	10	15	...	...
OCEANIA									
Fiji	1966–70	Public sector	£F	...	20.5	...	13	5.6	...
Tonga	1965–70	”	£T	...	2.05	...	17	...	...
Western Samoa	1966–70	”	£	...	0.96	...	61	...	...

NOTE: Where possible, data refer to net investment. In many cases, however, no distinction is made in the plan, and data may refer to gross investment or may include some elements of recurrent expenditure. The agricultural sector includes animal production, fisheries, forestry, irrigation, land reclamation, community development and agricultural extension, etc.

[1] Of 1960. – [2] Gross fixed investment. – [3] Of 1958. – [4] Gross domestic product. – [5] Of 1963. – [6] Of 1965. – [7] At constant prices. – [8] Calculated on the basis of new self-sufficiency programs. – [9] Original plan now extended for one year but new figures not yet available. – [10] Food production only. – [11] Including MG fr 14.000 million investment in kind. – [12] Commercial sector.

in some of the latest plans there is a significant increase in investment in agriculture, both in absolute terms and in relation to total investment. For example, the new plans of Ivory Coast, Rwanda and Upper Volta devote about a third of planned investment to agriculture. Agricultural investment is also increasing in most Latin American countries.

Another major trend in developing countries is toward increased emphasis on the use of improved seeds, fertilizers, crop protection chemicals, and other inputs. For example, India's High-Yielding Varieties Program envisages about 13 million hectares under high-yielding varieties of cereals by 1970/71, and in Pakistan the target is 3 million hectares for 1969/70, with parallel increases in both countries in complementary inputs such as fertilizers. These targets represent 14 percent of the cereal area in India and 15 percent in Pakistan (35 and 30 percent respectively of the irrigated cereal area), and both countries now expect approximate self-sufficiency in food grains by the end of the decade. Equally ambitious targets for the use of modern inputs in some other countries, mainly in Asia, are indicated in the pages that follow.

Credit schemes are also being increasingly used in developing countries as a means of stimulating production in chosen sectors and are particularly important in connection with the adoption of new varieties and the increased use of fertilizers. Direct incentives to farmers in the form of price and market guarantees of various kinds are being more widely applied.

In the U.S.S.R. the targets for agricultural production were adjusted upward in 1967. In both the U.S.S.R. and eastern Europe, planning methods are under revision, and prices of agricultural commodities and of production requisites are being brought more closely into line with their costs of production. Institutional changes also continue. Much attention has been paid to improving minimum wages and pensions and to other welfare questions.

In western Europe the further accumulation of butter stocks, both inside the European Economic Community (EEC) and elsewhere, has led several governments to introduce measures to discourage milk production or to encourage meat production. The common market for milk and dairy products, which came into force in the EEC countries on 1 July 1968, does not involve any immediate price reduction, but a ceiling has been placed on expenditures by the EEC Commission on price support operations in favor of dairy products.

While the common market for both agricultural and industrial goods is now virtually complete for the EEC countries, there is little progress to report from the various regional economic cooperation schemes in other parts of the world, although a number of new groupings have been formed in Africa.

North America

UNITED STATES

There have been no major changes in United States policies relating to food and agriculture since the enactment of the Food and Agriculture Act of 1965 and the Food for Peace Act of 1966.

Legislation to extend the provisions of the Food for Peace Act beyond 31 December 1968 is at present before the Congress and may be expected to be enacted later this year. The administration has requested that the legislation be extended for three years with no major changes in its basic provisions. It would however include an explicit directive reflecting United States determination to obtain "a fair share of any increase in commercial purchases of agricultural commodities by the purchasing country."

Legislation to extend the provisions of the Food and Agriculture Act of 1965 is also before the Congress. However, since the Act does not expire until the end of 1969, action may not be completed until next year. Permanent legislative authority is sought for the continuation of present programs for wheat, feed grains (maize, grain sorghums, and, if designated by the Secretary of Agriculture, barley), cotton, wool, and of the Cropland Adjustment Program. There would be no major changes in the basic provisions of the existing legislation.

The Congress also has legislation before it to establish a national food bank that would hold reserves of wheat, feed grains and soybeans for purposes of national security and agricultural stability.

Commodity programs established for 1968, under the provisions of the Food and Agriculture Act of 1965, illustrate how the United States Government seeks to manage national supplies and to equate production with effective demand. The acreage allotment for wheat had been increased from 51.6 million acres (21 million hectares) in 1966 to 68.0 million acres (27 million hectares) for the 1967 crop to avoid a further running down of reserve stocks. The record harvest in 1967, however, resulted in an anticipated increase in the end-of-year carryover of perhaps 3 million tons; the wheat acreage allotment for 1968 was therefore cut back to 59.3 million acres (24 million hectares) and for 1969 it was further reduced to 51.6 million acres (21 million hectares).

Similarly, the 1967 feed-grain harvest resulted in an anticipated carryover somewhat larger than considered desirable, and the 1968 feed-grain program was designed to obtain diversion of an additional 10 million acres (4 million hectares) from feed-grain production. For cotton, however, production had been restricted during 1966 and 1967 by reduced

allotments and poor growing conditions to such an extent that the surplus, which was expected to take four years to work off, was eliminated during these two seasons. The cotton program for 1968 was therefore changed to bring output more nearly into line with anticipated current domestic and export needs.

During early 1967, declining farm prices and mounting costs created a cost-price squeeze that generated considerable discontent, especially among producers of livestock products. Although pressures for additional legislation to restrict imports of meat and dairy products were successfully resisted, further limitations on imports of certain dairy products were imposed under Section 22 of the Agricultural Adjustment Act. Other measures taken, under existing legislative authority, to bolster prices included elimination of seasonal pricing schedules in federal milk marketing orders and maintenance of prices at the higher seasonal Class I level; extension of authorization to hold 1967 grain and soybeans under price support loans with the Government meeting the storage costs; increased price support purchases by the Commodity Credit Corporation, including butter, cheese, skim milk powder, beef, pork, turkeys, beans, orange juice, fruit, shortening, and margarine; expansion of school lunch programs and other welfare food distribution operations, including the Food Stamp Program.

Increasing public attention to antipoverty programs may prove to have significant implications for agricultural policy in the United States. The recent Report of the President's National Advisory Commission on Rural Poverty asserted: "The urban riots during 1967 had their roots, in considerable part, in rural poverty. A high proportion of the people crowded into city slums today came there from rural slums. This fact alone makes clear how large a stake the people of this nation have in an attack on rural poverty." [27] Benefits from the Government's agricultural support programs go primarily to commercial farmers, since marginal or small-scale farmers do not sell a significant volume of products on the market. Increased emphasis may therefore be expected on supplementary measures to promote rural economic and social development.

CANADA

There have likewise been no basic changes in Canadian agricultural policies during the past year. An agricultural task force has, however, been appointed by the Government to project national agricultural goals and to recommend policies for achieving them.

The Government decided to subsidize wheat exports by the Canadian Wheat Board in order to maintain prices to farmers while remaining competitive in foreign markets. This decision appears to have been motivated largely by the desire to ensure that prices to farmers reflect the schedule of export prices established by the International Grains Arrangement, especially during the period before this actually became operative on 1 July 1968.

The Canadian Dairy Commission, which began operations on 1 April 1967, undertook to assure producers of milk for manufacturing purposes of a national average gross return of $4.75 per hundredweight ($10.45 per quintal) of milk testing 3.5 percent butterfat. Accordingly, price support levels for various dairy products have been increased to enable milk processors to pay producers a national average of about $3.54 per hundredweight ($7.79 per quintal), while a direct government subsidy at the gross rate of $1.21 per hundredweight ($2.66 per quintal) covers the difference. A levy of 11 cents is assessed against this subsidy to create an export equalization fund which is used to equalize export and domestic prices. Unlike previous programs, which for the most part placed no limitation on the quantity of milk eligible for support or subsidy, the 1967/68 program fixed the total amount of milk on which the direct subsidy would be paid and provided for the allotment of a quota to each shipper of manufacturing milk.

Western Europe

While the trends in agricultural policies reported last year have been generally maintained, the cost of agricultural support policies has in several cases increased sharply, either because of market situations beyond the control of national governments or as a result of decisions to extend the scope of certain forms of assistance or support. Excessive supplies of dairy products, in particular, have led to heavy disbursements under price support regulations and the state of this market continues to be a matter of concern. Structural improvements and related measures have been given increasing emphasis; assistance takes a wide variety of forms, of which the most commonly used are grants and loans of various kinds to facilitate amalgamations or joint operation of small farms, and pensions or other payments to farmers who retire early.

After the rapid progress made by EEC in 1966 and the first half of 1967 toward unified markets for agricultural products, the past year has seen new markets instituted for rice, milk and dairy products, and cattle and calves, thus making the agricultural common market virtually complete.

---

[27] United States. President of the United States, *The people left behind: a report by the President's National Advisory Commission on Rural Poverty*. Sept. 1967. Washington, D.C., page ix.

Price and income policies

There have been few changes in price and income policies, apart from those consequent upon the adoption of various EEC regulations in the six countries. On the other hand, the application of existing policies has led in a number of countries to a substantial increase in agricultural support expenditures.

In Norway, target prices for grains, beef and pigmeat and maximum prices for milk and dairy products were raised in July 1967, yielding an estimated 8 percent increase in net agricultural income; other measures, including increased subsidies on fertilizers, were expected to add a further 1.5 percent. For the 1968/69 season, in an attempt to put an end to milk surpluses, dairies will be allocated a manufacturing quota and will in turn fix delivery quotas for individual producers; deliveries outside the quota will be subject to an excess marketing contribution of about one third of the normal price.

The difficult situation of Danish agriculture, caused by rising production costs and a deterioration in some export markets, led the Government to increase direct support to agriculture from 360 million kroner in 1966/67 to 515 million kroner for 1967/68, with a further increase of 50 million kroner to follow for 1968/69. The home market prices of beef, veal, pigmeat, poultry meat, butter and eggs were raised in July 1967. In November 1967 the Government awarded a sum of 177 million kroner, to be used for supporting butter and bacon prices, as compensation for losses incurred through devaluation. The farm organizations were asked to refrain from seeking further price increases before March 1969, in return for a grant of 100 million kroner against increased costs of production.

Somewhat smaller increases in government expenditure on agricultural price and income support are noted in Sweden and Finland. In Sweden action was taken in September 1967 to raise producer prices on average by 3 percent, and the economic stabilization program adopted in Finland this year provides for limiting further rises in agricultural prices to 2 percent this summer and a further 2 percent at the beginning of 1969.

The United Kingdom price review early in 1968 also awarded higher price guarantees for a wide range of products: pigs, milk, barley, oats, potatoes and sugar beet (increases ranging from 1.5 to 3 percent) and cattle, sheep, lambs and wheat (increases between 4 and 6 percent). In addition the standard quantity to which price guarantees apply was abolished for wheat and increased for milk and barley, while the beef cow and hill cow subsidies were raised.

A contrary tendency can be seen in Austria and Switzerland, affecting especially milk producers. Late in 1967 both countries decided to raise the producers' contribution to the costs of disposing of surplus milk and dairy products. Switzerland also introduced a number of other measures, including a higher imputed price for skim milk and a lower price for butter, greater differentiation of prices for cheese according to quality, a sharp rise in the levy on imported feeds, and higher acreage subsidies for barley, maize and oats; these measures are designed to divert resources from milk production.

Structural policies

The structure of the agricultural industry has continued to be a prime concern of policy-makers; indeed, there seems to have been a further switch in emphasis from short-term to long-term measures, though sometimes hampered by shortage of funds. In France the authority of the Sociétés d'aménagement foncier et d'établissement rural to preempt agricultural holdings has been strengthened, and such holdings may now be retained for a maximum of ten years, instead of five, to allow complete structural improvements to be made. Denmark has extended the facilities for joint operation of a number of holdings (up to a total of 100 hectares and a period of 10 years), increased the legal limit for farm amalgamations (35 hectares generally and 75 hectares in certain cases), and provided additional grants for amalgamations or increases in the size of farms and for newly established farmers. In the United Kingdom two types of amalgamation grant were introduced in 1967, one to defray costs of amalgamation and the other to compensate farmers surrendering their farms under an approved amalgamation proposal.

Grants or pensions for farmers who retire early are available in several other countries, and Sweden in particular intends to use them as an important instrument in carrying out its structural policy for agriculture. An agricultural development fund set up in Finland in 1967 grants low-interest loans for the purpose of amalgamation, land purchase and similar improvements in the viability of existing farms. It is forbidden to split farms where this would lead to the creation of uneconomic units. In March 1968 the Irish Government announced a program of assistance to small farmers (defined as having less than 20 hectares or paying less than £25 per annum in rates). They are eligible for grants if they carry out a development plan drawn up in agreement with an agricultural extension officer and aiming at a specified minimum gross output.

Regional development

Most countries in western Europe have some form of regional development policy in which agriculture figures prominently, since the problem areas

are often rural and agricultural in character. Many of these plans emphasize the need to provide earning possibilities outside agriculture.

In the United Kingdom the hill land improvement scheme of August 1967 offers grants toward the cost of a wide range of improvements and the first rural development boards have been set up. In France an important decree of September 1967 deals with the regional priorities for allocation of public aid. It considerably extends the scope of previous arrangements for less favorable regions: retirement pensions for farmers are available at the age of 60 instead of 65, special credits with longer repayment periods are provided for farmers modernizing their holdings, there are further facilities for establishing food industries and other new employment opportunities, and priority treatment (such as scholarships) is given with regard to education and training.

Farmers' organizations

New forms of farmers' organizations have been evolving over the past few years in France, with the active encouragement of the Government. Existing legislation was modified in 1967 to make it easier for farmers organized in groups to secure observance of their market regulations by unorganized farmers as well. These groups are now free to decide for themselves at what level to intervene in the market in support of prices; previously it was the decision of the Ministry of Agriculture. There have also been important changes affecting agricultural cooperatives in France. Alongside the traditional form of agricultural cooperative, governed by somewhat restrictive legislation but enjoying fiscal and financial advantages in exchange, the 1967 decree provides for the creation of a commercial type of cooperative enterprise able to engage in all kinds of processing and distribution and to do business with nonmembers but placed on the same footing as companies and private firms for purposes of taxation. The new regulations also provide for an increase in the participation of trade and industrial interests in the Sociétés d'intérêt collectif agricole and for the establishment of Sociétés mixtes d'intérêt agricole in which industrial representation may predominate. The object of the new measures is to stimulate competition in agricultural processing, marketing and distribution.

Most other countries also promote in one way or another the organization of agricultural producers in cooperatives and groups of various kinds. The Central Council for Agricultural and Horticultural Cooperation for the United Kingdom, the creation of which was announced in 1966, is now fully operative; new regulations governing producer groups are under discussion in the Federal Republic of Germany.

Other domestic policies

The development plans of both Portugal and Spain give priority to agriculture. Under the Portuguese plan agriculture and forestry receive 12 percent of total investment allocations, and an annual growth of 3 percent is aimed at in the agricultural sector. The main objectives of the Spanish plan are an increase in agricultural incomes and a switch from soft wheat and low quality wines to feed grains, oilseeds, fruit and vegetables, meat, and forest products. Subsidies are provided to encourage mechanization and the use of fertilizers, pesticides, and improved seeds.

Investment aid, ranging from direct grants to low interest loans, is available in many countries. Grants of up to 35 percent of the cost are given in Greece for the purchase of machinery and irrigation equipment, and the cancellation of a large volume of earlier agricultural debts has been announced. In Spain a guarantee fund has been set up to enable small farmers who wish to go in for beef production but who do not have enough land to offer as security for ordinary loans, to obtain credit more easily. The new Portuguese plan includes nonrepayable grants of up to 20 percent of the cost of farm machinery and low interest credits for farmers adopting approved methods of production.

Regional economic cooperation

After the important decisions taken by EEC and the progressive realization of a unified market for numerous agricultural products during 1966 and the first half of 1967, discussed in the previous issue of this report, the past year has been relatively uneventful.

The common market for rice came into force on 1 September 1967. Common markets for milk and dairy products, and for cattle and calves were scheduled for 1 April 1968 but agreement on their terms was not achieved until late in May and they came into force on 1 July 1968.

The intervention price for butter is fixed at U.S.$173.50 per quintal but this price is applied only by Italy and the Netherlands; Belgium, France, and Luxembourg are allowed to exceed it by up to $2.75 and the Federal Republic of Germany may reduce it by up to $6.00. These additional payments are to be borne by the Fonds européen d'orientation et de garantie agricoles (FEOGA) in the case of Belgium and Luxembourg, while the French Government is alone responsible for any disbursements to maintain the price to French producers above the EEC level. Intervention prices for Parmesan and similar cheeses, of exclusive interest to Italy, are calculated to give dairy farmers the same degree of protection as that

afforded by the butter market regulations. There is also an intervention price for skim milk of $41.25 per quintal which, as in the case of butter, may be increased by up to $2.75 by Belgium, France and Luxembourg; there is, however, no provision for reduction of the price by the Federal Republic of Germany. If EEC expenditure on regulating the dairy products market in 1968/69 exceeds $630 million, measures will be taken to reduce it.

As regards cattle and calves the uniform intervention prices, as agreed upon earlier, were introduced with temporary arrangements on 1 April 1968, the only exception being the orientation price for cattle in the Netherlands which was raised as of 1 July. According to the new regulation, market intervention is automatic and obligatory when market prices fall below 93 percent of the target price, while in the range between 98 percent and 93 percent of the target price each case is considered on its merits, thus allowing a certain discrimination, for instance, between regions or between different qualities of meat.

The fundamental problem in the livestock sector is to define a policy that would encourage meat rather than milk production, reduce the burden on Community finances, and improve the farmers' income, while doing nothing to hamper the necessary structural changes in agriculture.

Unified markets for sugar and tobacco, and for flowers and ornamental plants, became operative on 1 July 1968. The regulations for sugar include national production quotas for a transitional period lasting until 1975.

With the task of setting up new marketing structures now largely completed, emphasis has switched to a revision of Community prices, which in the case of cereals were fixed as long ago as 1964. The EEC Council of Ministers, meeting in October 1967, endorsed the Commission's recommendation to leave unchanged the prices of hard and soft wheat, oilseeds, sugar, and pigmeat. For barley, maize, rice, and olive oil it awarded smaller increases (ranging from 0.2 to 4.8 percent) than those suggested by the Commission, while for rye and for cattle and calves the increases (of 4.0, 2.6 and 2.2 percent respectively) were in excess of the Commission's proposals.

It has become increasingly clear during the past year that the marketing and price mechanisms to which the Community has hitherto devoted most of its attention cannot by themselves secure for farmers a level of living comparable to that of other sections of the population. Structural improvements need to be carried out with greater urgency and better coordination; in spite of decisions already taken by the Council in 1962 to facilitate such coordination, the assistance given by FEOGA toward the modernization of agriculture has generally followed the proposals of the individual countries, without reference to Community criteria or needs. Realizing this, in mid-1967 the Commission put forward some proposals aimed at integrating projects aided by FEOGA within a Community framework, with priorities by ten types of project and by geographical area. These proposals were considered too ambitious and too rigid by the Council of Ministers. From the discussions in progress, it seems that a compromise may be reached which would reduce the defined fields of action from ten to four and allocate credits for each one within a certain range rather than at a fixed figure. This solution would allow greater latitude of choice to the national authorities in each country.

Discussion of the status of producer groups has continued on the basis of proposals submitted last year by the Commission. Controversy turns mainly on whether the groups should undertake marketing, and whether financial aid should be given automatically to all recognized groups or only to those which prove their need and whose activity is relevant to development requirements.

Eastern Europe and the U.S.S.R.

The past year has not seen any major departure from the policies discussed in last year's edition of this report. While further expansion of production continues to be a main objective, it is to be achieved by a general improvement in yields and efficiency rather than by an extension of cultivated areas or an increase in livestock numbers, though these are by no means excluded. Price policies as an instrument to guide production have acquired increasing importance. In the U.S.S.R. in particular there have been significant new measures to promote the well-being of rural populations.

Development plans

In the U.S.S.R., as a result of the favorable results so far obtained, the targets for livestock products in the five-year plan for 1966-70 were adjusted upward in 1967. Thus the annual average target production for meat has been raised from 11.0 to 11.6 million tons, for milk from 78 to 81 million tons and for eggs from 34 million to 35 million. Substantial increases in yields are implied in these targets. The average milk yield is expected to rise from 2,000 kilograms in 1965 to 2,350 kilograms by 1970; corresponding planned increases in yield are of the order of 45 to 50 percent for cereals, 23 percent for potatoes, 22 percent for vegetables and 21 percent for sugar beet. For 1968 the target output for agriculture as a whole is 7.4 percent above the 1967 level.

In 1968 state investment in agriculture in the U.S.S.R. is planned to be 18 percent above 1967. About 17 percent of the total is earmarked for irrigation and drainage; 309,000 hectares are to be irrigated and 817,000 hectares drained, and sprinkler irrigation is to be provided for 7 million hectares of pasture. Other important items are agricultural training and research, rural electrification, repair shops for agricultural machinery, storage for fertilizers, the building of houses and schools, etc. The new arrangement for financing kolkhozes introduced experimentally in 1966 had been extended by the end of 1967 to 23,000 out of a total of 37,000 kolkhozes and may soon be applied to all of them. Fertilizer production capacity and output as set out in the current five-year plan are considered insufficient and it has been decided to increase capacity by 48 million tons (standard units) over the five-year period and to improve quality. Production during 1967 amounted to 40 million tons.

Other policies

The minimum wage in the U.S.S.R. (affecting state farm workers as all other employees) has been increased from 40 to 60 rubles per month, and workers whose wages were already around 60 rubles receive an increase bringing them up to 70 rubles. Taxation on wages between 61 and 80 rubles per month is reduced by 25 percent. Minimum paid holidays are increased from 12 to 15 days for the lowest categories, and pensions are improved both in amount and by lowering the ages at which they become payable (in the kolkhozes 60 instead of 65 for men, 55 instead of 60 for women).

In Bulgaria the basic pension for collective farmers has been doubled, though it is still below the levels in other sectors, and new regulations have been introduced regarding family allowances. As a result of new social security laws in Czechoslovakia farmers received improved benefits as from July 1968.

New methods of planning and management have been introduced progressively; these rely on economic inducements rather than administrative direction. Price policies have consequently assumed increased importance, and prices of both agricultural products and production requisites are being brought more closely into line with costs of production. Thus both Czechoslovakia and Hungary have raised the level of producer prices by about 8 percent during the past year or two, and Bulgaria announced increases, effective at the beginning of 1968, in the prices of most livestock and meat and some other products. These higher prices were calculated to provide an average holding with an acceptable income. Additional support is generally provided for farmers working under unfavorable natural conditions, and subsidies are given to orient production (for example in Hungary to encourage meat production or the planting of berry fruit) or to reduce the cost of certain investments. In Poland, as a means of stimulating grain production, contracts for delivery of certain minimum quantities per hectare enable the grower to purchase fertilizers at a concessional price. Eastern Germany has unified its system of premiums for increased production.

Special attention has been paid to structural reform in Poland, where it is desired to check further splitting up of holdings and to favor consolidation. New laws promulgated in 1967 enable the authorities to take over farms of 5 hectares and upward, with compensation to the owner in the form of a pension and allowances applicable to old-age pensioners in the state sector together with free use throughout the owner's lifetime of a house and a plot of land (1 hectare if at pensionable age or invalid). District authorities may order the sale by auction of farms with low productivity.

These new methods are accompanied by pronounced institutional changes. In Bulgaria a new United Central Cooperative Union was set up last year and the cooperatives given a free hand with management and planning. The Central Union includes 900 cooperative farms and 1,300 consumer cooperatives. In Czechoslovakia the Ministry of Agriculture, the Ministry of Food Industry and the Central Purchasing Board have been combined in a new Ministry of Food and Agriculture. In Hungary too the agricultural services have been reorganized in a Ministry of Agriculture and Food, and a National Council of Producer Cooperatives has been set up to coordinate the activities of the regional associations. Hungary also introduced measures enabling large-scale farms to increase their resources considerably, to orient production in ways most suitable to local conditions, to widen the scope of their activities (for instance by setting up processing plants and undertaking distribution), and to take independent decisions without intervention from above.

The supply of more and better inputs has been receiving attention in eastern Europe. Fertilizer supplies have increased markedly, although there are still wide variations in the intensity of use. Research on seeds is carried out by the agricultural services of the Council for Mutual Economic Aid (CMEA). As an example of the work of CMEA, the substantial increase in wheat yields in eastern Europe has been attributed partly to the introduction of the Russian hard wheat variety Bezostaya 1, which in 1966/67 was cultivated on more than half the wheat area in Hungary and on more than 80 percent in Bulgaria. Large supplies of mixed and concentrated feeds contributed to the further expansion of livestock production in 1967.

Australia and New Zealand

Perhaps the most important policy decision for Australian agriculture taken during the past year was the Government's decision that the Australian dollar would not follow the November 1967 devaluation of sterling. This decision would seem to have important implications for Australian agricultural exports, especially for their competitive position in the United Kingdom and the countries that did follow the sterling devaluation. The decision clearly reflects the increased importance to Australia of Japan and other nonsterling markets in the Far East and North America, markets which have become of primary importance as outlets for Australian wool, wheat, beef, lamb, cheese, and other products.

An Australian Wool Board study of current wool marketing methods included a recommendation that the auction system be retained with certain changes, and that a statutory authority to be known as the Australian Wool Marketing Authority be established to supervise and control the marketing of Australian wool.

The dairy stabilization program, which would have expired on 30 June 1967, was extended for five years. This program is designed to maintain returns to dairy producers and continues to subsidize exports of butter, cheese and other butterfat products to a maximum of A$800,000 per year.

Australian wool growers have continued to press for export subsidies. As the cotton harvest promised to exceed domestic requirements for the first time, the cotton growers have also requested export subsidies.

During March 1968 the Federal and Western Australian Governments announced agreement concerning terms for an additional A$48 million of federal aid for the second stage of the Ord river development project. Other federal assistance approved included $20 million to Queensland for an irrigation project at Emerald, and $50 million for road development over a seven-year period in Queensland, Western Australia and South Australia.

At the beginning of the 1967/68 season, the New Zealand Wool Commission lowered its support price level from 30 to 25 cents per pound, and announced that it would buy all wool offered that was not taken by commercial buyers at prices above that level. As the world wool market continued to weaken, however, the Commission lowered the level at which it supported the auction price to 16¼ cents per pound and instituted deficiency payments to growers to cover any difference between their realized auction price and the previously announced support level of 25 cents.

Latin America

Development plans

Few new development plans have come into effect in the period under review. Brazil adopted a three-year public investment program in March 1968, and an agricultural development law was passed in Peru late in 1967. Some details are also available regarding Colombia's four-year agricultural development program for 1967-70.

In Brazil the first three-year public investment program for 1968-70 was approved by Congress in March 1968. It provides for a total investment of 17,600 million new cruzeiros, of which 5 percent is allocated to agriculture. Much of the expenditure under other titles such as regional development and transport will, however, benefit agriculture considerably.

According to the four-year agricultural development program prepared in Colombia in 1967, public investment in agriculture was to be increased to about 29 percent of total public investment in 1968, compared with less than 10 percent in previous years. The program aims at increasing the output of staple foods for domestic consumption, accelerating the process of agricultural import substitution and diversifying and expanding nontraditional agricultural exports.

The agricultural development law in Peru provides for economic incentives to increase farm output in the form of price supports and improved credit and marketing facilities. All producers, processors and distributors of food and other basic agricultural products may obtain tax reductions and exemptions for a period of ten years, together with duty-free imports of farm machinery, equipment and other requisites not manufactured in Peru. Preferences and special treatment are provided for producers in the Selva and Sierra regions.

As a result of economic difficulties, including lower receipts from agricultural exports and currency devaluations, there has been a slowing down in many agricultural programs and in some cases considerable revision of targets to bring them into line with a more realistic appraisal of the situation. Land reform plans in particular felt the effects of this deterioration, though in Chile the program continued to be carried out energetically in spite of inflationary disturbances in the economy.

Against these generally negative trends can be set the fact that public investment in agriculture in 1967 increased both absolutely and relatively in almost all Latin American countries, reflecting the higher priority now given to the agricultural sector in current economic policies. It can also be noted that the plans and programs under revision, and the new

ones that are being formulated, clearly recognize the important role of the private sector and of private investment in stimulating agricultural growth, and contain measures to promote structural and institutional improvements and to provide incentives for agricultural producers.

Credit and financing policies

In Argentina the Banco de la Nación has announced a new line of credit of up to three years' duration to encourage farmers to retain breeding ewes and to prevent the rundown of flocks.

The International Bank for Reconstruction and Development (IBRD) has granted a loan of U.S.$40 million, for 20 years at 6 percent, to the central bank of Brazil. These funds, together with a roughly equivalent sum contributed by the Brazilian government and farmers, will be lent to the farmers through the commercial banks for the purpose of increasing production of beef, mutton and wool in Rio Grande do Sul and four states in central Brazil. The central bank requires commercial banks to devote the equivalent of 10 percent of their total deposits to credits for farmers or farm cooperatives. Special financing is being provided to develop milk production throughout the country and to subsidize fertilizers.

Commercial banks in Chile are required to allocate 4 percent of their average ordinary advances for the previous month for loans to farmers and other rural dwellers, at a maximum interest rate of 17 percent.

The Livestock Bank of Colombia has obtained a loan of $10.7 million from the Inter-American Development Bank (IDB) for expansion of meat and milk production. The Netherlands Government has offered a parallel loan of $1.3 million for the purchase of stock and equipment and the improvement of animal health.

In Mexico the central bank is to provide rediscount facilities to commercial banks for the financing of the crops that the Compania Nacional de Subsistencias Populares (CONASUPO), the official price-regulating agency, buys at guaranteed prices. Growers of maize, sorghum, soybeans, safflower and sesame seed will now be able to pledge their produce to obtain loans from commercial banks for up to 80 percent of the CONASUPO value of their crops, at 9 percent annual interest. Two 25 year loans for a total of $54.1 million were granted by the IDB to Nacional Financiera. One loan, for $34.1 million, is to help finance a program for irrigation of over 300,000 hectares; the other, for $20 million, is to finance credits for small farmers.

In Nicaragua the central bank has announced a $3.6 million program to establish 47 agricultural service centers to promote food production. The centers will eventually become self-sustaining cooperatives and will rent out equipment to small farmers. Part of the cost will be covered by a United States Agency for International Development (USAID) loan of $2.2 million.

In Venezuela the Banco de Desarrollo Agropecuario, has recently been established with an authorized capital of 100 million bolivares.

Other domestic policies

The coffee eradication program in Brazil is to be terminated; about 1.5 million trees have been destroyed. The main reason given is that other countries have been continuing to plant coffee during this time.

An export promotion fund has been set up in Colombia. Tax concessions and other incentives are offered to exporters. A program has been launched to raise output of eight staple foods for domestic consumption.

Large cuts have been made in the budget of the Instituto Ecuatoriano de Reformo Agrario y Colonización (IERAC) in Ecuador. The Church authorities have decided to carry out a pilot scheme of distribution of ecclesiastical land, involving 46,000 hectares and 12,000 families.

In Mexico the first of four state-owned plants for processing henequen has been opened in Yucatan; it will have a throughput of about 2,000 tons of henequen annually at first, rising later to 5,000 tons. It is planned to double the area treated with chemical fertilizers by 1970, reaching a total of some 8.4 million hectares. Irrigation and drainage works in the Rio Colonado region will affect an area of 250,000 hectares, 178,000 hectares of land will be leveled and 555 kilometers of roads built or improved.

It is estimated that 800,000 hectares of land in Peru will have been distributed to new owners by the end of 1968. Ninety centers for cattle fattening, each with about 3,000 head of cattle, have been set up in the department of Puno; they are owned by Indian communities and receive technical guidance from the authorities.

Regional economic cooperation

A regional export promotion center, with headquarters in Bogotá, is expected to begin operations in mid-1968. Its first-year budget of about $750,000 is provided through voluntary contributions from members of the Organization of American States (OAS). The center will undertake market research, disseminate technical data and market information to Latin American exporters and provide technical assistance to OAS member states. The center is expected to focus its first promotional activities on western Europe and North America.

The Inter-American Development Bank has called for the establishment, jointly by IDB and the Inter-American Committee on the Alliance for Progress, of a working group to develop a five-year plan and action program for physical integration projects in Latin America. The working group, which should report to IDB not later than the end of 1968, would give particular attention to transport, energy and communications, and to the problems of participation in integration projects by the less developed countries and those that lack access to the sea.

Far East

DEVELOPMENT PLANS

During the period under review a new plan, still awaiting official approval, was due to start in Cambodia. In China (Taiwan), India, Indonesia, and Laos, new plans are to be launched in 1969, the interim period being covered by annual planning in India. In other countries there have been various modifications in existing plans, while further details of some announced earlier have now become available.

Bhutan's second plan (1966/67-1970/71) gives priority to the improvement of agriculture and horticulture in order to achieve self-sufficiency in food and even small export surpluses in a country where cultivable land and water are abundant. Emphasis is placed on small irrigation schemes and, in view of the severe labor shortage, on mechanization. Progress during the plan's first year has been satisfactory.

In Burma and Cambodia, plans call for both the extension of cultivated area and the improvement of yields. In Burma, of a total of 61 crops cultivated, 19 are to receive special promotion, including paddy, wheat, maize, groundnuts, chilies, cotton, jute, sugarcane, rubber and nine varieties of pulses and beans. Cambodia's second plan, scheduled to start in 1968 after a series of annual plans covering the period since 1964, reportedly provides for equal proportions of investment to agriculture and industry. In crop production paddy, rubber, maize, cotton, jute, sugarcane and coconuts receive priority. Unemployment among "semi-intellectuals" is to be reduced by offering them land to farm.

In Ceylon an unpublished five-year program for agricultural development is broken down into detailed annual implementation programs. The food crop program for 1968 represents a new departure since it was prepared in a highly decentralized manner. Targets were first established at village level and then combined into divisional and, in turn, district level programs which the Ministry of Agriculture finally blended into a set of indicative targets for the country, largely in keeping with the agricultural development proposals for 1966-70. Targets for food crops and for inputs were generally overfulfilled in 1967, and higher targets have therefore been set for 1968. Targets for tea replanting were also generally met, but those for rubber replanting showed a lag because of the low prices.

In India the Planning Commission approved the draft of the new fourth plan due to start in 1969. According to the Planning Commission (which proposed an outlay between 180,000 and 230,000 million rupees) 180,000 million would be needed for an annual economic growth rate of 4 percent, 210,000 million for a rate of 5 percent, and 230,000 million rupees for a rate of 6 percent. The Ministry of Finance doubted whether it would be possible to undertake the additional resource mobilization needed to sustain a growth rate of 6 percent. A 5 percent growth rate, which implied a rate of 4.5 percent in agriculture and 7 to 8 percent in industry, was accepted in principle by the National Development Council. Special emphasis is to be laid on self-reliance, as doubts have been expressed as to the timely availability of foreign aid. The three years 1966/67 to 1968/69 have been covered by annual plans. Relying on hopes for a good monsoon and a breakthrough in the supply and utilization of the necessary inputs, the plan for 1967/68 anticipated a 25 percent rise in agricultural production over the previous year. About a fifth of total foreign exchange earnings are allocated to imports of fertilizers and fertilizer raw materials.

In Indonesia agricultural development efforts in 1967 were concentrated on the intensification of paddy production, mainly through BIMAS, the scheme for mass guidance for self-sufficiency in food, which so far is active only in Java. It is reported that some 270,000 hectares (roughly 3 percent of the total rice area) are to be sown to high-yielding varieties of rice (mostly IR-8) in 1968/69. Two programs, for agriculture and for migration of settlers from Java to the outer islands, are being formulated within the framework of the five-year development plan, to start in 1969. Priority will be given to the rehabilitation of the infrastructure and the irrigation systems. It is hoped to achieve an annual growth rate of agricultural production of between 3.5 and 5.5 percent. The plan is to be part of a 25-year perspective plan which is to place top priority on achieving self-sufficiency in food and improving the foreign exchange position, mostly from exports of farm products. Lack of capital for investment and scarcity of skilled manpower seem to be the main obstacles to the implementation of the plan.

In North Korea, where the seven-year plan (1961-67) was extended to 1970, the priority given in 1967 to heavy industry and transport is to continue in

1968. Investment funds for agriculture, which in 1966 were raised by 30 percent, were further raised in 1967 by 20 percent. The latest target for food-grain production by 1970 is 7 million tons as against an output of 5 million tons in 1966 and about 5.6 million in 1967.

In the Republic of Korea a growth rate of GNP of 10.5 percent for 1967 and 10 percent for 1968 was envisaged as against the plan's target of 7 percent. In order to achieve these higher growth rates special emphasis is being placed on the development of electric power, transport, and communications.

After the failure to meet plan targets for livestock and grain production in the Mongolian People's Republic in 1966, due largely to natural calamities, planners in 1967 called for increases of 29 percent in grain production instead of the projected 5.7 percent, and of 3 percent instead of the planned 1.4 percent in the number of livestock.

For China (Mainland) no change in policies has been reported, except that revolutionary committees, where established, have been instructed to provide all possible assistance in the planting and harvesting of summer crops.

Both East and West Pakistan have started new programs in order to achieve self-sufficiency in food by the end of the current plan (1970). Targets for the production of all major food crops have been raised. During the first two years of the third plan, agriculture grew at an annual rate of 1.6 and 2.8 percent, respectively, as against a planned rate of 5 percent. The growth rates for the three remaining years needed to achieve the targets in the new programs will be around 8.9, 6.5 and 6.8 percent respectively, which works out at an annual 5.8 percent for the third plan period as a whole.

Under the Philippines' four-year economic program (1966/67-1969/70), crop production targets for 1967 were largely met, with small shortfalls of less than 10 percent, while livestock production exceeded the targets set. With the help of high-yielding varieties and increased utilization of other necessary inputs, it is hoped to achieve self-sufficiency in rice by 1969, or one year ahead of the plan.

PRICE, CREDIT AND MARKETING POLICIES

In order to improve procurement in Burma, official paddy prices for the 1967/68 crop were raised by 5 percent for early deliveries, and the number of procurement centers increased. No outstanding loans or debts owed to the Government will be deducted from the paddy sales proceeds.

In Cambodia cultivators received government loans totaling 9.14 million riels in 1967 for the acquisition of seeds and fertilizers.

After the devaluation of the rupee in late 1967 the guaranteed price paid for rice in Ceylon was raised from 12 to 14 rupees per bushel. Rationed rice continues to be distributed free to consumers in the lower income groups.

In India guaranteed minimum prices as well as procurement prices for cereals have been raised. For 1967/68 increases in minimum prices per 100 kilograms ranged between 4 and 7 rupees for paddy and 2 and 6 rupees for coarse grains. Minimum prices for wheat were increased by 4 rupees in the major wheat producing states and 7.25 rupees in the marginal ones. It is hoped to build up a buffer stock of 3 million tons of food grains. While in late 1967 an estimated 241 million people were served to some extent by the public distribution system (30 million under statutory rationing and 211 million under informal rationing), statutory rationing has since been relaxed or discontinued in several cities in view of improved supplies. The food zones system, involving restrictions on the movement of food grains from one state to another, is being continued. It is proposed during 1968 to increase the supply of institutional credit for agriculture from 5,300 to 6,500 million rupees.

In Indonesia measures were taken to ensure that rice producers obtain 80 percent of the retail price. The procurement price for rice has been fixed on the principle of keeping a favorable ratio between producer prices and inputs. More specifically, under the BIMAS mass guidance scheme for improved rice cultivation in selected areas, a "farmer's formula" was adopted in late 1967 which assures the cultivator a price for 1 kilogram of rice equivalent to the value of 1 kilogram of fertilizers. The BIMAS program now covers 25 percent of the paddy area and is expected to produce at least 25 percent of the national output of rice. About 48 percent of the project area has now progressed to the stage of INMAS (large-scale intensification), under which intensive guidance and credit facilities from the central government are no longer needed.

In Japan the producer price for rice in late 1967, as in the two preceding years, was again raised by 9 percent, while the consumer price was increased by 14.4 percent (8.6 percent in 1966). Rice procurement was stepped up by 70,000 tons to 9.9 million tons, or 70 percent of the crop, in order to satisfy the large number of farmers who wish to sell to the Government.

In the Republic of Korea, measures for dealing with shortages caused by a severe drought in 1967 included rice imports and economizing in rice by mixing it with barley. Consumption of wheat and other rice substitutes was also encouraged. Price policies are aimed at limiting seasonal fluctuations in rice prices to 20 percent, and procurement has been

substantially stepped up. The National Assembly passed a Farm Mortgage Law in order to facilitate the pledging of land as collateral for loans to farmers.

In the Mongolian People's Republic collectives are being reorganized, with a Union of Agricultural Cooperatives at the apex and subordinate unions in the 18 provinces. Admission fees for new members of cooperatives are to be eliminated, and further reduction of private herding has been indefinitely postponed. On the other hand, the minimum number of workdays required of members of cooperatives for work on collective herds has been increased to 250 in 1967, as against 150 in 1959.

Rice continues to be procured on a monopoly basis in selected districts of West Pakistan, while in East Pakistan it is procured on a compulsory basis in border areas and on a voluntary basis in other areas. Farm prices were raised in 1967/68 in West Pakistan from 28 to 31 rupees for Basmati rice.

The Rice and Corn Administration (RCA) in the Philippines plans to acquire about 10 percent of the total production of rice and maize to build up reserve stocks and for exports. Purchases by RCA, undertaken only when prices are below the support levels, have been greatly facilitated by a system of procurement utilizing rural banks and buyers from private warehouses through payment against bankable warehouse receipts.

The outlook for producers of some fibers, such as abaca, is not favorable in the Philippines. The Abaca Corporation lacks the funds needed to expand its buying program and stabilize prices. It is attempting to set up an association of small producers in order to improve their bargaining position, and to conduct studies on the expansion of abaca processing plants.

In Thailand the guaranteed minimum prices for paddy have been raised in 1968 by 8 percent for first grade rice and by 5.5 percent for lower grade rice. By increasing the capital of the Bank of Agriculture and Agricultural Cooperatives by 100 million bahts, the Government significantly added to credit available for agricultural development.

Regional economic cooperation

The Asian Development Bank (ASDB) completed its major Asian agricultural survey designed to set out key problems and show how the bank's funds can contribute to their solution. At the first annual meeting of ASDB held in Manila in early 1968, plans for cooperation in developing agriculture in the region ranked high on the agenda.

At the first Intergovernmental Consultations on Regional and Subregional Plan Harmonization, held at ECAFE headquarters in late 1967, it was decided that the most feasible approach was to proceed by single commodities, single projects, and on a subregional basis. Rice, rubber, tea, oilcrops and four industrial commodities, including fertilizers and agricultural machinery, were singled out for studies on plan harmonization and cooperation in production and trade. Projects of common concern were selected in fields such as transport and communications, deep sea fisheries and marketing surveys. Special consultations took place between a number of countries in order to identify areas for bilateral or multilateral cooperation.

The Association of Southeast Asian Nations (ASEAN), consisting of Indonesia, Malaysia, the Philippines, Singapore and Thailand, was launched in 1967 to replace the former ASAS by an organization with larger membership and wider scope. Of particular concern to the organization are matters such as the development of the countries' agriculture and industries, trade liberalization, the formation of a payments union, harmonization of regional development, and cooperative projects which would attract assistance from United Nations agencies and ASDB.

Near East

Development plans

Only two new plans have come into force, in Iran and Turkey. The main features of the latter were described in last year's issue of this report. Libya's plan, which was to have ended on 31 March 1968, has been extended for another year.

In Afghanistan lower export income, owing to reduced demand for carpets and karakul pelts and a fall in tax revenue, has delayed the implementation of the third five-year plan (1967-71), which started officially in March 1967 and about which some details were given in *The state of food and agriculture 1967*. The Agricultural Development Bank is to be strengthened to enable it to supply short-term credit to farmers for the purchase of chemical fertilizers, insecticides, small agricultural tools, and equipment. The Government will also subsidize the sale of fertilizers until a factory now under construction is ready to begin production. Similarly, tractors, pumps, and other agricultural machinery will be sold to farmers at reasonable prices and credit terms. A wheat program provides for the multiplication and distribution of 204,000 tons of improved seed (mostly Mexican varieties) to be used with 312,000 tons of chemical fertilizers. The area under cultivation with improved seed and chemical fertilizers will reach 482,000 hectares by the last year of the plan.

Iran has started implementing its fourth five-year development plan for 1968-73. The plan aims at a growth of GNP of 9 percent a year, compared with a target of 6 percent a year during the third plan. If this is achieved, per caput income will rise from 16,700 to 23,300 rials, notwithstanding an annual population growth rate of 2.6 percent. The new plan gives top priority to industrial development, to which over 20 percent of public investment is to be allocated. Agricultural output is expected to increase by 5 percent a year. Of total investment under the plan, 11 percent has been earmarked for agricultural development as such (agriculture and water development). However, much of the large allocation to industry will in fact be for farm mechanization, such as the Tabriz tractor factory. The primary objective for agriculture is to step up the production of wheat, meat and oilseeds. Particular attention will be given to farm mechanization and to the improvement of soil fertility. The utilization of water for irrigation will rise from 29,000 million to 33,000 million cubic meters per year, and it is expected that another 400,000 hectares of new land will be brought under cultivation. An impact plan to boost wheat production will be implemented in Iran on 500,000 hectares of irrigated land. Under this plan farmers will be supplied on a per hectare basis with 130 kilograms of superphosphate and urea at half the cost price, 150 kilograms of certified seed on an exchange basis, and a cash loan of 2,000 rials. The quantity of improved wheat seed used is expected to increase from 6,000 tons in 1968 to 22,500 tons in 1972. Fertilizer use for wheat is to increase from 19,500 to 65,000 tons over the same period.

The Government of Libya has extended the first five-year plan, which was to end on 31 March 1968, by one year in order to complete a number of projects. Originally the public sector allocation of the plan amounted to £L169 million. As oil revenue has been increasing rapidly, the plan allocation has been raised to £L336 million, of which actual expenditure up to March 1968 has been estimated at £L275 million. It is estimated that GNP has doubled during the last five years. In the meantime the second five-year plan has been prepared. Total expenditure under the new plan is set at £L 1,180 million, of which £L700 million is in the public sector. The plan puts heavy emphasis on manpower development, the improvement of the administrative structure, and infrastructure development. An attempt will also be made to diversify the economy by stressing agricultural development, and industrial development other than oil.

It has been reported that a new development plan is in preparation in the United Arab Republic. This plan, which is expected to run from 1970 to 1975, will give priority to industrial development.

Price and marketing policies

The area planted to cotton in the United Arab Republic in 1967 was much smaller than in the previous year, as crops such as rice, wheat, and maize have become more remunerative than cotton; this decrease in profitability also caused farmers to give less care to their cotton crop. The Government thus found it necessary to raise the producer price for cotton by two thirds to £E2 per kantar (U.S.$9.2 per 100 kilograms).

Because of an abundant harvest, Iran was faced with a wheat surplus in 1967. In order to assist farmers, the Government undertook to purchase the entire wheat crop at an official price slightly higher than the market price. The necessary finance for this program was obtained by means of a loan of 1,000 million rials from the Bank Melli.

A joint government/private company is to be set up in Lebanon for the marketing of Lebanese fruit. The company will have a share capital of £Leb. 6 million of which a third will be provided by the Government. The company will also develop the fruit industry, build or rent warehouses, set up new processing factories, and organize transport. Every fruit producer will be required to sell his produce to the company. Prices will be fixed by a three-man committee representing the Office fruitier libanais, the producers, and the company.

Other domestic policies

Work on the Euphrates dam in Syria was inaugurated in March of this year. The dam's construction is being financed by a loan from the U.S.S.R. worth about U.S.$130 million. The first stage of the project is expected to be completed by 1972.

In principle IBRD has agreed to make a long-term loan of $25 million to the Sudan for the Rahad irrigation project, which will utilize the stored water of the Roseires dam to irrigate 400,000 hectares of the land east of the Blue Nile.

The Agricultural Bank of Iran has issued bonds worth 30,000 million rials. The funds raised are to be used for agricultural development projects.

The capital of the National Agricultural Bank of Libya has been increased in order to extend long-term loans to agriculture, especially for the establishment of farms and for the improvement of agricultural marketing.

All orchards in Iran have been exempted from taxation for a five-year period once the trees begin to produce fruit. In an effort to encourage the export of agricultural products the Ministry of Agriculture of Iran has decided to exempt all agricultural exports from production tax.

In Somalia two new ministries dealing with agricultural development were created. One is the Min-

istry of Rural Development and Self-help Schemes, to which the Agricultural Development Agency (established in 1966) is now attached; the other is the Ministry of Animal Husbandry, Fisheries and Mineral Resources, to which the Livestock Development Agency has been allotted. In addition there is the Ministry of Agriculture, which deals primarily with agricultural research and extension, and also with plant protection.

It is understood that the Government of the Sudan has decided to postpone its decision to nationalize private agricultural schemes in view of the many difficulties encountered.

The former Ministry of Agriculture in Iran has been reorganized to form four new ministries: for land reform and rural cooperatives, for natural resources, for agricultural products and consumer goods, and the Ministry of Agriculture proper. The Ministry of Natural Resources is responsible for the conservation and development of natural resources, specifically soils, pastures, forests and fisheries, while the Ministry of Agricultural Products and Consumer Goods is responsible for the marketing of agricultural products.

Regional economic cooperation

The Arab Economic Unity Council decided at a recent session that industrial products would move freely between member states of the Arab Common Market by 1971 — three years ahead of the previously agreed schedule. Another resolution provides that tariffs on agricultural products will be completely abolished by 1969; there has been a 20 percent reduction annually on these products since the Arab Common Market started operating in January 1964. The rate for industrial goods has been 10 percent annually. The Arab Economic Unity Council also decided to establish an Arab Payments Federation to extend short-term credit facilities to member states and facilitate transactions among them; the capital of this federation has not yet been agreed upon.

The Arab Economic Ministers have approved the text of an agreement for the establishment of an Arab Development Fund with a capital of 100 million Kuwait dinars, of which Kuwait would contribute 30 million. The Kuwait Fund for Arab Economic Development has given a loan equivalent to $14 million to the Sudan to finance irrigation projects.

Africa

Development plans

The only new plans to come into force since the account given in last year's issue of this report are in Ethiopia, Ivory Coast, Morocco, Rwanda, and Upper Volta. An official development plan for Burundi is expected to be ready in mid-1968. Elsewhere development efforts have continued in conformity with plans already operating, and additional details of some of these have now become available.

A three-year development plan for 1967-69 has been established in Algeria as the basis for elaborating the annual investment budget. The plan emphasizes industrial development and expansion of employment opportunities. Approximately 16 percent of total investment will be spent on the agricultural sector. The present policy is largely directed toward improving the management of modern state farms and planning a strategy for the development of traditional agriculture.

Botswana is at present implementing a transitional plan for economic development that indicates projects to be executed in the period 1966-69. The plan represents a transition to a period when the Government will undertake much more comprehensive resource planning. Total investment expenditures foreseen by the plan amount to 25.5 million rands of which 33 percent is to be spent on water resources development and agriculture.

The first four-year plan (1967-70) of the Central African Republic calls for a 40 percent increase in the total GNP by 1970. By then, commercial production is expected to make up 75 percent of GNP. Agriculture has been given top priority under this plan. Farm development will receive 40 percent and industry 23 percent of the total projected investment, the remainder being spent on research, infrastructure, social welfare and administration.

The 1964-68 interim plan of Congo (Brazzaville) is coming to an end on schedule. During its execution the total investment provided for was increased to 57,981 million CFA francs.

In the Democratic Republic of the Congo political difficulties in recent years have prevented the effective implementation of any coordinated economic planning at the national level. In 1966 an interim plan for the revival of agriculture was prepared but, owing to civil disturbances and to scarcity of funds and qualified personnel, it has still not been implemented.

Dahomey's five-year development plan, covering the period 1966-70, gives high priority to rural development in general and an increase in agricultural production in particular. Various development authorities have been set up on a regional basis, responsible for special campaigns to increase production in defined areas. During 1967 the principal campaigns conducted by these development agencies were highly successful. Targets in the five-year plan were in most cases considerably exceeded.

July 1968 is the starting date of Ethiopia's third five-year plan, which has been drawn up on the basis

of past planning experience and is expected to be published shortly. It follows a one-year transitional plan.

During the present stabilization period, the Government of Ghana has substantially reduced its investment program and only priority projects have been continued. A review of current and possible projects has been undertaken and more realistic economic appraisals have been made. At present a two-year development plan is being prepared with practical proposals to stimulate production.

In Guinea a number of major projects in the present seven-year plan have been completed. Owing to the scarcity of external finance for new projects, however, recent months have seen greater emphasis on the increase of agricultural production and on a more economic utilization of existing infrastructures and plant and equipment.

A four-year development plan has been adopted in Ivory Coast for the period 1967-70. Increased diversification of agricultural production is one of the primary aims of this plan. During the plan period per caput income is expected to grow at a rate of 4.8 percent a year. Of the total planned public investment 30 percent will be devoted to agricultural development. This figure represents a large increase over actual agricultural investment in the preceding five-year period and reflects the Government's determination to accelerate the rate of development in the agricultural sector. At the end of the plan period this sector is expected to contribute 31 percent of GDP.

Lesotho set up a Central Planning Office in 1967. This unit is now drawing up a detailed framework for the first five-year development plan (1969/70-1974/75).

In Liberia a draft four-year development plan was presented in April 1967; it defined national targets and policy guidelines. Priority was given to investment in transport and other infrastructure.

In Madagascar the first five-year plan covering 1964-68 came to an end on schedule, and was then extended by one year to mid-1969. The second five-year plan, to follow directly after the first, is at present being drawn up and should be completed by late 1969. While in the 1964-68 plan priority was given to infrastructure with agriculture rating second, in the second plan it is expected that priority will be given to the agricultural sector.

Planned development in Mauritius is at present centered around the public sector development program for 1966-70. This program forms part of the national plan currently under preparation by the Government's Economic Planning Unit. The main objective of the program is to plan for long-term economic development while promoting additional employment opportunities within the limits of available resources. Particular emphasis is placed on the diversification of crops and better utilization of land resources.

Morocco's current three-year plan (1965-67) has come to an end; investments made under this plan have been lagging behind schedule and are estimated to amount to about two thirds of forecasts. Moreover, output from the private sector has been below expectations. The country's new five-year plan (1968-72) was issued in March 1968. With about 70 percent of the population engaged in the agricultural sector, the new plan stresses the importance of agricultural development as the basis for raising levels of living and modernizing the economy. Nearly half of the 5,050 million dirhams allocated to the plan will be spent on agriculture.

Niger's four-year plan for 1965-68, which is fitted into the framework of the ten-year perspective plan (1965-74), is scheduled to end in September 1968. The plan's target, which had been set very ambitiously, has not quite been achieved. This fact has been taken into consideration in fixing the targets for the country's second four-year development plan. Rural development has again been given first priority. In the meantime a public investment program for 1968-71 is reported to have been established.

Rwanda adopted its first five-year development plan (1966-70) in January 1968. High priority has been given to the agricultural sector which will receive almost 36 percent of the total resources. The plan foresees an annual increase of 4.4 percent in GDP.

In Tunisia the present four-year plan (1965-68) was continued without change into its final year; main emphasis still being on industrial development (33 percent of total investment). In agriculture major policy guidelines have been greater self-sufficiency in wheat, efficient management of state and cooperative farms, and transformation into cooperative farms of traditional agriculture in the central and southern regions.

In Uganda the second five-year plan, covering the period 1966-70, is being implemented but investment is lagging somewhat behind the planned figures.

Upper Volta's national plan for economic and social development (1967-70) was officially introduced in August 1967; it places top priority on the agricultural sector, which is to receive 29 percent of total investment. This aim is to be achieved by means of integrated regional rural development schemes in the framework of the regional development offices. The plan further provides for an effort to integrate with the economies of neighboring countries.

In Zambia the first four-year development plan (1966-70) is well under way. It aims at substantially increasing the national income by raising rural productivity, diversifying the economy, and creating 100,000 new jobs.

OTHER DOMESTIC POLICIES

Although there has been no agricultural development plan in the Democratic Republic of the Congo, the revival of agriculture was one of the major objectives of the currency reform undertaken in June 1967. The double exchange rate that had existed from 1963 to 1967 was abolished and a new currency unit established at an exchange rate approximately equal to its free market value. Imports were liberalized. Plans were made to allow some repatriation of profits and steps taken to draw up an investment code. These policies seem to have had a favorable impact on output from the plantation sector. It was recognized, however, that their success would largely depend on the extent to which the traditional farming sector would be able to increase supplies of foodstuffs for the domestic market.

The Government of Ghana has decided to provide guaranteed prices for maize and rice as an incentive to farmers to produce more of these commodities. In Senegal a fund has been set up to stabilize the price of groundnuts.

REGIONAL COOPERATION

In April 1968 the Central African Republic and Chad withdrew from the Union douanière et économique de l'Afrique centrale (UDEAC) leaving only Gabon, Congo (Brazzaville) and Cameroon as members. This will certainly modify existing trade flows between these countries and may imply difficulties for Congo (Brazzaville) in the marketing of some of its manufactured products. Development plans should not be fundamentally affected since there has not been, in fact, much coordination of investment projects among members.

The Union des états de l'Afrique centrale was set up in April 1968 by the Democratic Republic of the Congo, the Central African Republic and Chad, but four other states, Burundi, Congo (Brazzaville), Gabon, and Rwanda, will be invited to join.

A significant step was taken with the formation, at the end of 1967, of the East African Community (EAC), a new common market for Kenya, Uganda and Tanzania. The formation of this new trading group is a major step in African economic cooperation and development.

At a meeting of heads of state held in Monrovia in April 1968 it was decided to establish the Economic Community of West Africa. The meeting was attended by 9 of the 14 countries: Ethiopia, Gambia, Ghana, Guinea, Mali, Mauritania, Nigeria, Senegal, Upper Volta. Four countries of the Conseil de l'entente (Dahomey, Ivory Coast, Niger, Togo) were not present, nor was Sierra Leone.

An agreement has also been concluded between Guinea, Mali, Mauritania, and Senegal for a regional grouping.

Fishery policies

Fishing operations are being influenced to an increasing extent by the extension of fishing limits by countries with important resources close to their shores, and by the regulation of fishing by nationals of other countries in the newly claimed zones. Among those countries which announced wider fishing zones in 1967 were Cameroon, Ivory Coast and Portugal. Bilateral negotiations were held, *inter alia*, on Japan's fishing operations in Mexican waters, on the activities of the fishing fleet of the U.S.S.R. in waters adjacent to the United States, and on the fishing rights of United States and Mexican fishermen in the coastal zones of each country.

Other developments in the international sphere included the establishment of a Convention on the Conduct of Fishing Operations in the North Atlantic, aiming at increasing safety at sea. Two new regional fisheries bodies with responsibilities in resources protection and development were organized under FAO auspices: the FAO Fishery Committee for the Eastern Central Atlantic and the FAO Indian Ocean Fishery Commission.

Tariff reductions planned by the participants in the Kennedy Round of tariff negotiations may lead to an expansion of trade in fishery products. Because of existing trade patterns the principal beneficiaries are likely to be among developed countries. The devaluation of sterling and other currencies in November 1967 was expected to result in a decline in fishery exports to the United Kingdom, the second largest importer in the world, from countries which have not devalued their currencies.

Intergovernmental arrangements to promote research and training in fisheries have been made by Japan, Malaysia, the Philippines, Singapore, Thailand and the Republic of Viet-Nam. The facilities planned include a training center in Thailand and a research center in Singapore. A major contribution was offered by Japan, which agreed to provide experts, vessels and other equipment.

Several countries, both developed and developing, enacted new measures to support ailing branches of their fishery industries. In Peru a new fishery development law took effect in April 1968. It provided tax relief and stipulated that no licenses were to be issued for new fish meal plants and that licenses already granted could not be transferred to new plants. The Government of Chile also tried to streamline its expanded fish meal industry. The Chilean Corpo-

ración de Fomento de la Producción was to provide funds to industry to effect integration of companies which were in financial difficulties, because of high debt burdens among other reasons. The objectives of this and other measures were a reduction of the fleet fishing for raw material as well as of the number of fish meal plants, consolidation of remaining operations under the leadership of the strongest companies, and diversification of operations by the addition of freezing and canning facilities.

In Iceland a new bill was enacted which continued existing subsidies to the fishery industry. In addition to the consolidation of production facilities, it sought to achieve higher productivity and qualitative improvements in the fish freezing industry.

Policies of financial support to the United Kingdom fisheries were modified to some extent. Investment allowances for taxation purposes were replaced by a system of investment grants, which were made available for the improvement of major fishing ports, in line with general government policy in regard to commercial ports. Subsidies for the deep sea trawler fleet as well as for inshore and herring vessels were reduced, while special subsidies payable in cases of particular hardship were given to some vessel classes.

Forest policies

Calls on the forest have continued to increase, owing to the growth in population and the steadily rising level of living. The protective functions of the forest are also growing in importance, especially since substantial forest areas in the developing regions are being cleared every year in order to extend the agricultural area, while the desert is still advancing in large parts of the Near East and North Africa. There has been a pronounced trend toward greater utilization of forests for recreational purposes as a result of the growth in tourism (which has become a major source of income to a number of developing countries), in urbanization, in motorization and in leisure time. The resources made available to forest services have been only slightly increased to meet these requirements, although forest policy, legislation and administration have been increasingly influenced by the principle of integrating the forestry sector more closely into overall social and economic development plans.

Together with the increase in the production of forest products has gone greater attention to the question of forest concessions, in particular in developing countries, many of which have not yet found the best way of applying the type of concession most suited to their conditions and objectives. In a number of developing countries real progress has been made in this respect. In Ecuador, for example, the integrated use of the forest has been fostered by concession contracts, signed by the Government in May 1968, with 11 existing and 3 new industries, covering an area of 400,000 hectares. Under these contracts integrated industries have to be installed by the concessionnaires, who have to refrain from exporting raw material, pay the Government a surface rent for the concession area and certain fees for the timber used, provide employment for local labor, and use national technical personnel as far as possible. Similar aims are under consideration in other countries, such as Honduras where there is a project for the annual production of 230,000 tons of liner and fluting and 120,000 cubic meters of sawnwood, with a value of U.S.$23 million and an investment of $77 million in forest industries and $33 million in infrastructure — in short, a project large enough to have a strong influence on the economy of the whole country.

Improper utilization of natural forests and neglect of their reforestation have tended to increase the distance between forest areas and consumption centers to a point where transport costs become prohibitive. This is becoming a problem of growing importance in a number of developing countries.

The use of secondary species is another pressing problem, in particular in tropical forests where frequently only very few species are being utilized, thus greatly increasing harvesting costs. Progress in promoting the use of secondary species has so far been slow and inadequate in relation to needs.

The cost of roundwood production has remained one of the most important price factors for all forest products, accounting for one to two thirds of the total cost, depending on the type of product. For roundwood production, in turn, the costs of logging are decisive. The availability and rising costs of forest labor have been the object of increasing attention. As a result, there is growing awareness of the need to attain a high degree of efficiency in logging, through the use of operational techniques well adapted to the particular condition of the site and with well-trained workers using the equipment and methods appropriate in each case.

When logging operations are programmed, there is a growing and welcome tendency to take into account the interrelationship between techniques, equipment, and the human factor. Mechanization in forestry operations has made considerable strides. This is so not only in developing countries but also for example, in Scandinavia, which is already in the lead for the mechanization of its forestry operations. Capital investment per worker therefore appears to be on the increase throughout the world. There is a trend toward heavier crawler tractors, while the "second generation" of wheel skidders, in the

100 to 150 horsepower class, holds out the promise of wider application in tropical forestry. Progress in the development of multipurpose harvesting machinery specially designed for forestry has been steady, though as yet its use is on a comparatively modest scale.

One corollary of increasing capital investment in logging is the concentration of production in bigger logging areas, a trend discernible not only within the conifer belt of the Northern Hemisphere but also in a number of forest areas in the tropics, such as west Africa. This has important repercussions on forest management practices, since silvicultural measures in productive forests have to aim at facilitating subsequent timber harvesting. Another corollary is the lengthening of the work season, linked to greater investment in transport and lessening dependence on floating in areas such as the Amazon region of Brazil and Peru.

Increased productivity through more and better equipment and improved working methods is rendering possible better living conditions for forest workers while preventing a sharp rise in timber prices. At the same time, higher degrees of mechanization of forest operations require increasingly skilled labor. The need for a more skilled labor force presents not only the economic problem of ensuring that higher forest wages are offset by an increase in the productivity of forest operations, but also the formidable problem of providing forest workers with intensive training in the use and maintenance of equipment.

Transport is another important element in the cost of wood and its products. Since roundwood is a bulky material of low unit value, the overall tendency to concentrate wood-processing close to the forest resource has continued. At the same time, forest plantations are increasingly being established within easy reach of consumption centers or shipping points. The rapidly increasing use of vessels constructed to carry wood chips is opening up new markets for pulping materials, particularly in the Asia-Pacific region, while in northern Europe specially-designed vessels and specialized maritime terminals are easing the flow of both sawnwood and pulp products. The use of unit loads such as prepacked sawnwood has been expanding in the softwood trade and is likely to spread to a wide variety of wood products.

Housing remains one of the most important outlets for forest products. In many regions the shortage of adequate housing has continued or even grown; in Latin America, for example, the housing shortage has been calculated at over 10 million units and is growing at the formidable pace of 1 million units per year. A recent study has indicated that between one half and two thirds of the world's sawnwood is used in housing and construction. In many countries, wood-based panels are an equally important building material; in North America, for example, three quarters of the plywood and no less than four fifths of the fibreboard and particle board manufactured there are used for housing, construction and maintenance purposes. Particularly pressing and of worldwide importance is the problem of low-cost housing, to the solution of which wood can make a decisive contribution since it is an excellent and cheap building material.

Paper continues to be another very important forestry commodity because of its role in cultural and industrial development. The rapid rise in consumption and in the development of production capacity has continued. With the present good supply of market pulp and rapidly expanding local markets, however, many opportunities arise in the developing countries for the gradual establishment of production in nonintegrated mills and eventually in integrated mills. This would reduce initial investment requirements and expenditure of foreign currency, and assist in developing internal markets.

Though difficult to express in terms of costs and returns, the protective functions of the forest are growing in importance. In a number of areas, from western South America via the Sahara to the Arabian peninsula, the desert seems to be advancing, and the area available for cultivation and returns from marginal areas are thereby diminished. There is also growing concern about erosion, in particular in tropical and subtropical areas where soils are often specially vulnerable. Another source of major concern is the continued practice of shifting cultivation, which contributes decisively to the impressive figures of an annual forest clearance of about 8 million hectares each in Asia and Africa and of 10 million hectares in Latin America.

There has recently been a pronounced trend toward a much more intensive and wider use of forests for recreational purposes, particularly in more industrialized countries. Tourism has also become an important item in the foreign exchange earnings of many countries, for example in the Mediterranean area, and in this connection recreation forests are of primary importance. Furthermore, the recreational use of the forest by a wide public has created a new interest in forestry and an understanding of its problems. There are, however, disadvantages for forest owners, such as increased fire hazards and greater difficulties in timber production and harvesting, thus further squeezing profits in forest production and making it more difficult to convince private owners in particular to expand forest management activities and investments in forestry.

Adaptation of forestry to meet the recreation boom, especially in western Europe, has raised a

number of questions such as the best combination of the productive and other functions of the forest, the extent to which the multiple use of forests affects the economics of their productive functions, and how to forecast the demand for recreation in forests and the investments required in forestry for recreational purposes.

The past year has witnessed a growing awareness of these problems and greatly increased efforts to solve them. New goals have been set for the forestry sector and a number of decisions taken regarding the degree of self-sufficiency in wood production required to satisfy a rapidly expanding world timber trade, the extent to which forestry activities should support agriculture and sustain the farm economy, and the level of expenditure on social forestry — protective, recreational or amenity — which countries are prepared to underwrite.

The growing difficulties experienced in many parts of the world in the economics of forest production have resulted in increased efforts to intensify cooperation between foresters, industrialists and planners. The increasing calls on the forest for a variety of goods and services and the emphasis now being placed on the multipurpose functions of forests have had important repercussions on the formulation of policies and legislation, the solution of institutional problems and the organization of forestry education and training programs.

The trend toward more comprehensive and coherent legislation, more flexible forestry institutions and a forestry education wider in scope than before should be underlined and at least one important example of concrete progress mentioned: the draft African Convention for the Conservation and Management of Wildlife, which was completed in 1967 after extensive preliminary studies on legislation concerning hunting, national parks, and wildlife. It is noteworthy for the emphasis placed on the active management of wildlife resources within the framework of land use and economic and social development planning. It is rapidly proving its value for the African countries, eight of which have already redrafted or are in process of redrafting their national legislation on wildlife, hunting, and national parks, using the new convention as a guide.

Chapter III. RAISING AGRICULTURAL PRODUCTIVITY IN DEVELOPING COUNTRIES THROUGH TECHNOLOGICAL IMPROVEMENT

Introduction

In a number of developing countries there are signs of a substantial acceleration in the rate of application of modern technology to agricultural production. Long years of patient activity in research, extension, trials and demonstrations, and long-term investments in water development, agricultural institutions and other infrastructure are at last beginning to show results. Many governments have become aware of the need for a "package" of improved practices, including improved seeds, chemical fertilizers, better water use, crop protection, improved implements, and generally higher standards of farming, if production is to be increased sufficiently rapidly. Farmers in many areas also show a new awareness of the possibilities of obtaining higher yields per hectare by the use of purchased inputs such as better seeds, fertilizers and pesticides. The recent sharp spurt in fertilizer availability and use in many developing countries is perhaps the most striking indication of the changes that are taking place.

Attention has recently been focused on the rapid increases in productivity promised by the so-called "high-yielding varieties" of cereals, in particular the varieties of wheat developed in Mexico and those of rice issued by the International Rice Research Institute in the Philippines. These varieties have begun to be introduced on a large scale in several Asian countries, where their arrival has coincided most opportunely with the upsurge in the use of fertilizers and other improved practices.

Increases in agricultural production in developing countries have hitherto come mainly from extension of the cultivated area. In many of these countries, however, the remaining untilled land is either of poor quality or can be brought into production only after heavy investment. The needed increases in agricultural production can in many cases be obtained much more cheaply and rapidly by raising yields on existing farms. At the same time, higher productivity per person engaged in agriculture is a principal requirement if incomes and levels of living are to be raised for the farm families who constitute one half to three quarters of the total population in most developing countries.

The size of the market ultimately imposes a limit to the degree to which productivity per man can be raised. In most developed countries the average farm worker's productivity is so high that he produces enough to provide for the consumption of agricultural products of a large number of nonfarm workers. [1] In many developing countries, in contrast, the average farm family supplies less than one nonfarm family, in addition to providing for its own subsistence. This comparison illustrates not only the technological gap between farmers in developed and developing countries but also the difference in the size of the market available to them. While exports provide an important outlet in many countries, the main market is the domestic one, and this is determined chiefly by the size and income levels of the nonfarm population, which are still small in developing countries.

These relationships were examined in an earlier study of agricultural productivity in *The state of food and agriculture 1963*,[2] and will not be discussed in detail here. While they may impose a very real limit on increases in agricultural production and productivity, it is clear from recent trends that in most developing countries this limit has not yet been reached. In general, food production is lagging behind rather than exceeding the growth of domestic demand, and there have been substantial increases in food imports. Furthermore, the limit imposed by demand is constantly rising as the nonfarm population increases and as per caput incomes rise, although the effect on an individual farmer's market remains small until the comparatively advanced stage of economic development when the farm population begins to fall in absolute as well as in relative terms.

The theme of this study is how farmers in developing countries can be enabled to raise their produc-

[1] In 1966 each United States farm worker supplied 39.56 persons (33.54 in the United States and 6.02 abroad).

[2] FAO, *The state of food and agriculture 1963*, Rome, 1963, p. 95-134.

tivity up to this ceiling. This involves an examination both of the technological possibilities now available and of the many measures that must be taken in the organizational and institutional spheres if these possibilities are to be realized.

The study begins with a review of trends and levels of agricultural productivity in different countries, of the factors that contribute to increased productivity, and of the special difficulties involved in raising productivity in developing countries. The technological possibilities are then reviewed in turn for each of the main aspects of crop production (crop improvement, water use, fertilizers, crop protection, machinery and implements) and of livestock production. An account of the organizational and institutional requirements covers research, extension and training, seed production and other input supply services, finance and credit needs, and the provision of incentives. In a final section some suggestions are made as to the overall strategy needed to promote technological improvement in agriculture in the developing countries.

Productivity levels

Before reviewing trends and levels of agricultural productivity in different countries, it is advisable to clarify a number of questions concerning the concept of productivity and its measurement.[3]

Productivity is essentially a measure of the efficiency with which inputs are utilized in production. There is a substantial literature relating to methodological procedures for measuring productivity in agriculture.[4] A serious handicap, especially for studies of developing countries, is the lack of adequate data concerning the quantities of inputs utilized and outputs realized. Results obtained from studies undertaken for developed countries can, however, provide useful indications of potential increases in productivity that could be attained in other countries, especially from the application of improved technology.

[3] For a detailed analysis of these questions, reference should be made to the previous issue of this report already cited: FAO. *op. cit.*, p. 95-134.

[4] This includes, among many others: Folke Dovring. *Productivity of labor in agricultural production*. Agricultural Experimental Station Bulletin No. 726. Urbana. University of Illinois College of Agriculture. September 1967. – D.D. Durost and G.T. Barton. *Changing sources of farm output*. Production Research Report No. 36. Washington. D.C.. United States Department of Agriculture. Agricultural Research Service. February 1960. – J. Horring. *Concept of productivity measurements in agriculture on a national scale*. OECD Documentation in Food and Agriculture No. 57. Paris. 1964. – J.W. Kendrick. *Productivity trends in the United States*. General Series No. 71. Princeton. National Bureau of Economic Research. 1961. – R.A. Loomis and G.T. Barton. *Productivity of agriculture. United States. 1870-1958*. Technical Bulletin No. 1238. Washington. D.C., United States Department of Agriculture. Agricultural Research Service. April 1961. – C.O. Meiburg and K. Brandt. *Agricultural productivity in the United States. 1870-1960*. Food Research Institute Studies. Stanford. California. Food Research Institute. May 1962. – A.S. Tostlebe. *Capital in agriculture*. Princeton. National Bureau of Economic Research. 1957. – P.C. Van den Noort. Agricultural productivity in western Europe. *Netherlands Journal of Agricultural Science*. 15(2). 1967. p. 115-126.

Measures of productivity can provide little in the way of meaningful explanation of the level of productivity that has been measured. Although they can serve to establish clearly the need for productivity to be increased, they can provide little direct guidance as to how this can or should be accomplished.

The explanation of productivity levels is to be found in the properties and qualities of the various inputs, the manner in which they are combined and utilized for production, and effective market demand for the outputs. Thus increases in agricultural productivity are essentially the result of management decisions made by individual farmers: regarding their choice of inputs and their relative quantities, the techniques and skills with which they are utilized in the production process, and the outputs that they produce. These management decisions are of course made within the context of government policies and programs, which will generally aim to improve the availability and quality of inputs and the techniques and the skill with which individual farmers use them, and to ensure an appropriate relation between the outputs and effective market demand.

The increased use of externally purchased inputs is a characteristic feature of agricultural development and an important source of greater productivity. The increasingly important role of such inputs has stimulated the development of concepts and methodologies to take appropriate account of their significance. For example, the concept of "aggregated labor productivity in agricultural production" attempts to take account of all labor that contributes to agricultural production, not only that used directly on the farm but also that used indirectly off the farm in producing the materials and services used in agricultural production.[5]

The measures of agricultural productivity which are most frequently undertaken are those of partial productivity: the relation of a single input or group of inputs to the total output or to a part thereof (yield per hectare, output per man-hour, output per unit of capital, etc.). This is not only because the data required are more likely to be available than are those required for measures of overall productivity, but also because the aggregation of total inputs may tend to obscure the effect of changes in their composition. Inasmuch as an essential feature of agricultural development is the substitution of capital for land and labor, measures of partial productivity for these three conventional categories of inputs are likely to prove more revealing for developing countries than measures of overall productivity.

[5] See F. Dovring. *op. cit.*, in which such an index is developed for the United States.

Measures of partial productivity cannot, however, indicate how much of the total output or change in output is attributable to any particular input. They are merely expressions of the output obtained per unit of the input (land, labor or capital) when employed as part of a particular total combination of inputs. With these reservations in mind, some measures of partial productivity may now be examined, with a view to comparing the trends and levels in developed and developing countries.

Productivity of land

The productivity of land, the most permanently fixed of the three conventional categories of inputs, has assumed special importance as the population explosion has enormously increased the requirements of agricultural products. With available inputs of land limited at least in the short run, measures that increase output per hectare of land provide the most ready means of achieving the immediate increase in production required to keep pace with demand. This applies particularly to developing countries, which can ill afford heavy expenditure on food imports or on capital-intensive land settlement and development schemes.

There are still large areas of land at present unused for agricultural production which, on the basis of the physical properties and technical characteristics of the soils, topography and climate, could be brought into productive use. There are, however, only limited areas where this can be accomplished either rapidly or inexpensively. For example, the enticing potential of the tropical rain forest lands has been summarized as follows: " ... once the problems of maintaining soil fertility and controlling disease have been solved, rainfall and temperature will permit of cropping in all seasons, thus multiplying the physical extent of the area brought under agriculture two or three times in terms of crop area. If this analysis is basically correct, an agricultural revolution comparable to the opening up of the grass and forest lands in the temperate areas of North and South America and Australia lies somewhere ahead. The difference, and it is a great one, is that whereas the former awaited only the individual pioneer provided with transportation for his products and using techniques he had brought with him from not too dissimilar lands in Europe, the vast equatorial expanses will require the coordinated efforts of governments, using the full resources of science and capital."[6]

Table III-1 compares changes in production, in the amount of land used, and in the average yield per hectare of 12 major crops combined in the main regions of the world from 1948-52 to 1957-59 and from 1957-59 to 1964-66. This gives an approximate

[6] W.H. Pawley, *Possibilities of increasing world food production.* FAO Freedom From Hunger Campaign Basic Study No. 10. Rome. 1963. p. 40-41.

Table III-1. – Changes in regional production, area, and combined average yield per hectare of 12 major crops [1]

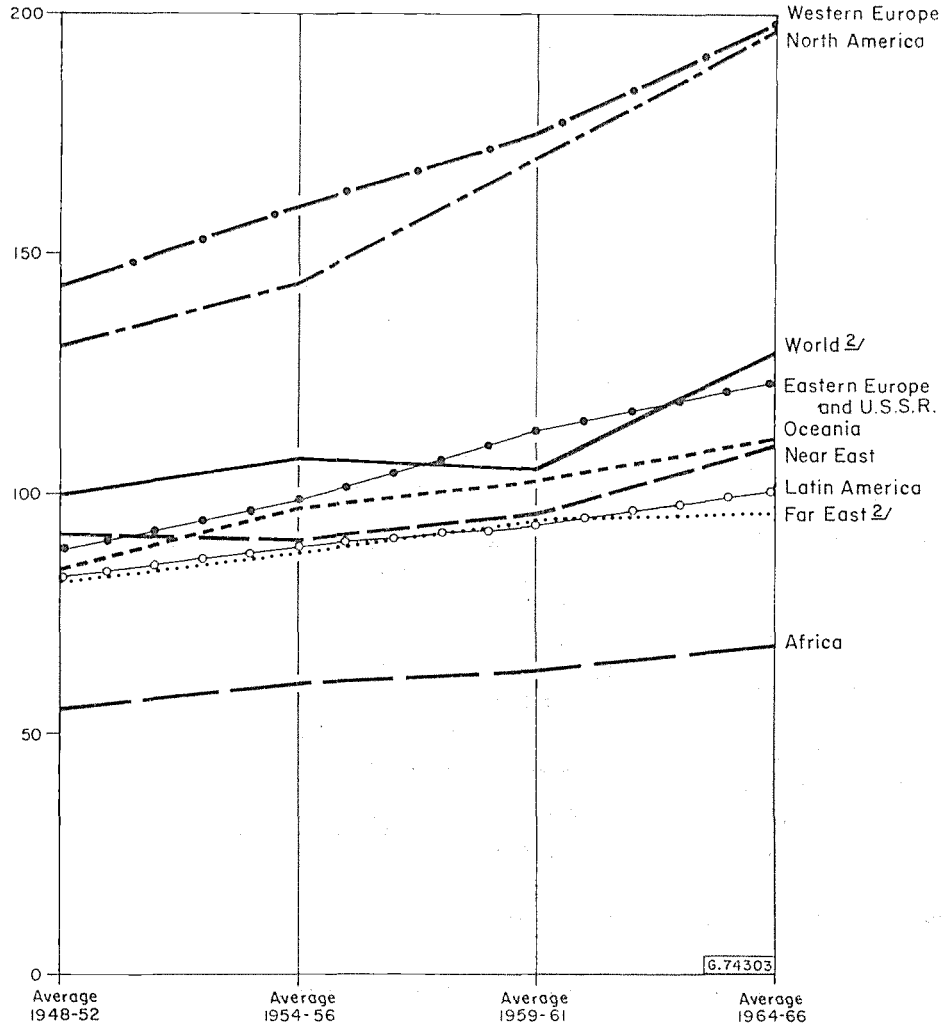
	Production [2]		Area		Yield [2] per hectare		Contribution of change in yield to change in production [3]	
	I	II	I	II	I	II	I	II
	Percentage change						*Percentage of total*	
Western Europe	23	13	4	—3	19	17	84	125
Eastern Europe and U.S.S.R.	38	15	13	1	22	15	65	97
North America	7	17	—13	—6	22	24	290	132
Oceania	10	79	10	51	1	18	6	35
Developed regions	21	16	2	—1	19	18	90	105
Latin America	37	37	26	22	8	12	29	40
Far East [4]	28	18	18	9	9	8	36	49
Near East	47	20	36	9	9	10	25	55
Africa	32	17	18	5	11	12	42	73
Developing regions [4]	32	22	21	11	9	10	34	50
World [4]	25	18	10	4	14	14	61	77

I. 1948-52 to 1957-59. – II. 1957-59 to 1964-66.

[1] Wheat, rye, barley, oats, maize, rice, potatoes, groundnuts, soybeans, tobacco, cotton, jute. – [2] Price weighted. – [3] Percentages over 100 indicate that production has increased despite a reduction in area. – [4] Excluding China (Mainland).

FIGURE III-1. – CHANGES IN COMBINED AVERAGE YIELD OF TWELVE MAJOR CROPS [1]

(Indices, 1948-52 world average = 100)



[1] Price-weighted average yield of wheat, rye, barley, oats, maize, rice, potatoes, groundnuts, soybeans, tobacco, cotton, jute. – [2] Excluding China (Mainland).

indication of the relative contribution of changes in areas and yields to the increase in production.[7]

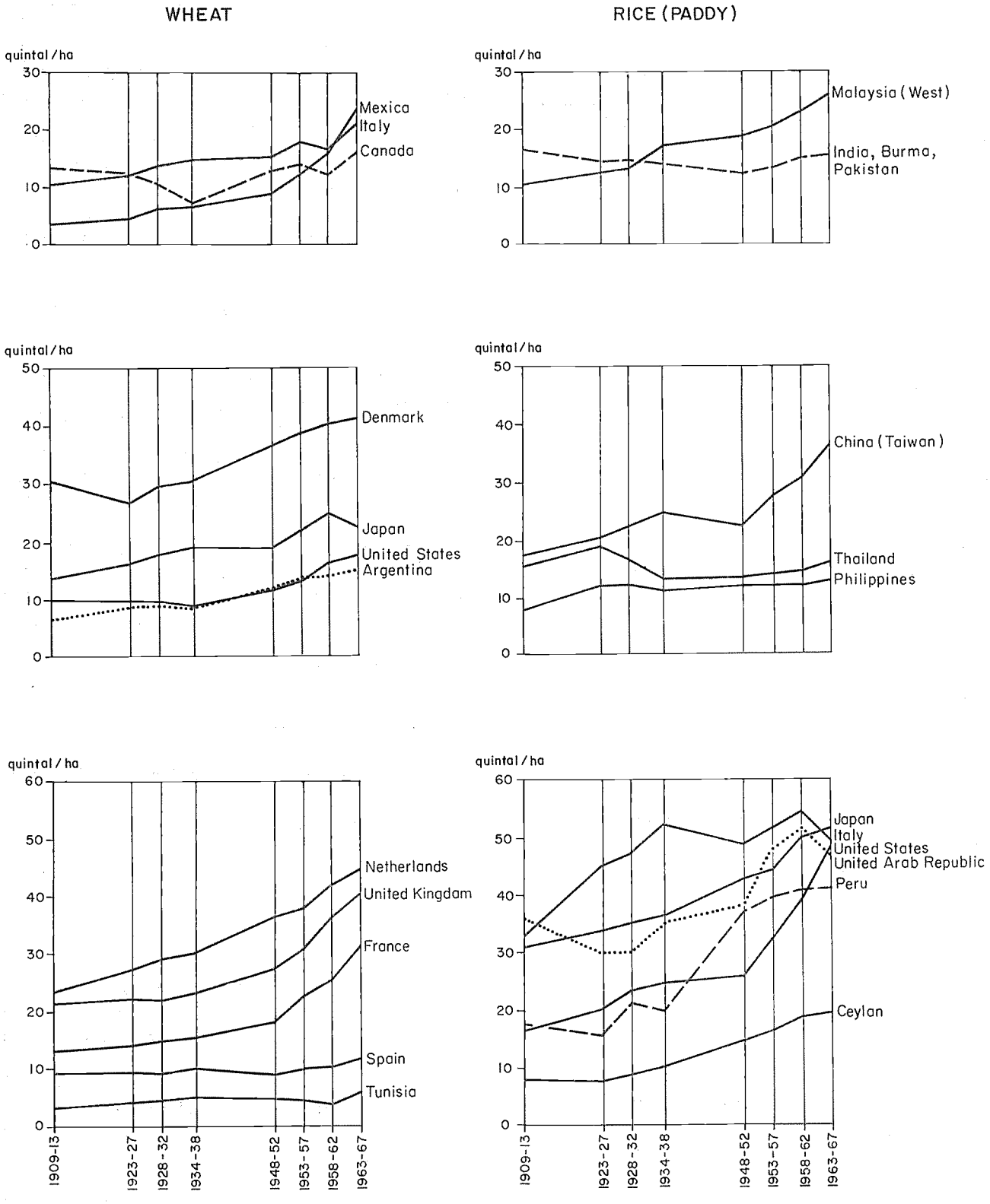
In the developed regions increased production of these crops since the second world war appears to have resulted almost entirely from higher yields. In fact in the more recent of the two periods covered in the table the total area devoted to the 12 crops in these regions declined slightly. In the developing regions increases in yield have been much smaller. It is noteworthy, however, that the contribution made by higher yields to increased production in the developing regions as a whole appears to have risen from about a third in the first period to a half in the second. This reflects not only the growing scarcity of land but also the gradually increasing use of improved technology in the developing countries.

In spite of these developments, yields per hectare for the 12 crops remain much lower in the developing than in the developed regions, and the gap has tended to widen because of the faster increase in yields in the developed regions (Figure III-1). These comparisons provide some indication of the scope for increasing yields in developing countries.

Figure III-2 shows trends since before the first world war in yields of wheat and rice, two of the world's major crops, in a number of individual countries, both developed and developing. Similar data are assembled for a larger number of countries in Annex table 16. These indicate a very wide range of yields, reflecting a complex of causes including

[7] The price-weighted figures of production and yield may partly reflect changes in the pattern of production as well as in the yield of individual crops. Similarly, the figures of area will reflect not only actual additions to the cultivated area but also land switched from other crops and increased multiple cropping. Except for Africa, the crops chosen are fairly representative, accounting for 40 to 60 percent of cultivated land in each region. In Africa, where such crops as cassava, millet and sorghum (for which few area statistics are available) are important, and where shifting cultivation results in a high proportion of fallow, the 12 crops account for only about 15 percent of the crop area.

FIGURE III-2. – TRENDS IN YIELDS OF WHEAT AND RICE (PADDY) IN SELECTED COUNTRIES, 1909-13 TO 1963-67

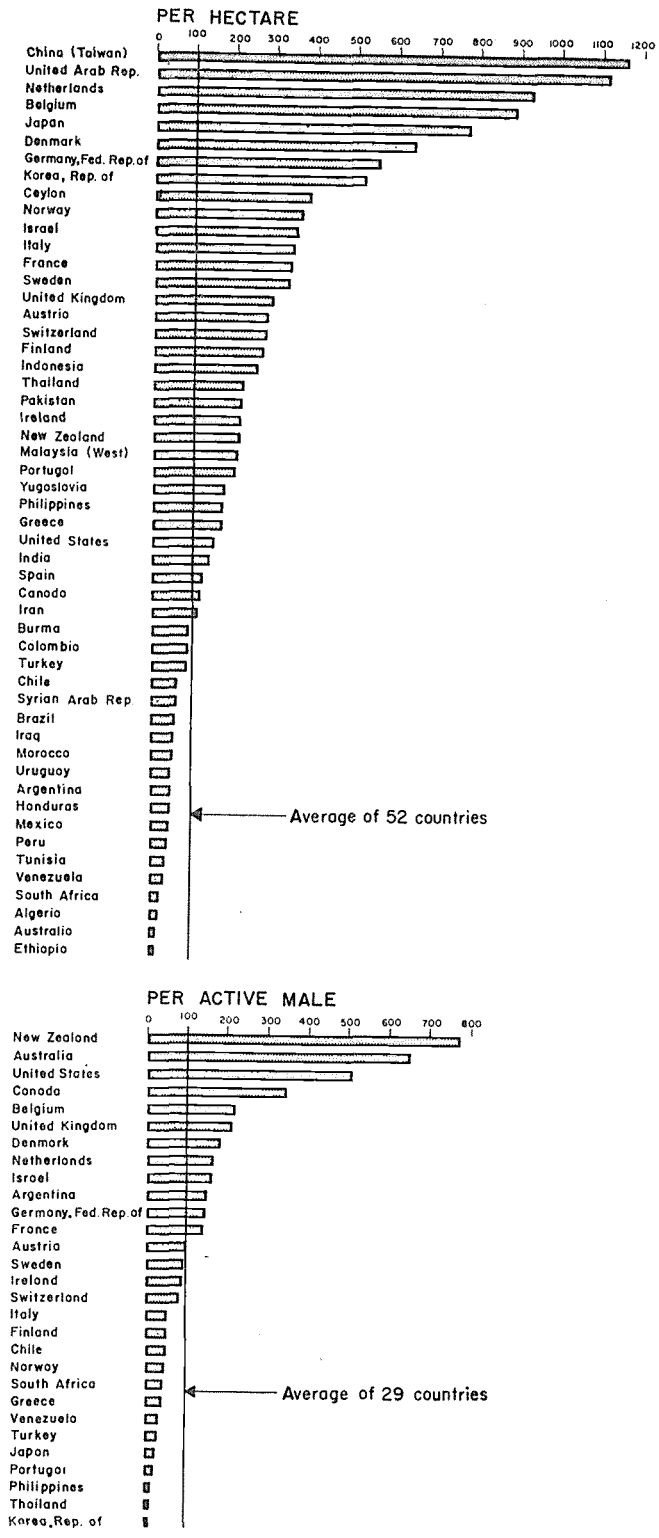


soil and climate and various historical factors, as well as the level of technology. But what is most striking is the acceleration in the yield increase in a number of countries in recent years.

Looking at data for a period even longer than that covered in Figure III-2, this acceleration is still more marked. For example, in Japan it took until the middle of the nineteenth century for rice yields

FIGURE III-3. – GROSS AGRICULTURAL OUTPUT PER HECTARE OF AGRICULTURAL LAND AND PER ACTIVE MALE IN AGRICULTURE

(Indices, average of all countries = 100)



NOTE: Data of gross agricultural output are based on the FAO index numbers of agricultural production. They exclude feed, seed and waste, and are aggregated by using regional average producer prices relative to wheat. Data of output and agricultural area refer to the 1962-66 average but for active males in agriculture it has been necessary to use census data referring generally to 1960, 1961 or 1962.

to reach double their level in the eighth century. With the introduction of chemical fertilizers and other technological improvements it took only till the middle of the present century for yields to double again. Similarly, in the United Kingdom wheat yields doubled between 1550 and 1900 and have subsequently doubled again.[8]

In the developing countries yields can potentially be doubled even more quickly, both because of their very low present levels and the accumulation of technological improvements available for application. Recent developments in China (Taiwan), where rice yields rose by two thirds between 1948-52 and 1963-67, and in Mexico, where wheat yields were almost trebled in this period, are an indication of the kind of increases that should be possible in other developing countries.

Before leaving the subject of the productivity of land, mention may be made of multiple cropping, which introduces the additional concept of maximizing the yield of a given piece of land per unit of time. The treatment of multiple cropping in agricultural statistics is far from uniform, but generally its effect on the productivity of land is not apparent from statistics of individual crops such as those in Figures III-1 and III-2. In Figure III-3, however, which covers all commodities, multiple-cropped land is counted only once in the agricultural area, so that in this case the productivity measure reflects the effect of multiple cropping.

PRODUCTIVITY OF LABOR

Whereas the productivity of land is of primary importance as a determinant of the total level of food and agricultural production, the productivity of labor is mainly important as a determinant of the income of the population engaged in agriculture.

Figure III-3 compares the ranking of countries on the basis of labor productivity with their ranking on the basis of the productivity of land. The measure used here is the price-weighted volume of total agricultural production (crops and livestock) per hectare of agricultural land and per adult male engaged in agriculture. The two rankings are significantly different.

The productivity of labor (gross output per worker) in agriculture generally tends to be greatest in developed countries, where readily available alternative employment opportunities have caused workers to shift to nonagricultural sectors, and agriculture accounts for only a small proportion of the total labor force. The highest figures are found in such countries as Australia, New Zealand and the United States,

[8] H.L. Richardson, Increasing world food supplies through greater crop production, *Outlook on agriculture*, 3(1), 1960, p. 9-22.

where the substitution of capital for labor has been carried farthest. The range between these countries and developing countries such as the Republic of Korea, the Philippines and Thailand at the other end of the scale is extremely wide.[9]

The productivity of land, on the other hand, tends to be highest in densely populated countries, including developing countries such as China (Taiwan) and the United Arab Republic.

Productivity of capital

Measures of the productivity of capital are particularly complicated to compute and difficult to interpret. This is largely because of the diversity of forms in which capital may be utilized in agricultural production: for land purchase or improvement, reclamation, drainage, irrigation, farm buildings, mechanical power, machinery and implements, livestock, feeds, seeds, fertilizer, crop protection chemicals, etc. Differences in the effective time dimensions for these alternative forms are of paramount importance in determining the productivity of capital. Whereas expansion of the area or improvement of the quality of available land (as for example through irrigation or drainage works) commits large amounts of capital and pays off at only modest rates over relatively long periods of time, the utilization of financial resources as working capital (applied for example in the form of seed or fertilizer) ties up smaller amounts of capital and pays off during a single crop season.

Sources of increased productivity

In the developed countries, stages in the historical development of agricultural production have tended to be characterized by differing combinations of inputs: differences in the relative proportions of land, labor and capital, and in the composition of the capital input. Such changes reflect primarily the changing structure of the economy and the successive advances that have been made in agricultural technology.

The well-documented case of the United States will serve as an illustration.[10] During the period 1870-1900 farm production was increased through a further rapid expansion of the agricultural area. The agricultural labor force increased by about 60 percent, but there was replacement of labor by nonland capital in the form of horses and mules, and new and more efficient types of horse-drawn machinery including plows, cultivators, seed drills, grain harvesters, and mowers.

The following period, from 1900 to 1930, was a period of transition: the first half saw the beginning of the end of traditional farming, based predominantly on large inputs of relatively unskilled labor, and the second half the beginning of commercial agriculture, technologically oriented and capital intensive. The area of cropland in use continued to be increased until about 1920 but remained relatively stable thereafter, and the agricultural labor force continued to increase until about 1918. Equally significant, however, were the shifts that began to become evident in the composition of capital inputs (other than real estate); the replacement of horses and mules by tractors, automobiles and trucks, of manpower by motor-driven machinery and equipment, and the purchase of production inputs (fertilizers, lime, seed, feed, etc.) required for the application of improved production techniques.

Between 1935 and 1960 output per man-hour of labor increased about 4.5 times, and crop production per hectare of cropland almost doubled. Inputs of labor were decreased by 50 percent, inputs of land remained relatively stable, but inputs of capital (other than real estate) were nearly tripled. Among these capital inputs, those of fertilizer and lime increased by about five times, those of seed, feed and livestock purchased by about four times, and those of mechanical power and machinery by more than 2.5 times.

It has been estimated that of the total increase in United States farm output between 1940 and 1955, 43 percent is attributable to increased crop yields per hectare, 27 percent to increases in value added by livestock production, 23 percent to reduction in farm-produced power, and 7 percent to changes in the amount of cropland used.[11] While it is not possible to isolate the effect of a single input, it is roughly estimated that increased fertilizer accounted for more than half of the increase in crop production per hectare. Other important causes of increased crop yields per hectare included the use of hybrid maize and other improved plant varieties, irrigation, better soil tillage practices, more timely planting, cultivation and harvesting operations, and better weed, insect and disease control.

Experience during this period demonstrated that increases in crop yields tend to be compounded when improved technologies are applied in combination. For example, the introduction of hybrid maize into the southeastern United States caused little increase in average yields until it was combined with heavier

[9] Data of net output or value added per worker (that is, the gross output less inputs from outside agriculture), which are of particular relevance to farm incomes, are available for fewer countries. These show a somewhat narrower range, mainly because the inputs from outside the sector tend to be greatest in the countries with the highest labor productivity, but the range is still wide. See: FAO, *op. cit.*, p. 117.

[10] R.A. Loomis and G.T. Barton, *op. cit.*

[11] D.D. Durost and G.T. Barton, *op. cit.*, p. 17.

TABLE III-2. – FIELD TRIALS COMPARING LOCAL AND HYBRID VARIETIES OF MAIZE, UTTAR PRADESH, INDIA

	Local practices	Recommended practices[1]			
	Local seed	Local seed	Ganga 1	Ganga 2	Ganga 3
	..... *Kilograms per hectare*				
Yield (average of two years)	1 908	2 443	3 449	4 246	3 982
	..... *Rupees*				
Value of crop	1 183	1 514	2 138	2 632	2 469
Cost of production . . .	906	1 236	1 236	1 236	1 236
Net returns per hectare .	277	278	902	1 396	1 233

SOURCE: Agricultural University of Uttar Pradesh, India.
[1] Including fertilizers, crop protection and improved cultural practices.

applications of fertilizer, closer spacing of the plants, better tillage practices, etc.[12]

In developing countries this slow evolution, dependent on successive waves of technological advance, can to some extent be bypassed. In fact it is essential that technological improvements should no longer be introduced piecemeal in developing countries but as a "package." For a long time fertilizer use in developing countries tended to be hindered by the fact that, except for a few export crops, the improved seeds available for use in the tropics and subtropics were varieties that were primarily resistant to drought or to certain diseases, without a high response to fertilizer application. Now an increased "fertilizer consciousness" in many developing countries has coincided with the arrival of a number of varieties of cereals, adapted to wide areas of the tropics and subtropics, which are highly responsive to fertilizers. But even this combination of fertilizers and fertilizer-responsive varieties is not sufficient. To give maximum yields the new varieties require adequate water supplies and careful attention to crop protection measures. A general improvement in husbandry methods is also essential, including seeding at the correct depth, water control and better weeding, if part of the potential benefits of the purchased inputs is not to be lost.

These relationships are illustrated in Table III-2 in respect of field trials comparing local and hybrid maize in India. The use of fertilizers, crop protection and improved cultural practices increased yields by about 28 percent with the local seed but more than doubled them with the Ganga 2 hybrid variety. Furthermore, with local seed the cost of the additional inputs offset the benefits obtained from the increased yield, and the net returns per hectare were virtually unchanged; only when improved varieties of high yield potential were sown could large increases in both production and net returns be obtained.

It is also known that the returns from several inputs used together exceed the sum of the returns from them when used singly, provided the inputs are used in the right proportions and are properly adapted to the ecological conditions.[13]

[12] United States, Department of Agriculture. Economic Research Service. *How the United States improved its agriculture.* ERS Foreign - 76. Washington. D.C.. March 1964. p. 8-9.

Problems of raising productivity in developing countries

Ensuring that the necessary package of inputs is available to farmers and that they have both the possibility and the incentive to purchase and use them involves numerous problems in developing countries. Organizing the necessary services over wide areas will place a severe strain on the administrative capacity and financial resources of many governments. These questions are discussed in detail later and need be only briefly introduced at this point.

In achieving the technological potential many special problems are imposed by the conditions existing in the developing countries. The influence of land tenure systems is often overriding: not only questions of ownership, which relate particularly to incentives to use improved technology, but also the frequently small and scattered nature of holdings, which greatly hampers the introduction of rotations, crop protection measures, and machinery. Other such factors include the poverty and lack of education of farmers, and the orientation of production primarily to the subsistence of the producers and their families rather than to commercial production.

The abundant agricultural labor supply, which is still increasing in absolute numbers (even though decreasing as a proportion of the total population) in most developing countries, poses many problems, in particular regarding the use of machinery. It may be pointed out, however, that technological improvements that increase yields tend to increase the labor requirement for such tasks as fertilization, crop protection, weeding, and harvesting. They may also facilitate (particularly when they make possible multiple cropping) a better distribution of the labor requirement throughout the year, without the marked peaks and troughs that are characteristic at present.

Research services will need to be geared to the new momentum of technological advance that it is hoped to get under way. Extension services will have a crucial role to play in helping farmers to avoid

[13] See for example: Shigeru Ishikawa. *Economic development in Asian perspective*, Tokyo. 1967. p. 118-122. - W.D. Hopper. Planning yardsticks for fertilizer and irrigation, *Agricultural situation in India*. 20. 1965. p. 463-477. – V.G. Panse, T.P. Abraham, and C.R. Leelavati. *Yardsticks of additional production of certain food grains, commercial and oilseed crops*. New Delhi. 1964.

failures resulting from the use of the wrong plant variety, new pests and diseases, and incorrect methods of sowing or fertilization, which might destroy their new confidence in modern technology. Improvements in the general level of farming do not seem likely to permit any slackening in the extension effort but will necessitate an increase.

The massive supplies of chemical fertilizers needed could well prove a serious bottleneck, especially as in most developing countries they mostly have to be imported. Getting the greatly increased supply of these and other purchased inputs to the farmer at the right time will necessitate the expansion and improvement of transport, distribution and storage facilities, particularly at field level. The organization needed for the efficient production and distribution of improved seed is particularly poorly developed in most countries.

A rapid increase in the use of purchased inputs will entail greatly expanded credit facilities. Particular attention also needs to be given to price relations and other factors influencing the farmer's incentive to purchase inputs in order to raise his production and sales.

Many of the problems of input supply, credit, marketing, and storage can be met by cooperatives or other farmers' organizations. The need for effective organizations of these or other appropriate kinds is likely to increase as the use of modern technology becomes more widespread.

Role of science and technology

Some of the main ways in which modern technology can contribute to raising agricultural productivity in developing countries will now be discussed. Although each is dealt with separately, it should be borne in mind that, as emphasized above, their full impact is obtained only when they are combined in a suitable "package."

Crop improvement

As yields are the result of an interaction between crops and their environment, they can be increased by improvement both of the plants themselves and of their environment.

Since the beginning of this century, when the significance of Mendel's research became evident, there have been remarkable developments in crop improvement. Through plant breeding (the controlled hybridization of parents with the most desirable characteristics) and the systematic selection of new improved varieties greatly superior to the old local strains obtained through natural selection, a continuous flow of new and better varieties is being made available to the farmer. These new varieties may be superior to the old ones in three different ways: yield capacity, cultural reliability, and quality of product.

The high-yielding varieties of food crops now becoming available offer an unprecedented opportunity for a breakthrough in agricultural production in developing countries. If used with suitable combinations of other inputs — in particular, fertilizers, water, and crop protection chemicals — they are capable under favorable conditions of raising yields severalfold, compared with those of local varieties.

The use of improved seeds obtained through breeding and selection has a long history. In developing countries, however, high-yielding varieties have hitherto chiefly been available for export crops, including tree crops such as oil palm, cocoa and rubber. Improvements in food crops were largely in terms of resistance to drought or disease. It is only recently that high-yielding varieties of food crops, particularly cereals, have become available that are adapted to wide areas of the tropics and subtropics.

What is new about the so-called high-yielding varieties[14] of cereals is not so much their yields (which have long been reached or surpassed by many varieties adapted to the temperate zone) as the very large yield increases that their wide ecological adaptability makes possible over extensive areas where hitherto only low-yielding indigenous varieties have been grown. They can transform the production situation in these areas by substantially altering input-output relationships and greatly raising the yield ceiling for the profitable application of fertilizers and other inputs.

The performance of any improved variety must be considered in relation to a given ecological and agricultural environment. A variety may produce high yields under certain conditions and may fail under different ones. Another variety may give the safest yield but not the highest. Thus the task of crop improvement in increasing productivity is to search for plants producing a maximum of economically interesting plant parts under given agro-ecological conditions (light, temperature, water, nutrients, etc.) and cultivation practices.

[14] From a technical standpoint the description "highly responsive" might be more appropriate, but since the term "high-yielding" has gained such wide currency it is considered advisable to continue to use it.

Some of the main new cereal varieties are described below, although it should be recognized that the picture is constantly changing as new varieties come forward.

Hybrid maize originated in the United States as long ago as the 1930s. It was later successfully introduced in Mexico (where the Rockefeller Foundation began breeding programs in the early 1940s) and in certain European and African countries. Generally, however, its spread to developing countries has been slow. This is not only because the necessary complementary inputs were not available, but also because of the complex problems of seed production resulting from the need for the yearly renewal of hybrid seed.

Emphasis in maize breeding in developing countries is now shifting to open-pollinated synthetic varieties, whose seed can be produced cheaply and needs to be replaced only every three or four years. The yield potential of the synthetic varieties is more than double that of local varieties, but slightly less than that of the hybrids.

Much of the more recent work in developing countries has been on wheat and rice. The Rockefeller Foundation began work on dwarf wheats in Mexico in 1943. The main characteristics of these varieties, as compared with the traditional ones, are their genetic ability to respond favorably to heavier seeding and that their response to fertilizer (provided this is correctly applied) is expressed not in increased length of straw (and consequent lodging) but in more tillers and more grains per plant. They are also relatively insensitive to the length of daylight, and are therefore adaptable both to a fairly wide range of latitudes and to planting at different seasons. Combined with a great expansion in fertilizer use and in irrigation, the new varieties have approximately trebled average wheat yields in Mexico since the second world war (see Figure III-2).

Mexican varieties of wheat have been introduced and tested in a large number of countries in the Near East under the FAO Near East Wheat and Barley Improvement Project, begun in 1952. In India and Pakistan the first import of Mexican seed for large-scale field trials was as recent as 1964, but large imports of seed were subsequently made and already by 1967/68 2.7 million hectares were planted to these varieties in India and 1.2 million hectares in Pakistan. Their average yields in 1966/67 in Pakistan were 2 to 3 tons per hectare, or more than twice those of local varieties, while yields under irrigation may reach 7 tons per hectare in experimental fields and those of progressive farmers. In the United Arab Republic the locally developed rust-resistant Giza varieties compete favorably with the Mexican varieties.

Work on high-yielding varieties of rice has been conducted in a number of Asian countries and at the International Rice Research Institute (IRRI), which was founded in 1962 at Los Baños in the Philippines with support from the Ford and Rockefeller Foundations. It has been possible to make much more rapid progress with rice than with wheat, since IRRI has been able to profit not only from earlier work on rice in such countries as China (Taiwan) and Japan, but also from the work on wheat in Mexico, which indicated the characteristics that should be looked for.

As with wheat, the new varieties of rice are characterized by dwarfness and high response to fertilizers. They have successfully disproved the long-standing belief that the Indica varieties of rice, grown and consumed in most countries of southeast Asia, were inherently incapable of the high yields of the Japonica varieties preferred in the more northerly countries of Asia. The variety IR-8 has shown wide adaptability and has given yields of 6.5 to 7.5 and even 10 tons of paddy per hectare; in a trial involving three crops in a year, a total yield of 20.2 tons per hectare has been reported. Problems that have arisen include its susceptibility to bacterial leaf blight and blast disease, and its poor palatability and milling quality.

Taichung Native 1, a variety developed in China (Taiwan), was distributed by IRRI before the development of IR-8. It is widely grown in India, but it too is susceptible to bacterial leaf blight. The Chinese Agricultural Team is conducting trials of

TABLE III-3. – CHARACTERISTICS OF IR-8 AND IR-5 VARIETIES OF RICE

	IR-8 [1]	IR-5 [2]
Height	90-150 cm	130-140 cm
Maturity	120-130 days	130-145 days
Photoperiod	Insensitive	Slightly sensitive
Lodging	Resistant	May lodge at high level of fertilization
Nitrogen response	High	High
Seed dormancy	Moderate	Moderate
Amylose content	High	High
Milling recovery	Low	High
Diseases		
Bacterial leaf blight	Susceptible	Moderately resistant
Blast	Highly susceptible	Susceptible
Tungro virus	Moderately resistant	Moderately resistant
Yield	5,800 to over 10,000 kg/ha	Over 6,000 kg/ha
Palatability	Limited acceptability in southeast Asia	More acceptable than IR-8

[1] Parentage *Dee-geo-woo-gen* (a short Indica rice from China [Taiwan]) × *Peta* (a tall Indica rice from Indonesia). – [2] Parentage *Peta* × *Tankai Rotan* (from Malaysia).

this and other varieties from China (Taiwan) in a number of African countries. Other high-yielding fertilizer-responsive varieties, usually with a lower yield ceiling than IR-8 but often quicker maturing and with more acceptable grain and resistance to local diseases, have been developed in a number of countries, including Ceylon (H-4 and H-7), Guyana (Bluebelle), India (ADT-27), and Indonesia (Syntha). More recently IRRI has released the IR-5 variety, the characteristics of which are compared with those of IR-8 in Table III-3.

Hybrid varieties of millet and sorghum have been developed in India and the United States. As with maize, the technology is more complex than with wheat and rice. The direct introduction of the United States hybrid sorghums in developing countries has not proved successful because of disease and quality problems. The Indian hybrids CSH-1 and 2 are reported to be suitable for nearly two thirds of the country's sorghum area, and in 1967/68 were planted on 0.7 million hectares. They yield 60 to 80 percent more than the local varieties. They are particularly susceptible to insect damage, but this problem is being solved by sterilization of local resistant varieties for use as male parents in hybrid seed production.

Less progress has been made in breeding improved varieties of food crops other than cereals that are suitable for the tropics and subtropics (the main exceptions are certain oilseeds and horticultural crops). Since the high-yielding varieties of cereals make it possible to grow a country's cereal requirements on a much reduced area, land will be freed for such alternative crops as pulses, vegetables, and animal feedstuffs. These crops will not be grown, however, unless varieties are available whose high yields make their production as profitable as that of cereals.

The high yield potential of the new cereal varieties can be achieved only if they are used in conjunction with adequate inputs of fertilizer and water, careful attention to crop protection, and generally high standards of farming. It is necessary to raise levels of fertilizer application well above those in current use even by the better farmers. For most traditional varieties of wheat and rice, fertilizer responses fall off at about 40 to 50 kilograms of nitrogen per hectare, mainly because of lodging beyond this point. For the high-yielding varieties the response increases more steeply and does not begin to fall off until 100 kilograms or more. In India recommended fertilizer doses for the Mexican wheats are 80 to 120 kilograms N, 40 to 60 kilograms P_2O_5 and about 40 kilograms K_2O per hectare.

Water management and availability are particularly important. For wheat it is recommended in India that the Mexican varieties should receive at least two more irrigations than the local ones. For rice in some areas the problem is an excess rather than a deficiency of water. For example, because of deep flooding the new short-strawed varieties cannot be introduced without improved water control in about a third of the cultivated area of East Pakistan and about 40 percent of the current rice area in Thailand. This will entail flood control, adequate drainage or land shaping and the adoption of proper irrigation methods.

Pests and diseases are another problem. Not only do many of the new varieties not have the disease resistance of those hitherto used, but their denser and genetically uniform stands provide a more favorable environment for pests and diseases. In addition to close attention to crop protection measures, it is essential to develop a number of disease-resistant varieties with differing genetical makeup for simultaneous use, so as to avoid too great a reliance on a few varieties that may suddenly become susceptible to disease against which chemical control is either not possible or uneconomic. New rust races have emerged to attack the new varieties of wheat in Mexico, while the IR-8 variety of rice has proved susceptible to bacterial leaf blight and blast disease.

Better cultivation practices are also needed. For example, the short straw of the new varieties of wheat is a function of their short internodes, and is reflected in the shortness of the coleoptile or seed leaf. The usual method of plowing in seed must therefore be replaced by drilling, so as to avoid burying it too deeply. There are also advantages in fertilizer placement. Some type of drill is therefore required for combined seeding and fertilizer application.

An additional problem with some of the new varieties of rice is that they have only a short period of dormancy, and therefore require quick drying at harvest and better storage to escape serious deterioration.

In the case of rice the question of palatability has already proved a problem. In areas with substantial export markets for high quality rice, such as West Pakistan (Basmati rice) and Thailand, there is a natural reluctance to sacrifice quality to yields. New varieties of better cooking and eating quality are, however, already being developed.

Nutritional aspects require careful investigation, in particular the amino acid composition of the grain, which affects protein quality. Chemical analyses are needed of the protein content and amino acid composition of samples of the new varieties grown in the areas in which it is proposed to introduce them. There is little doubt, however, that on balance the high-yielding varieties of cereals should have a beneficial effect on protein consumption. Their high yields should make possible the release

of land for the production of pulses and other protein-rich crops, and their lower costs of production should enable prices to be lowered sufficiently for them to be fed to livestock.

Further progress in variety improvement can be expected in the near future. Hybrid wheat development is at present a major topic of research. It depends on the same phenomenon as hybrid maize, that is to say, heterosis, which often results in increased yield and greater vigor. Since heterosis expresses itself primarily in the first generation after crossing, the repetition of the cross to produce fresh seed for each crop is necessary. Further research topics in connection with hybrid wheat are the possibility of increasing fertility as well as industrial quality and protein content and quality.

The possibilities of increasing the nutritive value of maize grain have been substantially increased by the discovery of mutant genes such as opaque 2 and floury 2. In addition, varietal differences in amino acid content are found.

The development of high-yielding wheat varieties with high protein content such as Atlas 66 may have far-reaching possibilities. It has been reported that certain lines derived from crosses between Atlas 66 and other varieties have not only high protein content but also leaf-rust resistance, as well as high-yielding capacity. Much progress may also be expected through the breeding of quicker maturing varieties suitable for multiple cropping.

Lasting benefits from improved varieties can be expected only if supplies of pure seed can be made continuously available. Otherwise, with each successive generation the quality of the stock is reduced in genetic and physical purity and in freedom from seed-borne diseases. A major factor is therefore the availability of facilities for seed multiplication, certification and distribution. Such facilities are highly inadequate in most developing countries. They are discussed in a later section of this study.

Water use and irrigation

Agricultural production is greatly dependent on the availability of water and on its proper use and management. As was noted above, assured and controlled water supplies are one of the essential requirements for the achievement of the full potential of the new high-yielding varieties of cereals.

Most of the world's agricultural production is carried out under rainfed conditions. Many of the agricultural practices developed in areas of rainfed agriculture are concerned primarily with the better use and conservation of water supplies. In many areas the problem is not shortage of water but the provision of adequate drainage and flood control. Improvements in water regimes are closely linked with questions of land use and afforestation.

Only about 10 percent of the world's cultivated land is irrigated. A number of countries, however, are very heavily dependent on irrigation, for example the United Arab Republic where the whole of the cultivated area is irrigated, Peru (75 percent of the cultivated area), Japan (60 percent), Iraq (45 percent), Mexico (41 percent) and Pakistan (38 percent).

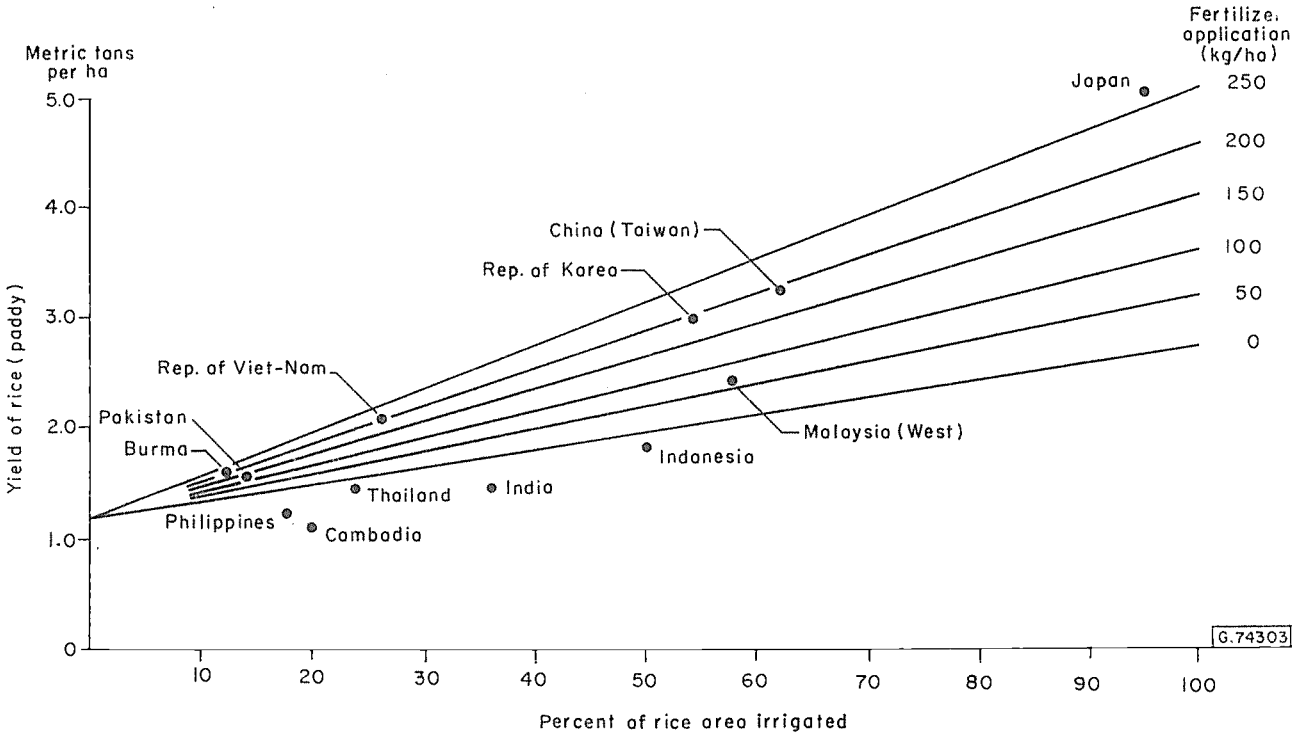
The effect of irrigation on productivity is such that the 10 percent of cultivated land that is irrigated may be roughly estimated to contribute about 20 percent of total agricultural production. Irrigation usually goes together with a general intensification of agriculture. Figure III-4 indicates that in the Far East an increase in the irrigated percentage of the rice area tends to be accompanied by a higher rate of fertilizer application and by higher yields per hectare.

In many arid areas agricultural production would not be possible without irrigation, and in many other areas supplemental irrigation makes it possible to maintain production at reasonable levels and to avoid crop failures due to unstable rainfall. The most suitable irrigation policy will, of course, vary from one area to another. In India, for example, it has recently been suggested[15] that the country can be divided into three broad groups of areas according to the character of the water supply and the stability of production, and that different policies are required for each of these areas. The first are areas "where there is an assured water supply both in volume and in spread either from assured rainfall or from sources of irrigation (e.g., tubewells, deep bore wells, canals from snow-fed rivers or storage dams) which are not unduly dependent on the vagaries of the monsoon." Here irrigation policy should be intensive and productivity oriented, aiming to maximize yields per hectare, for example through multiple cropping. In the second group, where the water supply (either from rainfall or irrigation) is largely dependent on the monsoon and thus subject to wide fluctuations, the policy should be mainly protective, including the provision of mobile pumps for use in unusually dry spells and the use of drought-resistant varieties. In the third group of areas there is no dependable irrigation and rainfall is scanty and precarious, and the main effort should be on contour bunding and contour cropping, dry farming practices, enclosures and controlled grazing, so as to maximize returns per unit of water.

While the expansion of the irrigated area can greatly increase agricultural productivity, much can also be achieved by increasing yields on land al-

[15] S.R. Sen. Growth and instability in Indian agriculture. *Agricultural Situation in India*. 21(10). January 1967. p. 831-833.

FIGURE III-4. – RELATION BETWEEN RICE YIELD PER HECTARE AND PERCENT OF RICE AREA IRRIGATED
(Average 1959/60-1963/64)



SOURCE: International Rice Research Institute, *Annual report 1966*, Los Baños. 1966.

ready irrigated. Bringing new land under irrigation is usually both time-consuming and costly. Increasing yields on land already irrigated contributes to maximizing the returns from costs that have already been incurred. Improvements in irrigation efficiency or supplemental irrigation can double or treble production in many existing irrigated areas. Expensive irrigation works will not pay unless the water is used with maximum efficiency, which entails the intensive use of other inputs.

WATER AVAILABILITY

While most industrial processes use less than a hundred tons of water per ton of end product, agriculture requires several thousand tons of water for each ton of marketable dry matter produced. This explains why, in a highly industrialized country such as the United States, agriculture still accounts for 85 percent of all water consumed. Better irrigation practices could result in enormous savings. It may be estimated, for instance, that a 20 percent improvement in irrigation efficiency could reduce the world's additional irrigation water requirements in 1985 from 600 million to 300 million acre/feet (740,000 million to 370,000 million cubic meters) per year.

The most economic and practical methods for increasing water supplies will continue to be the better control of river flows through the construction of storage dams and other classical structures, together with the discovery, assessment and rational exploitation of more groundwater. The potentialities are not always realized of joint exploitation, on a basin-wide scale, of surface and underground aquifers, including groundwater recharge and storage.

In the planning, design, and operation of major supply works to provide the right amount of water at the times needed, there is often insufficient attention to farm use and management requirements. There are often gaps between planning for dams and main canals and planning as far as the point of delivery to each parcel of land. There must be a dependable supply and efficient control of water before the water user can afford to maximize other inputs such as fertilizer, and in order to provide the flexibility needed to make possible variations in cropping patterns. Complete water control requires water measuring devices and control structures which maintain uniform flows to the farms.

As water supplies become more fully used, waters of poor quality (in respect of their content of salts) must sometimes be used for irrigation purposes. Systems must be designed to reduce waste and losses to a minimum and to be dependable in operation. Consideration should also be given to the possibility of re-using waters after another use (domestic, municipal or industrial).

More study is needed of the water requirements of plants in different parts of the world, as one of the basic indicators of irrigation requirements.

Irrigation methods and practices

Uniform application of water is essential to maintain optimum soil-moisture conditions. This requires systems designed to fit the method of irrigation best suited to the cropping pattern, the soil conditions, and the farmer's ability. At the same time, flexibility in design should be encouraged, to allow for possible changes in cropping patterns.

Surface methods will usually be the major means of farm water distribution. It is necessary to study the causes of the low efficiencies obtained with present methods, which often reach only 30 to 40 percent of potential levels.

Basin irrigation is one of the methods most commonly used. The size of the basins varies with the land gradient and the equipment available for constructing the small dikes that confine the water in the basins. On leveled land of low gradient with good distribution systems, this is a fairly efficient method of applying water.

Proper land leveling and distribution systems can help not only in saving water but in achieving a more uniform distribution to the soil for maximum production potential. Since land leveling can best be done with large equipment, it is often advantageous in settlement schemes to level the land prior to its division into individual farmlots. On low gradients, border irrigation is usually the most efficient method. This requires precision land leveling and flows of water of 55 to 85 liters per second. When supplies to individual farms are less than needed, a rotational or trading system can be employed to concentrate the water. Where border irrigation is not possible for lack of sufficient water volume, furrows should be used. On steeper lands where sprinkler irrigation is unavailable, contour furrows on benches will provide uniform distribution and will save water.

Although sprinkler irrigation is generally thought of as adapted only for developed countries, such installations have also proved advantageous in developing countries. They provide more flexibility than other methods, and at the same time save water in the distribution system and on individual farms. The capital cost is often the limiting factor for installing sprinklers, but this may not be more than would have to be spent for land leveling, installation of lined canals, proper structures and measuring devices. With sprinklers, there are at least facilities available to apply water uniformly when needed on almost any soil or topographic condition. It is easier to train or supervise irrigators to use sprinklers efficiently than to manage surface methods. With these facilities and adequate supervision, drainage and salinity problems should not be serious.

Drainage and salinity control

Possibly the greatest problems facing large areas of irrigated land in the developing countries are salinity and, to a smaller extent, sodic conditions. In some areas where adequate drainage exists salinity is caused by insufficient water for leaching. In other areas high water tables supply a continuous source of water near the soil surface from which evaporation leaves salt residues. These high water tables have generally been caused by poor irrigation practices on farms and excessive losses from canals and other watercourses.

It is difficult to estimate the loss in yield potential or the area affected by these problems, but two examples can be given. First, an area of 3.3 million hectares in Turkey requires reclamation owing to high water tables and salinity; a large proportion of this land is unsuitable for agriculture and on the rest yields are very low. Second, of the 9 million hectares under canal irrigation in the Indus basin in West Pakistan, it was estimated in 1960 that 2 to 2.5 million hectares were affected by salinity and waterlogging.

Technical means for reclaiming saline and waterlogged land are fairly well known, but the costs are usually prohibitive for individual action, and government initiative and financial assistance are therefore required. The first step is to provide suitable drainage. Drainage requirements in arid or semiarid irrigated areas are very different from those in humid areas since, in addition to surface drains to remove surplus or runoff water, a system of deep drains is necessary. In arid areas, excessive salt which accumulates in the plant root zone must be flushed down by the application of irrigation water.

Drainage systems should generally be planned and constructed together with those for irrigation. It is much less expensive to construct drainage systems initially than to do so after the situation becomes serious.

Once adequate drainage facilities have been provided, water should be applied to and through the soil to leach or wash salts down and out of the drainage system. If brackish waters are to be used for irrigation, a plentiful supply of inexpensive water is required and drainage must be continuous, since large supplies of water will be needed. After sufficient salts have been removed from the immediate soil surface to allow the germination of the more salt-tolerant crops, production can be renewed. Further leaching should be continued by applying water in excess of plant requirements to remove harmful salts to greater depths.

Water policy, administration and legislation

A well-conceived water policy for the whole country is essential in order to ensure the successful development of irrigation projects. Such a water policy should aim at achieving maximum benefit from the development, utilization and conservation of available water resources for all uses, agricultural and nonagricultural.

The water policy must be backed by an appropriate administrative machinery at all levels: national, basin, local. Piecemeal administrative water control hampers efficient planning and development. The sound development and conservation of land and water resources, particularly for irrigation and agricultural uses of water, require adequate water administration and institutions. These should be considered both at different levels (national, regional, basin-wide, or by project) and according to the different functions they must perform (political, administrative, technical, and legal). Planning the development and conservation of water resources requires as much detailed knowledge as possible of the availability of land and water, existing utilization, and future water requirements on the basis of population growth. This, in turn, calls for a centralized or at least a coordinated administrative management, so that efficient control of water allocation may be achieved through water use permits, authorizations and concessions.

Water legislation is a complex matter requiring urgent attention in many countries. In most countries, water legislation has grown up haphazardly, often embodying provisions irrelevant to modern requirements, and is strongly influenced by custom and tradition. Subjects which have to be considered in framing water legislation include: basic legal definition of water ownership and of rights to use waters, as these concepts are often confused and the power of the state to administer or control water derives from them; provisions relating to water conservation and pollution control; water rights administration, at different levels and for defined purposes of use; and procedures for granting permits to use water.

Economic and financial aspects

Irrigation enhances the benefits of modern inputs, makes possible better crop rotation, diversification, and mixed farming, reduces instability in output, and increases agricultural employment. This indicates the need to give adequate attention to farm management and production economics, and to fix water rates in such a way as to promote rational water use.

It is necessary to establish procedures and standards for the evaluation of projects, including not only economic but also social and political factors. In multipurpose projects, an equitable distribution of costs for each purpose should be established to evaluate the merits of including a particular purpose. In many developing countries, the choice among various alternatives must of necessity be dictated by compelling social needs, such as overpopulation, poverty, unemployment, low levels of living and health, which determine the preference for a particular project, use, or area.

An assessment should be made of the overall benefits of a project, direct and indirect, in order to decide whether the investment is justified. Where projects are undertaken by private investors or banking institutions, it is expected that revenues from the project should be sufficient to recover the costs within a certain time and yield a profit. Governments also should attempt to secure an economic return on their investment where this is feasible. However, it is not always possible to apply this principle, on the assumption that the investment of public funds is compensated for by the benefits derived by the people at large and that the expenditures will be recovered through the usual means of revenue collection at a later stage. There is ample justification for subsidizing some types of investment because of their critical role in the country's development; this may be particularly true in the case of some irrigation and drainage projects. However, it seems advisable to set water charges for irrigation according to the farmer's ability to pay. Consideration could be given to requiring a fixed minimum payment, sufficient to pay at least annual operation and maintenance costs, as a deterrent against misuse of water.

There is sometimes a choice between large-scale irrigation works, requiring highly technical engineering and foreign exchange, and small or medium-sized projects that can generally be executed with local labor, equipment, and currency. Many developing countries are in fact now paying increased attention to projects of the latter type.

Except where flood control and hydroelectric power generation are important as well as the provision of irrigation water, the possibilities of minor irrigation systems should always be carefully explored before embarking on a major project. Major irrigation works have a much longer gestation period and involve much greater official control over the distribution of water, so that the farmer does not have complete control over the timing of irrigation.

Comparisons of major and minor irrigation projects in East Pakistan [16] indicated that the Ganges Kobadak project will at the time of the full development

[16] Ghulam Mohammad, Development of irrigated agriculture in East Pakistan: some basic considerations. *Pakistan Development Review*. 6. 1966. p. 315-365.

of the Kushtian unit give a benefit-cost ratio of 2.2, assuming a rate of interest of 8 percent. A similar ratio of 2 to 2.5 was calculated for larger tubewell projects run by the Pakistan Water and Power Development Authority, but for smaller tubewells it varied from 3.6 to 4.4, rising to 4.8 to 5.7 with high-yielding varieties. For low-lift pumps, a ratio of 3.3 was calculated for pumps of 2 cubic feet per second capacity and 4.0 for those of 1 cubic foot per second capacity, rising to 5.2 with high-yielding varieties.

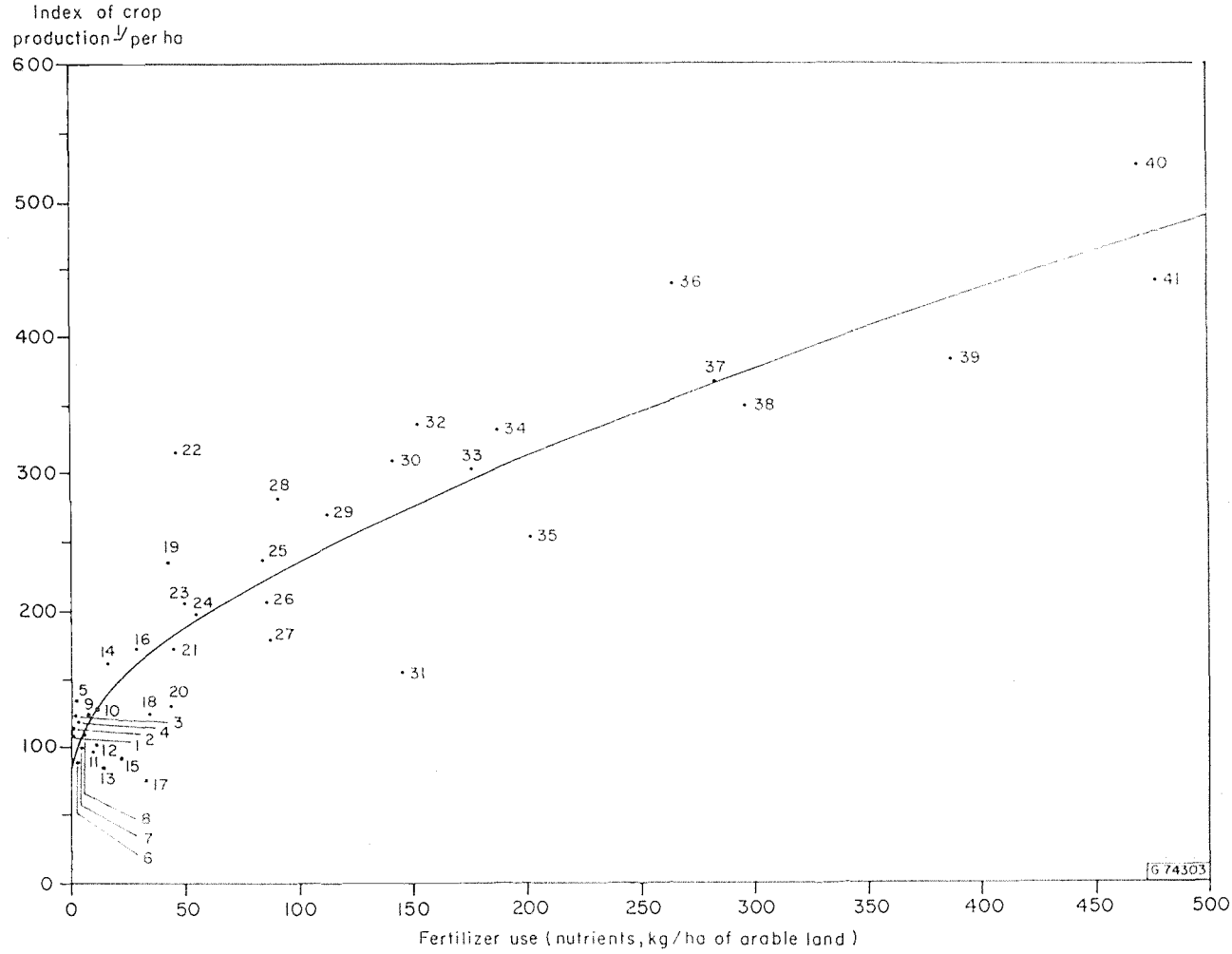
When a farmer is himself in charge of irrigation of his land, he has more incentive to intensify his crop production. For example in West Pakistan, where most of the tubewell irrigation has been supplemental to canal irrigation, it was found that farmers with tubewells used more than twice as much fertilizer per unit of cropped area than those without tubewells.[17]

Fertilizers

Fertilizer use has been a major factor in raising crop yields in the advanced countries. In fact the level of fertilizer use per hectare of arable land is closely linked to the level of crop production per hectare (Figure III-5).

[17] Ghulam Mohammad, Private tubewell development and cropping patterns in West Pakistan, *Pakistan Development Review*. 5. 1965, p. 25-26.

FIGURE III-5. – RELATION BETWEEN FERTILIZER USE AND CROP PRODUCTION [1] PER HECTARE, 1961-63



SOURCE: J.W. Couston. *Importance of mineral fertilizer for food and human health in developing countries* (mimeo). Paper presented to International Potash Congress. Brussels, 17-21 October 1966.

[1] Price-weighted aggregates of crop production expressed as an index.

1 – Burma
2 – Argentina
3 – Thailand
4 – Turkey
5 – Indonesia
6 – India
7 – Syrian Arab Rep.
8 – Pakistan
9 – Colombia
10 – Canada
11 – Mexico
12 – Brazil
13 – Philippines
14 – Chile
15 – South Africa
16 – Yugoslavia
17 – Portugal
18 – Spain
19 – United States
20 – Australia
21 – Greece
22 – Ceylon
23 – Peru
24 – Italy
25 – Sweden
26 – Israel
27 – Finland
28 – United Arab Rep.
29 – France
30 – Austria
31 – Rep. of Korea
32 – Denmark
33 – Norway
34 – United Kingdom
35 – China (Taiwan)
36 – Switzerland
37 – Japan
38 – Germany, Fed. Rep.
39 – Belgium-Luxembourg
40 – New Zealand
41 – Netherlands

It has already brought substantial increases in crop yields in many developing countries, and is a main component of the package of improved practices needed in these countries. Their ability to respond to very high levels of fertilizer application is a principal feature of the high-yielding varieties of cereals now being introduced. Research results comparing a number of improved Indian varieties of wheat show their potential to respond to up to 100 kilograms per hectare of nitrogen (N) in combination with 40 kilograms each of phosphate (P_2O_5) and potassium (K_2O), and adequate moisture provided by three irrigations at the time of tillering, head formation and milk stage of the crop. At these rates of fertilizer application, the best variety gave a yield more than four times and the poorest about three times the national average wheat yield. At 40 kilograms per hectare of all three nutrients the yield of the best variety was still three times that of the national average.[18]

The difficulties encountered in the introduction of the new varieties have included fertilizer problems. In some areas there has been insufficient fertilizer to meet the target figures. When fertilizer application is considerably less than that recommended, either because of the reluctance of the farmer to use much heavier rates than he is accustomed to or because of short supplies, the expected yield increases will not be achieved.

There may also be problems when high-analysis fertilizers are introduced in place of the low-analysis materials formerly used. In the absence of adequate extension work, the farmer may continue to use the same quantity as before, which may result in decreased yields owing to lodging, and lower economic returns because of the additional cost of the heavier rate of nutrient application and lower yields.

It has taken many years to reach even the present low levels of fertilizer application in the developing countries. In the case of Mexico, it was only after a number of years of experimental work, the improvement of different facilities and services including extension, and the carrying out of thousands of field trials and demonstrations that fertilizer consumption began to increase in the 1950s. In 1949/50 total consumption of fertilizer nutrients was about 8,000 tons, used mostly on cash crops like sugarcane and cotton. By 1959/60 fertilizer consumption had grown nearly twentyfold to reach almost 170,000 tons of nutrients, and in 1966/67 it was about 440,000 tons.

In India localized work on testing and demonstrating fertilizers on farmers' field was begun in the late 1940s, and was extended nationally in 1953 with outside technical and financial assistance. The trials provided information on the fertilizer needs of the different soils and crops, the basic knowledge required before making recommendations for use. They also showed the importance of all three major fertilizer nutrients — nitrogen, phosphorus and potassium — under certain conditions, whereas on the basis of experimental farm results it was formerly thought that only nitrogen was needed to increase crop yields. The thousands of demonstrations showed farmers the beneficial effects of fertilizer use. At the same time improvements were being made in fertilizer extension, supply, distribution, storage and pricing. As a result fertilizer consumption increased rapidly, from about 60,000 tons of nutrients in the early 1950s to over 300,000 tons by 1959/60. With more intensified efforts fertilizer consumption nearly doubled in the next four years and doubled again in the next three to reach about 1.2 million tons of nutrients by 1966/67. Nevertheless fertilizer consumption never reached the targets of any of the five-year plans, and on a per hectare basis is still very low.

Even without other improved practices, appreciable yield increases can be obtained by traditional farmers solely through the use of fertilizers. With local or local improved varieties, the recommended level of fertilizer use per hectare is much lower than with highly fertilizer-responsive varieties. Nevertheless substantial yield increases can be obtained and the additional yield per unit of fertilizer nutrient at these low levels may be fairly comparable to that of the high-yielding varieties.

In India the results of the numerous trials made in farmers' fields showed that the average response of rice to 34 kilograms per hectare each of N and P_2O_5 was 660 kilograms per hectare, or a 52 percent increase above the national average yield of paddy. The same fertilizer dressing increased the yield of irrigated wheat by an average of about 45 percent.[19] Similar trials carried out in Pakistan between 1957 and 1962 show that in West Pakistan a combined dressing of N and P_2O_5 increased wheat and rice yields by 50 to 100 percent. In the Punjab the addition of potash gave a further increase in the yield of these crops. In East Pakistan paddy yields were increased by 62 to 92 percent when all three nutrients were used. These yield increases with local varieties resulted in economic returns of two to three times the cost of the fertilizer dressing.[20] Formerly, in Pakistan as in India, the importance of phosphate and potassium in addition to nitrogen in increasing crop yields was not recognized. In

[18] H.N. Singh. D.N. Garg and V.P. Shukla, Response of improved Indian wheat to nitrogen, *Fertilizer News*, 12(10). October 1967, p. 12.

[19] Moyle S. Williams and John W. Couston. *Crop production levels and fertilizer use*, Rome, FAO, 1962, p. 10.

[20] J.G. Vermaat, *Report to the Government of Pakistan on soil fertility investigations*, FAO/EPTA Report No. 1887. Rome, 1964.

Iran field trials with rice, wheat and cotton showed returns ranging from over two to nearly five times the cost of the fertilizer applied.[21]

The FAO Freedom from Hunger Campaign Fertilizer Program shows comparable results with the major food crops of 23 developing countries in three regions of the world. The large number of trials and demonstrations with different crops laid down in farmers' fields over the period 1961/62-1964/65 indicate that small-scale farmers using their traditional methods can raise their yields by an average of over 50 percent through the use of relatively low rates of fertilizer alone. Averaging all of the results recorded, it may be estimated that the average economic return was over four times the cost of the fertilizer applied.[22]

In the Fertilizer Program emphasis is placed on training extension staff and teaching farmers the efficient use of fertilizers. When necessary, pilot schemes for fertilizer distribution and credit are also initiated to ensure that farmers readily obtain fertilizers. Owing to the previous lack of demand or the relatively small quantities taken by traditional farmers, fertilizers are not always available in developing countries. Under these pilot schemes fertilizers are provided on credit or sold for cash, the receipts forming a revolving fund used to purchase fertilizers the following season. With the provision of additional fertilizers a scheme may be extended as experience is gained in its operation until it eventually reaches a national scale. Such schemes have helped to overcome problems of fertilizer distribution and the provision of credit to traditional farmers in a number of countries, and may also cover the supply of other inputs and the marketing of crops.

It has been found that, once farmers have been shown the effectiveness of fertilizers in raising their crop yields and incomes, they become interested in ensuring good responses by other means as well. This has led to the use of better seed and pesticides and other improved practices such as better tillage and sowing methods and higher plant populations.

Not only do fertilizers and other improved practices increase yields, they also decrease unit costs and thereby increase profits. This is shown in an economic study of maize production by a group of farmers taking part in a pilot scheme in Honduras, in which improved seed and insecticides in addition to fertilizers were provided on credit (Table III-4).

Although crop responses to fertilizers can be quite large, the question of whether or not to use them is primarily an economic one. The price relationship of the fertilizer applied and the extra yield is of crucial

TABLE III-4. – HONDURAS PILOT SCHEME: AVERAGE EFFECT OF FERTILIZERS, IMPROVED SEED AND INSECTICIDES ON MAIZE YIELDS, PRODUCTION COSTS AND RETURNS OF 46 FARMS, 1965

	Fertilizer, improved seed, insecticides		Change	
	Without	With	Amount	Percent
Yield (kg/ha)	1 740	4 550	+ 2 810	+ 161
Production costs ($/ha)	54.30	86.80	+ 32.50	+ 60
Production costs ($/100 kg)	3.12	1.90	— 1.22	— 39
Returns ($/ha)	41.40	163.21	+121.81	+ 294
Value/cost ratio [1]	1.76	2.88	+ 1.08	+ 61

SOURCE: J.W. Couston, *Importance of mineral fertilizers for food and human health in developing countries*, Paper presented to the International Potash Congress, Brussels, 17-21 October 1966.

[1] The value of the yield increase divided by the cost of the fertilizer dressing used to obtain the yield increase.

importance. A small response of a high value crop can be economic. On the other hand a large response of a low value crop may not be economic. It is food crops that generally have the lowest prices in developing countries, particularly at harvest time, but the very large fertilizer response of the new high-yielding varieties may substantially alter the relationship of costs and prices.

Considering the uncertainties and risks faced by farmers, more efficient pricing policies and marketing systems for farm products and fertilizers would help them to decide in favor of using fertilizers to increase crop production. This means that they must also be provided with information as to the kinds and amounts of fertilizer nutrients needed under local conditions for the crops they grow, particularly how much additional yield can be expected with different amounts of a particular fertilizer. Generally crop responses fall off after a certain level of fertilizer application has been reached. This is of great importance in determining the most economic amount of fertilizer to use on a crop, given both crop and fertilizer prices. Traditional farmers, who have little ready cash and lack credit, will probably be more interested in a lighter fertilizer dressing which gives the largest return on the money spent on fertilizers, rather than the heavier dressing needed to give the largest return per unit of land. This is also an important consideration for countries wanting to maximize crop production with a limited supply of fertilizers.

ALLOCATING LIMITED FERTILIZER SUPPLIES

When fertilizer supplies are unlimited, returns from their use are largest when the value of the last addition to yield just covers the cost of the extra fertilizer used to obtain the additional yield. In the hypothetical example in Table III-5 this point is reached with the use of four units of fertilizer. The use of

[21] V. Ignatieff, J.J. Doyle and J.W. Couston, *Future fertilizer requirements of developing countries and crop response to fertilizer in these countries*, The Fertilizer Society, Proceedings No. 83, London, October 1964.

[22] FAO, FFHC Fertilizer Program, *Physical and economic summary of trial and demonstration results 1961/62-1964/65*, Rome, 1967.

TABLE III-5. – HYPOTHETICAL EXAMPLE OF OPTIMUM APPLICATION OF FERTILIZER

Fertilizer applied	Total crop output	Additional yield/unit of fertilizer	Value of additional fertilizer at U.S. $17.00/unit	Value of additional crop at U.S. $0.05/kg	Gross returns	Net returns
Units/ha	..... *Kg/ha*		..... *U.S. dollars*			
1	1 030	1 030	17.00	51.50	51.50	34.50
2	1 740	710	17.00	35.50	87.00	53.00
3	2 230	490	17.00	24.50	111.50	60.50
4	2 570	340	17.00	17.00	128.50	60.50
5	2 810	240	17.00	12.00	140.50	55.50
6	2 900	90	17.00	4.50	145.00	43.00
7	2 820	— 80	17.00	— 4.00	141.00	22.00
8	2 670	— 150	17.00	— 7.50	133.50	— 2.50

more fertilizer increases total crop production but the value of the added crop is less than the cost of the added fertilizer. The seventh unit of fertilizer decreases the total yield and total revenue.

On the other hand, if fertilizer supplies are limited and land is not and government policy is to maximize crop production, instead of applying four units of fertilizer per unit of land to equate the additional cost and additional revenue and thereby maximize the economic return, one unit of fertilizer should be applied to obtain the largest additional yield per unit of land and cumulatively the largest output. In this hypothetical example, applying four units of fertilizer to four units of land, 4,120 kilograms would be produced (4 × 1,030). If the four units of fertilizer were applied to one unit of land, total production would be only 2,570 kilograms. From Table III-5 it can be seen that the first unit of fertilizer shows the largest increase in yield, and the application of extra units increases total output by decreasing amounts of additional yield. Consequently, the largest addition to yield is generally to the lightest rate of the recommended fertilizers applied to a unit of land. Doubling the rate does not usually double the yield increase. The use of lighter rates on a greater area of land not only cumulatively results in the largest output, but a larger number of farmers enjoy an increase in income. This can have a favorable effect on the rural sector, but it also implies that the various services — extension, distribution, marketing, storage, credit — have to function effectively over a very wide area.

Crop protection

Without suitable crop protection measures the increased yields obtained through the use of improved varieties, fertilizers and irrigation are in danger of being wiped out by pests and diseases. The risk is increased since the newly introduced high-yielding varieties do not always have the disease resistance of those hitherto used, and since their denser and genetically more uniform stands will provide a more favorable environment for pests and diseases. Multiple cropping also increases this hazard. In fact, as the constraints imposed by supplies of improved seed, fertilizer, and water are gradually reduced, pests and diseases may well emerge as the main factor limiting the further expansion of production.

Such losses (as also those from weeds) are difficult to measure and tend often to be overestimated. A rough indication, however, of the potential contribution of crop protection measures to increased productivity is that in the United States, a country where crop protection is highly developed, insects were estimated to cause a loss of 4 to 12 percent in the potential yield of the main cereals in 1951-60, diseases 7 to 14 percent, and weeds 10 to 17 percent.[23]

Plant breeding work to maintain a continuous supply of varieties resistant to the main pests and diseases is clearly essential. At the same time, modern methods of crop protection also assume considerable importance. These methods have evolved considerably in recent years, and have now come to rely very largely on chemical control through the use of pesticides. In developing countries, where most farmers are poor and uneducated and their holdings small and often fragmented, such methods are difficult to apply effectively.

Until about 25 years ago the principal methods of crop protection were mechanical, physical, biological, and cultural. Chemical control methods were used only as an adjunct to the other methods, primarily because of their high cost and relative inefficiency. Great emphasis was placed on the thorough study of the plant in its total environment, including the detailed study of the life history and habits of the associated pests and diseases, their natural parasites and predators and other environmental controls, with a view to discovering the points of greatest vulnerability.

However, with the introduction of the modern pesticides (insecticides, fungicides, and herbicides) in the years following the second world war, the broad spectrum of these new synthetics was so efficient in the control of pests and diseases in the developed countries that there was little incentive to exploit and further develop the classical methods of plant protection. The new and highly potent pesticides were thought by many people to be a panacea for all the problems of crop protection. Their wide effectiveness, their long persistence in the environ-

[23] United States, Department of Agriculture, Agricultural Research Service. *Losses in agriculture*, Agriculture Handbook No. 291. Washington, D.C., 1965, p. 5, 41, 56.

ment, their relatively low cost, and their low order of acute toxicity to higher animals all contributed to this attitude. However, their indiscriminate use soon produced undesirable effects and resulted in the development of a high level of resistance to pesticides in those areas where they had been most extensively used. Under these conditions, the research and development programs of the pesticide industry and of national governments were rapidly expanded in a search for satisfactory substitutes, still using as basic criteria the broad spectrum of effectiveness, stability, cost and low order of mammalian toxicity of DDT, the original compound in this group. Those which have been developed in the intervening years are in general less widely effective and of higher cost, although some have been discovered which are of a lower order of mammalian toxicity and even more persistent than DDT.

In more recent years the persistence of these types of pesticides has in some instances been found to be a disadvantage in that they produce undesirable residues in food for human and animal consumption, and in some cases find their way into food chains and are concentrated by certain organisms such as shellfish.

The great majority of the more recently discovered compounds are also of a higher order of toxicity to humans, and have resulted in many cases of poisoning when they have been improperly transported or used. In practically all instances the newer compounds are more costly. They also often require highly sophisticated equipment and close supervision for their safe and efficient application. Where some of the older chemicals, such as the arsenicals, were applied in kilograms per hectare, the more modern insecticides are so effective that they can be applied in grams per hectare. The technical difficulties in applying very small amounts of highly active materials to very large areas have only partially been solved, as, for example, by the development of low volume spraying techniques. The farmer in the developing countries is placed at an additional disadvantage because the necessary application equipment is costly and difficult to maintain in the absence of adequately trained maintenance personnel.

Thus the use of pesticides in the developing countries has generally so far been restricted to large land holdings, which are often devoted mainly to export crops. Undoubtedly it will take some time before small farmers in these countries can be supplied with the technical knowledge and the credit required for the utilization of these compounds and equipment on cereals and other locally consumed food crops. Consideration should accordingly also be given to the application of less sophisticated plant protection measures.

The undesirable effects stemming from the indiscriminate and widespread use of pesticides have also led to the development of an integrated approach in pest control, emphasizing the combined use of chemicals and biological agents together with other compatible methods, in order to reduce the use of toxic chemicals and to achieve more economic and lasting results. The need to consider the ecological systems as a whole is also emphasized.

One effective step which the government of a developing country could take would be to introduce legislation for strict plant quarantine. This would greatly reduce the potential hazard of introducing exotic pests and diseases which would seriously jeopardize production. The establishment of such a program would require relatively few technically trained specialists.

Detailed studies of crops and their associated pests and diseases should be carried out in order to devise simple cultural techniques which could be introduced for use by small farmers. Since such methods are usually preventive and employed well before damage becomes apparent, it is not easy to convince farmers of the need to use them. They are often, however, the cheapest of all control measures, being merely variations in the timing or manner of performing operations which are necessary in crop production. Such techniques are of particular importance with crops having a large acreage and low unit value.

Crop rotation and fallowing are basic examples of such cultural control methods. Various methods of soil cultivation can also affect certain insect pests. Of even more importance are variations in the time of planting and harvesting, the classical example being the control of the Hessian fly in wheat. Planting after the fly-free planting date has been found to decrease infestation by 90 percent and to raise yields by as much as 20 percent.

There is also scope for the establishment by governments, private firms, or cooperatives of pesticide application services. Such services are particularly important where highly toxic compounds have to be used, since they make it easier to ensure that the necessary safety precautions are taken.

Governments can assist farmers to adopt modern methods of crop protection by the organization of training courses and the provision of subsidies on chemicals and equipment. (An outstandingly successful example of this approach was the campaign conducted in Ghana in the late 1950s to control capsid infestation of cocoa.) Governments will also need to maintain buffer stocks of pesticides in order to meet emergency requirements.

The economics of crop protection require further study, especially in the conditions prevailing in developing countries. It is generally assumed that

costs of crop protection are greatly outweighed by benefits in terms of increased monetary yield. While this is undoubtedly true of total pesticide use at the national level, and also at the farm level for the higher value crops and the cheaper pesticides, there are many other cases that require careful economic investigation before farmers are advised to purchase expensive chemicals and equipment. Estimates of their effect on yields must cover the quality as well as the quantity of the crop.

Machinery and implements

Efforts to intensify agricultural production frequently require the introduction of improved farm equipment as well as an increase in the total availability and utilization of energy or power per hectare. Some changes in land use, such as the replacement of forest fallow by settled agriculture, or the introduction of multiple cropping, can take place only if accompanied by new tools and additional power. Under forest fallow, for example, where the land is generally cleared by burning and land preparation is rudimentary, only the simplest tools are used. In settled agriculture plows, weeders, inter-row cultivators, and similar equipment are needed. The agricultural implements required are thus closely related to the system and intensity of land use.

While the type of agricultural tool is usually well adapted to the prevailing system of land use, in many developing countries these implements are still made of poor material, crude in design and inefficient. Their replacement by improved tools would enable a greater volume of work to be accomplished with less effort. For example, improved hand hoes have been developed in Japan and India which considerably reduce the time required for inter-row cultivation, and increase yields through better weeding.

There is also considerable scope for the introduction of improved or new types of animal-drawn equipment. Improved yokes can increase the daily power output of oxen. Improved plows do a superior job of primary tillage and seedbed preparation in a shorter time than wooden ones; however, the plow must be light enough for the farmer to carry it into the field. For many crops the accurate sowing or planting of seed at regular depths and spacing has a significant effect on yield. Planting at the correct depth is particularly important with the new dwarf varieties of cereals. In India seed drills incorporating an attachment for fertilizer placement have been shown to increase yields by 12 to 40 percent, and to require 30 to 40 percent less time than broadcast seeding.[24]

[24] India. National Productivity Council, *Survey of agricultural machinery and implements*. New Delhi, 1967. p. 51.

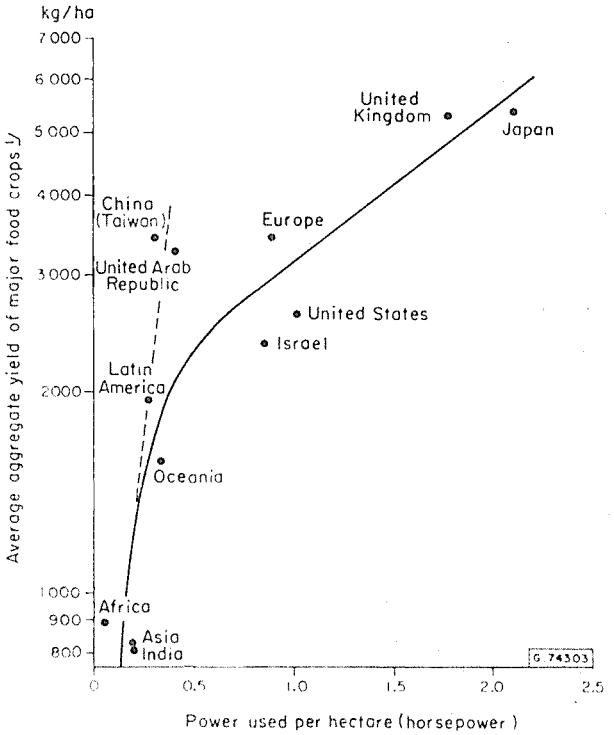
In Chad a seed drill for groundnuts has been developed "which has permitted denser planting and, above all, more rapid planting at a time when there tended to be a labor bottleneck due to the coincidence of millet weeding and groundnut sowing." [25]

For widespread acceptance by farmers in developing countries, improved implements should have certain essential characteristics. They should be simple to use, sturdy, inexpensive, capable of being repaired locally, and be significantly more useful and efficient than the existing implements. In most instances it is feasible to manufacture such improved farm tools in the developing countries themselves since investment costs are low, the techniques of manufacture are simple, and economies of scale are not pronounced. There is, however, considerable need for more research to improve existing implements, and to modify and adapt to the soil conditions and cropping pattern of a particular country implements which have been developed elsewhere.

The intensification of agricultural production is in general associated with an increase in the utilization of power. Figure III-6 shows the magnitude of the

[25] John C. de Wilde *et al.*, *Experiences with agricultural development in tropical Africa*. Baltimore. Johns Hopkins Press. 1967. Vol. 2, p. 363.

FIGURE III-6. – POWER USED PER HECTARE IN RELATION TO YIELDS OF MAJOR FOOD CROPS PER HECTARE
(Semilogarithmic scale)

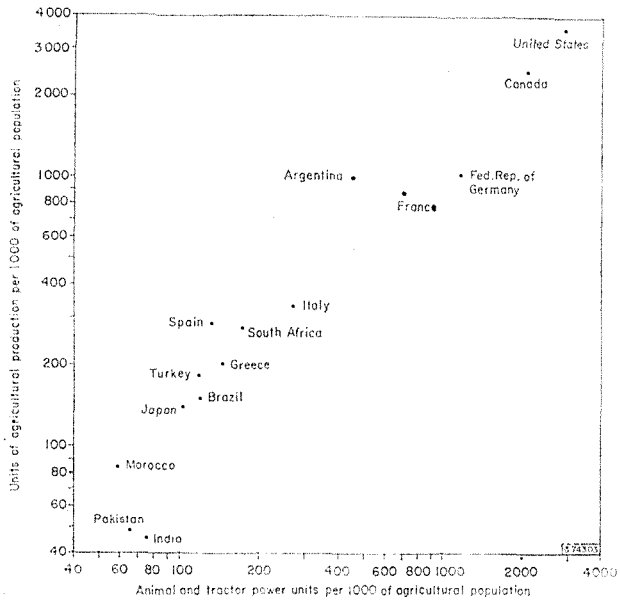


SOURCE: *The world food problem. a report of the President's Scientific Advisory Committee: Report of the Panel on the World Food Supply*. Washington. D.C.. 1967. Vol. II. p. 398.

[1] Cereals. pulses. oilseeds. sugar (raw). potatoes. cassava. onions. tomatoes.

FIGURE III-7. – ANIMAL AND TRACTOR POWER [1] IN RELATION TO LABOR PRODUCTIVITY [2]

(Logarithmic scale)



[1] Traetor power expressed as animal horsepower divided by five: animal power converted to horsepower equivalents. – [2] Price-weighted volume of agricultural production per person of agricultural population.

power input (animal, tractor, and human power) in a number of regions and countries in relation to crop yields per hectare. A direct relationship between power input and yields is clearly visible. Even more marked is the association between the animal and tractor power utilized per hectare and the productivity of labor (Figure III-7). Rising levels of labor productivity in agriculture are associated with higher inputs of power. The need for additional power should be recognized and adequate provision made for it in programs of agricultural intensification.

ANIMAL DRAFT POWER

Table III-6 shows the estimates of animal and tractor power on which Figure III-7 is based. These indicate that in the developing countries the major portion of the power input, apart from human labor, is met by animals. The continuing demographic pressure in these countries, the small and fragmented holdings in many of them, the extreme poverty, and the absence of mechanical experience and technical skills all contribute to maintain the importance of animals and restrict for some time to come the level of power mechanization.

Animal traction is particularly advantageous to developing countries in providing the additional power required for two reasons. First, the cost of the animals and associated implements is not completely beyond the financial capacity of most farmers.[26] Second, they cost little in terms of foreign exchange: draft animals are available locally and many of the implements used by animals could also be manufactured locally, unlike most tractor implements. On the other hand, a disadvantage is the limited draft power of animals. Unless soils are light, animals cannot be used to plow land in advance of the rains. This difficulty is aggravated because animals are faced with their heaviest tasks at the beginning of the rainy season when their strength is lowest owing to the inadequacy of grazing available during the preceding dry season. Thus, especially if the rainy season is of limited duration, it may not be possible to complete effectively the various agricultural operations solely by animal power.

POWER MECHANIZATION

Where the cultivated area is to be extended, power mechanization by the use of tractors is often the only effective means of clearing the land, leveling it, and preparing it for cultivation. This applies par-

[26] These costs, however, are far from negligible. It has been estimated in India that a set of improved animal draft implements costs U.S.$400, compared with only $13 for a set of traditional hand tools (India, National Productivity Council, *op. cit.*).

TABLE III-6. – ANIMAL AND TRACTOR POWER USED IN AGRICULTURE, IN SELECTED REGIONS AND COUNTRIES [1]

	Animal power	Tractor power	Total animal and tractor power	Animal and tractor power per 1 000 of agricultural population	Tractor power as percentage of total non-human power
	Thousand power units [2]			*Power units* [2]	*Percent*
REGIONS					
Africa	3 266	700	3 966	21	18
Far East [3]	30 544	440	30 984	53	14
Near East	5 176	680	5 856	64	13
Latin America	10 494	3 568	14 062	133	34
COUNTRIES					
Morocco	360	159	419	59	31
India	24 136	186	24 322	76	1
Japan	312	2 286	2 598	104	88
Turkey	2 308	300	2 608	118	12
Brazil	4 060	508	4 568	121	11
Spain	836	811	1 647	134	49
Greece	457	210	667	146	32
South Africa	37	834	871	174	96
Italy	1 248	2 427	3 675	271	66
Argentina	1 046	885	1 931	452	46
France	1 406	4 495	5 901	705	76
Germany, Fed. Rep. of	589	5 384	5 973	1 165	90
Canada	—	3 848	3 848	2 069	100
United States	44	33 113	33 157	2 864	100

[1] Arranged in ascending order of animal and tractor power per unit of agricultural population. – [2] Tractor power expressed as mechanical horsepower divided by five; animal power converted to horse equivalents. – [3] Excluding China (Mainland).

ticularly to rain forest areas, which are often highly fertile and well suited for agricultural production. In certain areas where new land is being brought under cultivation for the first time, there may be temporary labor shortages until the land is settled: in such cases power mechanization is essential.

Tractors also make it possible to obtain higher yields through improved soil and seedbed preparation and timely planting. Deep plowing, chisel plowing, subsoiling, and rotovating require considerable power that is usually beyond the capacity of hand or animal-drawn equipment. Furthermore, these operations can be performed by tractors at high speed, which is of critical importance in areas where yields depend on limited and uncertain rainfall. In such areas, timely planting is of great importance in obtaining maximum yields. Tractors are also of considerable assistance in minimizing the adverse effects on production and yield caused by unfavorable natural conditions — as, for example, in northern countries like the Republic of Korea where frost and snow can delay the start of land preparation. In such areas there may be a restricted growing season between the late spring frosts and the advent of autumn frosts. On the other hand, dry areas may have to wait for the first rains so that plowing can commence.

These and other advantages of mechanization — such as better soil and water conservation, through bunding and terracing and the ability to mulch and plow in green manures effectively — together with the opportunity they provide to reduce the drudgery of heavy hand labor, have led to a fairly rapid expansion in tractor numbers in developing countries. The available statistics, admittedly incomplete and fragmentary, show that in 1966 there were about a million four-wheel tractors in the developing countries as a whole, and that their numbers have recently been increasing at around 5 to 7 percent per year.

Countries where tractor numbers are increasing rapidly include some (for example, in the Far East) characterized by severe demographic pressure, rural underemployment and a preponderance of small holdings, all of which would appear to limit the need and scope for mechanization. Even under conditions of rural underemployment, mechanization may be found necessary, particularly to help overcome the labor bottleneck at peak periods such as planting or harvesting. This applies especially with multiple cropping, since it is necessary to get one crop off quickly in order to get the next one into the ground. The elimination of this labor bottleneck through mechanization permits an expansion in the total cultivated area and higher productivity both per hectare and per man.

Two other factors are of relevance in conditions of demographic pressure. First, by replacing draft animals power mechanization frees land for food crops which would otherwise be needed for feeding animals. In China (Taiwan), which is quite intensively mechanized, it has been estimated that, without mechanization, at least 80,000 hectares of land would have to be used to grow feed for the additional 100,000 head of draft animals which would be needed to till thoroughly the entire 870,000 hectares of cultivated land.[27]

Second, under conditions of rural underemployment the introduction of multiple cropping as a result of mechanization raises the demand for labor for such tasks as weeding, harrowing, or processing. With tractors new labor-intensive crops may, in addition, be introduced into the farming system. In China (Taiwan), where the shortage of land is particularly acute, mechanization on small farms has promoted multiple cropping and diversification into enterprises such as pig and poultry farming, bringing not only an increase in output but also a fuller and more effective utilization of labor resources over the entire agricultural season.[28]

Prerequisites for power mechanization

At the same time it should be recognized that there are a number of difficulties which must not be underestimated in introducing tractors into developing countries. The small size of holdings, small and scattered fields, and the limited financial resources of most farmers tend to make uneconomic the individual ownership and operation of a tractor. For animal draft mechanization the minimum size of farm may be estimated as 2 hectares for an intensive irrigated holding and 4 to 6 hectares for a dryland savanna farm; for a 40 horsepower tractor the corresponding figures would be 15 to 25 and 40 to 100 hectares.

The high initial fixed costs involved in the operation of a tractor make its fullest utilization necessary, with an economic minimum of 600 to 800 hours per year. It would be difficult to achieve such a rate of utilization on an individual farm unless multiple cropping is practiced with a wide variety of crops having differing labor peaks.

One way to overcome these difficulties is through the multifarm use of draft animals, tractors and equipment owned cooperatively, by private contractors or by the government, and hired out to individual farmers.[29] With cooperative ownership there is the risk that the equipment will be poorly maintained. Private contracting services have developed suc-

[27] S.C. Hsieh, Experience in the use of power tillers in Taiwan, *Coffee and Cacao Journal*, 6 (12), 1964, p. 274.
[28] C. Fengchow, *Mechanization of small farms in Taiwan*, United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas, Doc. No. MaE/Conf. 39/C 238, October 1962.
[29] FAO, *Multifarm use of agricultural machinery*, FAO Agricultural Development Paper No. 85, Rome, 1967.

cessfully in a number of countries, including Argentina, Ceylon, Chile, Kenya, Malaysia, the Sudan and Thailand. These contractors, frequently farmers themselves, undertake to carry out specific operations at set rates. The growth of such services would suggest that there is a demand for them among farmers and that they are profitable to the contractors.

In a number of countries similar contracting services have been set up by the government, but virtually all of them have failed to cover costs and have had to be abandoned or continuously subsidized. A budgetary loss may represent either a conscious decision to subsidize such a venture owing to its favorable repercussions on agricultural production and the economy as a whole, or a failure to assess accurately the real costs of the scheme. In Sierra Leone, for example, where a government contracting service carries out plowing and harrowing in swamp and riverine areas, fees in 1967 amounted to only 30 percent of costs. But it has also been estimated that the absence of this service would have necessitated additional imports of rice amounting in value to 500,000 leones (U.S.$ 689,000), while the loss (subsidy) amounted to 300,000 leones (U.S.$ 413,000) of which only a part would be a charge on the country's scarce foreign exchange.[30]

Another way to limit the obstacles to mechanization in the developing countries would be through the introduction of tractors and implements better adapted to the small size of holdings, the limited financial resources of farmers, and other conditions in these countries. Many failures of mechanization projects have been due to the unsuitability of equipment designed for use in European or North American conditions and transferred without modification to tropical and subtropical areas.

More attention might be paid to the single-axle tractor, also known as the power tiller, which is particularly suited for work on soft, friable soils and rice fields. These units are relatively cheap, easily maneuverable, and versatile, and thus more suitable for small holdings than the larger tractors. No comprehensive figures on the number of such power tillers are available. In Japan their number expanded from approximately 510,000 in 1960 to over 2 million in 1965, and in China (Taiwan) from fewer than 500 in 1958 to more than 12,000 in 1965. Efforts are being made to popularize them in some other countries of the Far East, including India, the Republic of Korea, and Pakistan.

The introduction of mechanized equipment significantly raises a farmer's cash costs, and a substantial increase in his gross income is generally required to cover them. Mechanization therefore makes it necessary sooner or later to intensify production and substantially raise both output and yield. This is one reason why mechanization has been more successful with irrigation schemes, because irrigation makes possible a high output per unit of area through double or even triple cropping and the introduction of high-value crops. Since intensification usually involves the use of other requisites, such as improved seeds, fertilizer and pesticides, it is necessary that farmers realize that profitable mechanization is not likely to reduce the labor requirement but rather to increase it, as well as involving a fundamental change in their entire agricultural operations.

Essential for a successful mechanization program is an efficient and geographically well-distributed spare parts and maintenance service.[31] It is difficult to give efficient service at low cost unless equipment is concentrated in a relatively small area, and it becomes even more difficult if there are several different makes involved. It would seem necessary therefore that governments should favor the import of equipment for which there exist service and spare parts facilities. When mechanization is being introduced into a new area, it is particularly important that a diversity of new makes and models should be discouraged, though without prejudicing the import of new advanced equipment. Local service stations should be backed by a central organization, provided by a well-established dealer. Governments should permit the import of spare parts, keep import duties as low as possible and provide any other measures of fiscal relief needed. For animal draft equipment and also for the simpler repairs to tractor implements, the aim should be to set up local artisan workshops, blacksmiths, welders and carpenters at village level.

There should also be facilities for training potential users in the operation and simple maintenance of farm machinery and equipment. Most developing countries have not had long experience of mechanization, and experienced tractor drivers and mechanics are in short supply. Training may often best be carried out by commercial distributors of farm machinery once there is a sufficient volume of sales, although in the interim period courses may have to be organized by the government with the assistance of the distributors.

Because of the high capital costs of mechanization, credit facilities are especially important, not only for individual farmers, but also for cooperatives and private contractors.

It is not possible to determine on the basis of past experience precisely under what conditions mechanization would succeed. There are too many

[30] *Mechanical ploughing of rice fields in Sierra Leone*, Final Report (provisional issue) prepared for FAO by the Consortium for the Development of Agriculture, Freetown, 1967, Vol. I, C 8.

[31] FAO, *Agricultural machinery workshops: design, equipment and management*, FAO Agricultural Development Paper No. 66, Rome, 1960.

factors involved. What is indisputable, however, is that power requirements for intensifying agricultural production will continue to rise and that, as intensification proceeds and the economy as a whole develops, an increasing proportion of this power will in most cases have to be provided by tractors. The tractors and much of the associated equipment now available have been developed to suit the conditions of the developed regions, and insufficient attention has sometimes been paid to evolving types of farm equipment specifically adapted to the needs of the developing countries. More technical and economic research on mechanization is required. This would provide guidance to developing countries as to the most appropriate forms of mechanization and thus help to avoid the costly mistakes which many of them have made in the postwar period. It is particularly important because of the large foreign exchange content of expenditures on mechanization in most developing countries, not only for the tractors and implements themselves, but also for fuel.

Livestock

Even in developed countries the efficiency of livestock production still appears to be well below its potential level. As disease control improves, and the steadily accumulating discoveries in nutrition, breeding and management are applied, substantial increases in productivity become possible. The main lines of advance are the widespread use of complete rations to improve conversion rates, the genetic selection of efficient feed converters in all classes of livestock, and improved prophylaxis in livestock disease.

Livestock production in the developing countries is among the world's most inefficient industries. Better nutrition, management, breeding and disease control, better crop rotations, the prevention of soil erosion, and the integration of animal and plant agriculture leading to improved soil fertility are required to bring the industry out of its present widespread state of inefficiency.

Milk production needs to be greatly increased in most developing countries. The wide variations in milk yields in different countries are apparent from Annex table 17, ranging from almost 4,900 kilograms per year in Israel in 1964-66 to little more than 100 kilograms in Togo. In many areas milk is still only a negligible source of protein, though there are production patterns in Africa and elsewhere which have shown the increases obtainable over relatively brief periods when milk cattle breeding and husbandry are allied to improvements in the handling, processing and marketing of milk and milk products, and where guaranteed outlets provide the necessary incentive for the producer. There must be effective coordination, from the early stages of any project for increased milk production, between processing and marketing and the expansion of supplies.

Some of the less traditional animals and birds are worthy of much closer attention than they have so far received: among these are goats, water buffalo, rabbits, hares, ducks, geese, guinea fowl and quail. The water buffalo, of which there are probably at least 110 million in the world, well deserves the increased attention which it is now receiving because of its potential as a producer of milk and meat. The swamp buffalo and various other buffalo breeds and crossbreeds are highly important draft animals throughout most of Asia. The trend to mechanization, however gradual, will result in more emphasis being given to meat production from this species.

Animal breeding

More attention should be paid to the production of the best animals for specific areas. Increased research on genetic improvement and greater attention to the conservation and use of neglected genetic resources can lead, for example, to the breeding of animals better adapted to harsh environments. In this connection, a high disease resistance factor may be a feasible objective which could lead to many more animals being reared in areas where only minimal numbers can be maintained at present. A better approach, however, lies in changing the environment to ensure better feeding and the control of parasites.

For the increased production of both meat and milk, detailed work on genetic reserves is essential. In the developed countries it is only recently that the qualities of certain improved breeds have come to be appreciated. Zebu breeding material in the Indian subcontinent and parts of Africa and America, and Criollo stocks in Latin America have attracted only limited attention as yet, although they appear to have considerable potential.

Feeding and management

The field of livestock nutrition offers opportunities for productive research in most countries: in many it is a neglected subject. The identification of mineral and other deficiencies alone can make a material contribution to animal productivity.

The proteins from various "unconventional" sources [32] at present being investigated for human consumption appear likely, at least initially, to have

[32] For example, oilseed residues, fish protein concentrate, green leaves, algae, synthetic amino acids, and single-cell protein derived from the culturing of yeast or bacteria on such hydrocarbon mediums as petroleum or natural gas.

TABLE III-7. – RELATIONSHIP BETWEEN BEEF AND FEED GRAIN PRICES, 1964-65 AVERAGE

	Beef [1,2]	Feed grain [1]		Ratio
	..... *U.S.$ per 100 kg*			
United Kingdom	81.4	Sorghum	5.6	14.5
Syrian Arab Republic	63.9	Barley	5.0	12.8
United States	[3]54.3	Sorghum	4.5	12.1
South Africa	52.4	Maize	4.6	11.6
Argentina	[3, 4]30.0	Barley	[4]2.7	11.1
Yugoslavia	[3, 5]59.5	Maize	[5]5.9	10.1
Australia	51.1	Barley	5.6	9.1
Iraq	81.2	Wheat	8.9	9.1
Kenya	[4]42.9	Maize	[4]4.7	9.1
France	[3]64.0	Oats	7.8	8.2
Tanzania	32.2	Sorghum	4.9	6.6
Pakistan	46.3	Sorghum	7.2	6.4
Germany, Fed. Rep. of	[3]62.1	Oats	10.5	5.9
Chile	44.9	Oats	8.1	5.5
Sudan	24.9	Maize	4.7	5.3
India	28.4	Sorghum	9.5	3.0

NOTE: Where price data are available for several feed grains, the cheapest has been selected.

[1] Wholesale price. – [2] Slaughtered weight. – [3] Live weight. – [4] Producer price. – [5] Supported price.

their most valuable application in the form of livestock feeds. The undiscriminating animal can utilize such material more completely and without the physiological or psychological rejection which may characterize the reaction of the human subject.

An important factor in livestock production is the relation between prices for livestock products and for grain and other feedstuffs. In many developing countries relative prices for grains and livestock products virtually preclude the feeding of grain to livestock (Table III-7).

The new high-yielding varieties of cereals, however, offer the possibility of a change in this situation, for their lower unit costs of production should permit prices to be sufficiently lowered for them to be profitably fed to livestock. The improvement of the livestock base should therefore be given high priority in countries where these varieties are being introduced, in anticipation of the availability of cheaper supplies of feedstuffs.

The bulk of the feed for domestic ruminants is derived, however, from natural grazing lands. Cattle and sheep reared under range conditions, including nomadic systems of livestock production, are the means by which vast areas of rough grazing land unsuitable for crop production can provide a protein harvest. Improved range management practices are therefore almost a universal requirement. The traditional grazing pattern is unaltered over vast areas of the world, and little has yet been done to apply existing knowledge in such fields as the control of grazing and stocking rates, supplemental pastures, forage conservation, the use of feed supplements, or the finishing of young range animals in ecologically better suited areas, on cultivated pastures or in feedlots.

Intensive systems of management

The problem of increasing livestock productivity in the developing countries is very largely a question of improving the productivity of the few animals and poultry owned by the typical small farmer. In the shorter run, however, because of the difficulties involved in livestock production in traditional agriculture, it is essential to foster the trend toward large-scale production and intensive "factory" systems of livestock production that is already occurring in a number of developing countries.

Pigs and poultry are among the most efficient converters of feed into food. They mature early and breed rapidly. Owing to their small demands upon available space, they lend themselves admirably to intensive systems of production. These advantages add up to the rapid and efficient production of high quality protein through efficient conversion. They outweigh the fact that pigs and poultry compete more directly than other animals for foods that can be used by man, which in any case make up only about a third of the total feed intake.

Under the intensive system of broiler and battery egg production, chickens eat scientifically controlled foods, carefully supplemented with amino acids. There is little place in the modern world for the barnyard fowl with its limited production of eggs. The battery fowl can yield more than 250 eggs in a year. The conversion rate of feed to food is remarkable, and this is now being emulated by pigs and by milk and meat cattle.

It is now widely recognized that pigs and poultry, which multiply rapidly and whose feed can be cheaply supplemented by the use of kitchen waste materials and similar garbage (heat-treated to obviate the risk of disease transfer), can produce large supplies of protein in a very short time when reared under adequate systems of intensification. Similar systems are applicable to cattle, buffalo and, with appropriate variations, to sheep and goats. The applicability of intensive systems of production to the developing countries has already been demonstrated in some areas, notably in the Far East with pigs and poultry. If the necessary technical skills can be made available, such systems may revolutionize animal production in many areas.

Factory systems of livestock production are a result of the diminishing area of agricultural land in relation to the increasing human population. They would appear to be especially applicable in such densely populated areas as Hong Kong, Singapore, and East Pakistan.

Unfortunately, these systems are peculiarly susceptible to disease, because of the artificially high density of population. Respiratory disease, salmonellosis and various types of gastroenteritis are especially prevalent. However, with so many aspects of housing and management completely under control (ventilation, light, temperature, humidity, handling, feed, and water) and with the technical weapons now at hand, prophylaxis may eventually become absolute.

Animal health

Livestock disease is one of the major factors affecting agricultural productivity. The losses caused by disease are not always apparent. Infertility, abortions, subsequent sterility and perinatal deaths make a substantial contribution to reduced production, even in the advanced countries. It has been estimated that in the United States disease losses in cattle and pigs alone take an average annual toll of $1,150 million.[33] It is not possible to estimate the vast losses in developing countries with any degree of accuracy.

Probably the greatest disease losses are caused by parasitism. This results in loss of condition, wasting, slow maturing, wasted feed and labor, abortions, early mortality. These are not always recognized, especially as they are usually unspectacular and are accepted as the norm in many countries.

Other diseases cause spectacular losses and tend to come in cycles. Foot-and-mouth disease, rinderpest, bluetongue, contagious bovine and caprine pleuropneumonia, hog cholera, African swine fever, African horse sickness, fowl plague, Newcastle disease, East Coast fever, trypanosomiasis are among the most serious examples. There is also a long list of emerging diseases — those which are increasing in incidence and in economic importance.

Veterinary science has made great strides in recent years, and it is now possible to control most of the diseases and parasitisms that are of the greatest economic importance. Competence has advanced to a stage at which, given the necessary logistical support, knowledge can be applied to reducing them with reasonable rapidity to negligible incidence.

New techniques, for example the use of tissue culture mediums in vaccine production, have made possible the rapid bulk production of better and cheaper vaccines for a wide variety of conditions. The contribution made by the pharmaceutical and related industries to the research and subsequent development of a wide range of drugs, medicaments and biologics in current use has been outstanding. Most of such work has been conducted in the technically advanced countries but the results are of universal application. There are indications that industry is now preparing to establish large-scale research and production units in some developing countries.

In the field of helminthology much research continues to be made into the practicability of producing a range of vaccines which will be effective against many of the most costly parasitisms. Ionizing radiation techniques have already shown some success. The discovery of vulnerable stages in the life cycles of many parasites can lead to the successful application of many of the new drugs.

Further development of more potent vaccines of all types will be assisted by current advances in culture techniques. In recent years there has been a trend toward the production of combined or polyvalent vaccines which provide effective protection against three or more diseases with one inoculation. These have scored some notable successes, especially in certain diseases of sheep.

The cattle population of the African region, which totals about 120 million, could be much larger were it not for the limitations imposed by disease. One of these is trypanosomiasis whose vector, the tsetse fly, at present virtually excludes livestock production from an area of some 12 million square kilometers. This is one of the few sizable and potentially productive areas of virgin land left in the world. Research, which has been continuous over a century and more, is at last beginning to offer some grounds for optimism. The lines of investigation have covered a wide front: new and more effective pesticides; herbicides to reduce the scrub cover in which the fly breeds; vaccines and drugs which create resistance; the so-called sterile male technique of reducing the fly population; and a variety of other approaches.

Prospects for controlling and reducing the incidence of most livestock diseases are good, but the successful outcome of all control measures depends on much more than the provision of efficacious drugs and biologics. The need for skilled manpower and appropriate government action in developing countries is nowhere more evident than in the wide field of disease control. In most of the developing world, veterinary services are undermanned, poorly equipped, and are working with inadequate legislative support. It is necessary to improve quarantine services and to apply new techniques in quarantine methods. Quarantine measures constitute the first line of disease defense. They face a steadily growing challenge in the speed of modern travel and the increase of international trade in livestock and livestock products. That animal diseases can circumvent control can be seen from the increasing number of African diseases which are spreading within that continent and are appearing to a significant extent

[33] United States, Department of Agriculture, Agricultural Research Service, *op. cit.*, 1965, p. 73-74.

in others. For the immediate future, the most serious attention must be given by all countries to matters of quarantine if national and international disease control measures are to be successful.

Where no inspection of meat by trained inspectors is carried out (and the absence of inspection is common in developing countries) there can be no collection and analysis of disease data. Information of this type is becoming increasingly important as the value of disease surveys to control programs is realized. All slaughterhouses of whatever size should keep daily records of the material which is condemned. From this information comes a wealth of knowledge about the disease situation in the area served by the slaughterhouse. Much of that disease is preventable, and it is for the field veterinary services to trace the cattle in question back to their origin as an essential step in the livestock disease control program.

Organizational and institutional requirements

Some of the organizational and institutional problems involved in raising agricultural productivity in developing countries were briefly mentioned in the introductory part of this study. Reference to a number of them has also been made in reviewing the different technological fields. The main requirements in respect of research, extension and training, seed production, input supply services, finance and credit, and incentives for farmers are discussed in more detail below.

First, however, it is necessary to refer briefly to the changes in the organization and management of individual farms that are needed for the profitable use of modern technology. Substantial changes may be expected in the combination of different crop and livestock enterprises that will maximize the farmer's income. The determination of the optimum combination involves the consideration, in the light of the technological possibilities, of such factors as the location and natural characteristics of the land, the size of farm, the managerial skill of the operator, the skill and availability of labor, the availability of capital, the costs of the inputs, and the prices and market outlets for the alternative possible outputs.

Prevailing relationships may be substantially affected by the introduction of an innovation. As has already been indicated, the use of the high-yielding varieties of cereals necessitates the use of fertilizers and pesticides, careful water management and a move to an altogether higher level of farming efficiency. There may also be other consequences, such as the need to use a seed drill to ensure the correct planting depth. The introduction of multiple cropping may have even more profound effects, including a complete change in the labor requirement throughout the year. An example of the kind of effect that is sometimes overlooked is that drying equipment may be needed if one of the crops matures during the monsoon.

The high-yielding varieties of cereals can completely transform the relative profitability of cereal and noncereal crops. Their low unit costs of production may also make it profitable to feed them to livestock. They are bound therefore to have substantial effects on the most suitable cropping patterns in many areas, though it will be some time before price relations settle down sufficiently for any very definite conclusions to be reached.

In many developing countries the prevailing system of land tenure is a major obstacle to raising agricultural productivity through the introduction of technological improvements. This is particularly the case where holdings are small and fragmented. Land consolidation and redistribution can mitigate these problems but can do little where the small average size of farm reflects heavy population pressure on the land.

Some governments therefore favor other land tenure systems than small, individually operated private units. Large increases in productivity are, however, possible within a framework of small farms, as is indicated for example by the rice yields obtained in China (Taiwan) and Japan. Where land ownership remains in individual hands, much can be done by carrying out various operations, such as pesticide spraying, in common, or by the joint ownership of tractors and other machinery. Privately owned land can be pooled for the purpose of rotations, as in the United Arab Republic.

Another way in which unsatisfactory systems of land tenure may impede technological improvement is through their effect on producers' incentives. This aspect is discussed later.

Effective organizations of farmers also have a major role to play in technological improvement. Cooperative and related systems of land tenure are being tried in some countries. Irrigation associations and cultivation committees have proved effective in the introduction of certain improvements. Farmers' cooperatives or other associations can help to meet many of the problems of input supply, credit, marketing, and storage discussed below.

Research

There is no need to emphasize the role of research in any program of technological improvement. In most developing countries it is necessary to intensify applied research, concentrating on the immediate problems facing agricultural production. Fundamental research may in many cases be introduced from abroad, but applied and developmental research must be conducted in the ecological, economic and social context of the country itself. For example, the pooling of the knowledge gained of the high-yielding varieties developed at research centers in Mexico, the Philippines and elsewhere can save much time for the research services in many other developing countries. It does not, however, remove the need for the research services in these countries to select the most suitable varieties for local conditions, to keep up with the problems that emerge, especially in respect of diseases and quality considerations, and generally to maintain a continuous flow of good genetic material.

Far too much emphasis is placed on research not directly related to development work. Agricultural research in developing countries should aim to serve agricultural development rather than agricultural science.

In most developing countries the percentage of research results applied on the farm is extremely small, one of the reasons being the common failure to recognize the organizational, administrative, institutional, social, and economic barriers to application. Even where a comprehensive national research institution exists, it is often so isolated from the field services that serious problems are faced in transmitting the results of research and ensuring that they can be put to practical use. Research must be integrated into the overall administrative structure for the promotion of agricultural development.

Each country should establish a national agricultural research program with clearly defined priorities based both on the immediate problems of farmers and on long-term requirements for agricultural development. Within the framework of these priorities, however, sufficient flexibility must be maintained to meet changing needs.

The organization of agricultural research should be centralized, and adequately equipped, staffed and financed multidisciplinary institutions and stations should be established in the different ecological zones. The dispersal of responsibility for research among a number of government departments and autonomous agencies not only introduces problems of coordination but also accentuates the difficulty of ensuring adequate staffing and finance. The aim of any research organization should be to ensure that the main problems of agricultural development are identified and defined, and then resolved as quickly and cheaply as possible. It is also necessary to secure continuity in research programs, without frequent changes in personnel or in budgetary allocations.

Adaptive research in particular must be undertaken on a multidisciplinary basis, taking into account all physical, economic, and social factors which determine the success or failure of application at the farm level. For this type of research requires results adapted not only to physical environmental conditions but also to economic and social conditions. More emphasis should be placed on economic and social research to develop new ways of adapting and adjusting rural communities to technological progress.

Widespread trials to determine suitable fertilizer application under varying conditions are generally insufficiently combined with work on other aspects, such as soil preparation, optimum planting dates, and weed control. Many more trials are needed to cover the great heterogeneity of ecological conditions and to allow for the adequate testing of different combinations of inputs and practices under actual farming conditions, before they are disseminated through the extension service.

Research has not been sufficiently based on an understanding of existing methods of agriculture, of the constraints to which farmers are subject, or the types of innovation which they can apply in practice and which correspond to their needs and possibilities. Any method of increasing yields must be clearly related to the extent and reliability of the benefit it brings to the farmer. Wherever significantly more effort in labor and skill is implied, a new method may have little relevance if farmers consider effort rather than land the factor limiting production.

There has been too much concentration on individual crops or specific improvements, without regard to the farming pattern and to farm management problems as a whole. Research on single techniques, such as optimum planting dates, cultural practices, fertilizer applications and plant protection, is virtually carried out for each crop in isolation. Yet the planting date that is optimum in terms of the yield of one crop may not be the best when the other crops which the farmer must plant are considered and when account is taken of the best way in which he can use his labor. To grow a particular crop in a pure stand may maximize its yield, but the net advantage will depend on the repercussions from this practice and the extent to which it is necessary to sacrifice other crops formerly grown in association with it. There has been insufficient concern with the problem of fitting new crop varieties and methods of cultivation into existing farming patterns and rotations.

Much valuable research has been done all over the world and a considerable amount of data is available in publications or stored in unpublished reports and archives. Such data should be made available, and as far as possible adapted for rapid practical application. A determined effort should be made to collect, collate, and publish all worthwhile research results lying in the files and unpublished records of research stations and ministries of agriculture. Improved methods of recording and indexing research results could also be of assistance.

In view of the shortage of research personnel and facilities, it is important not only that research be focused on priority problems and critical bottlenecks in agricultural development, but also that research be carried out as far as possible on a basis of international cooperation and that its results be widely disseminated so as to avoid duplication. It is necessary to make systematic periodic assessments of the research that has been accomplished. Such appraisals should be carried out for groups of countries and research institutions that operate under more or less similar ecological conditions.

Agricultural research programs should be developed internationally on an ecological zone basis, and top priority common problems selected which call for concerted action and closer cooperation between countries with similar environments. Computer cataloging systems should be initiated to keep research data up to date and facilitate the exchange of information.

The recent breakthroughs in developing new high-yielding varieties of cereals suitable for a wide range of conditions in developing countries will necessitate some reorientation of research. While research in developing countries should be geared to taking the fullest possible advantage of these cereal varieties, it is necessary at the same time to devote increased attention to noncereal crops, such as pulses and oilseeds, and to livestock if serious distortions in the production pattern are to be avoided and if the opportunity is to be taken to improve nutritional levels.

Extension and training

The farmer can take full advantage of technological progress only if he receives regular technical and economic guidance and training. It is therefore essential that there should be an effective agricultural extension service, with a suitable organization, an adequately trained staff, sufficient equipment, and facilities for mobility.

In the developing countries, agricultural extension is inevitably a government responsibility. All departments of a ministry of agriculture should join in supporting a single extension service. As agriculture develops, however, farmers' organizations can gradually take over part of the responsibility.

Use should be made of all possible media to reach farmers and persuade them to seek information, and to accept and practice improved techniques. Extension should not only take information to farmers, but also encourage them to visit extension centers and experiment stations, and arrange field days and periodic training courses for farm leaders. The fullest use should be made of mass media, in particular farm broadcasting and work-oriented literacy programs. In order to be able to raise the level of farming and farm living effectively, extension must reach not only farmers but also farm wives and farm youth.

Extension staff members, particularly those working at field level, must have adequate salaries and essential living facilities at their duty stations. They require regular on-the-job training, periodic refresher courses (especially when innovations are introduced, such as the high-yielding cereal varieties), and regular technical supervision.

At national level extension staff should be kept to a minimum. Provinces or subdivisions of provinces should generally be the centers of extension activities, from which the field level agents should be provided with technical backstopping and supervision.

It will be necessary to achieve much closer contact with farm families through the extension service than has so far been possible in developing countries. The number of villages or farms that an average field level extension worker can cover depends on various factors, including the size of the farms, the condition of the roads, and transport facilities. Under the conditions that exist in most developing countries, however, it would usually not be realistic to expect efficient performance from an extension agent who serves more than about 500 farms or 10 to 15 average-sized villages.

Training

Agricultural development programs call for large increases in trained manpower at all levels and in many specialized fields. They involve the education and training of the farmer and his family and, in a sense, of the whole rural community. New attitudes and desires have to be created, and new skills and concepts in the use of resources must be taught. In order to achieve these objectives the general system of education as well as technical education and training have fundamental roles to play.

General education is a powerful vehicle for new ideas and concepts. Its aims have naturally been broad in scope, and in some respects the systems that

have evolved have not proved entirely suitable for countries which are primarily rural and agricultural. A major problem in many developing countries is to modify and adapt these systems to meet the needs of national development.

Agricultural education and training cover a very broad field, ranging from the informal out-of-school level (including agricultural extension, farmer and youth training) up to the university level. The education and training required to provide farmers with an opportunity to use improved technology consist primarily of technical and vocational education in two main categories: the training of young people entering farming, and the instruction of adult farmers in new and improved farming systems.

Many projects have been initiated in developing countries, especially since the second world war, to train young people for careers in farming. These schemes have been undertaken both by government agencies and by independent societies and organizations. Often they were undertaken because of the grave problem of unemployed school leavers. Sometimes they have been grafted onto the school system. Vocational training centers and farm schools or institutes have been established. Others have been established in connection with settlement schemes. For a variety of reasons farm schools established within the educational system have seldom proved successful. They have frequently been used by pupils as a means of getting further education so as to seek paid employment outside agriculture. A more successful and less expensive way of interesting young people in farming as a career and of teaching them some elementary practical and applied skills has been through voluntary out-of-school informal activity such as the 4-H Club movement and Young Farmers' Clubs.

In a number of developing countries new forms of education, training and instruction are rapidly developing to supplement and strengthen the more traditional field extension service. Among these are: work-oriented adult literacy campaigns, farm broadcasting programs, instructional literature, farming journals, and the institutional training of adult farmers in various types of training centers and institutes. The primary purpose of these centers is to give residential short course training to practicing farmers, their wives and in some cases their sons, in general agriculture and specialized topics. This type of training has the advantage that it is given to people already engaged in farming who are willing and able to put into practice on their own farms the improved practices which are taught and demonstrated. A whole range of other courses in such subjects as home economics, cooperative management and community development are taught at a number of these centers, and they are also being used successfully for the inservice training of field extension officers.

The farmers' training centers and district farm institutes of east and central Africa, which have been established within the past decade, provide an excellent example of the impact which can be made. They are essentially an integral part of the field extension service, and offer certain advantages over some of the traditional extension methods:

1. Permanent facilities and equipment for teaching, demonstration and practical training are available.
2. There is a professional staff, often of a higher level than regular field extension workers.
3. Operating in groups in a residential center, farmers, their wives and young people have an opportunity to learn by sharing experiences.
4. Training can be given in greater depth than through field trips and demonstrations in the farmers' home area.
5. The centers provide a service to extension staff through in-service training, updating of technical information, and follow-up of the farmers' course.

The main disadvantages are that these centers and institutes are costly and can deal with only small numbers of students. They should therefore be supplemented by nonresidential centers operated by extension staff in the areas in which they serve.

Seed production

The organization needed for the efficient production and distribution of improved seeds is at present very poorly developed in most countries. Lasting results from improved varieties can only be expected when a competent seed industry can make available quality seed in the quantities required. This necessitates the establishment of plant breeding stations, field trials for varietal and other testing, seed certification and testing agencies, seed processing and storage facilities, and an efficient seed distribution and marketing organization.

Once a variety is released it must be maintained so that pure propagating stocks are constantly kept moving into commercial channels. This can be done in a number of ways. Most European countries, for example, have legislation and regulations dealing with the classification of seed. Regarding the number of generations through which stock seed may pass and still be eligible for certification, attention must be paid to the fact that normally each generation has the effect of successively lowering the standard of the resultant seed. This is of par-

ticular importance with regard to varietal purity and freedom from seed-borne diseases.

Legislation and regulations are published in many countries controlling the sale and marketing of agricultural seed, so that seed offered for sale to the public must conform to certain standards, based on seed analyses or purity, germination, and the absence of weed seeds and of seed-borne diseases. Official seed sampling and sealing are compulsory, as well as official seed testing. There are special rules for seed import and export as well as for plant quarantine. In some countries production is limited to certain areas, as in the Syrian Arab Republic, where the production of wheat seed must be located north of the rainfall line of 350 millimeters per year if it cannot be irrigated with sufficient water to guarantee normal growing conditions.

Field trials are used to compare new varieties with standard varieties and determine whether or not they may be released and further multiplied. There are countries where varieties released by plant breeders must prove superior in field performance tests, conducted over several years by an official body or some other independent authority, before the variety may be published in official lists and brought on the market. After official release the extension service assists in the dissemination of a new variety by running simple demonstration plots to demonstrate to the farmers the particular variety suitable for local conditions.

To ensure that seed sold to farmers is true to variety and type, the production of seed should be supervised by official agencies. A seed certification scheme generally includes measures to ensure that the seed-growing farmer uses stock seed supplied to him. The fields are checked during the growing period, the identity of the seed is maintained from its harvest until its sale, and the seed has to conform to certain standards. In some countries additional checking is carried out by sowing seed samples the following year in test plots.

In developed countries many organizations are involved in seed production. Seed growers' associations assist their members over technical questions while seed growers' cooperatives organize large-scale seed production. Seed production in these countries is generally based on contracts between breeding firms, seed merchants and cooperatives on the one hand and farmer growers on the other. Some individual seed growers also produce and distribute seeds on a private basis.

In many developing countries breeders' seed is produced on state breeding stations, basic seed on government land, and certified seed by contract growers. The contracts are made between the government or its agencies and farmer growers. However, in most developing countries the degree of efficiency attained leaves much to be desired. Government farms are often inefficiently operated. Laboratory testing and field inspection are frequently inoperative because staff are inadequately trained and paid and are not provided with proper equipment and transport. Adequate facilities for the processing, storage, and distribution of seed are not available, and the overall organization and management necessary for what is essentially a commercial undertaking (when large quantities of seed have to be distributed) are lacking.

In consequence, excellent work at research centers in developing new varieties is frustrated because the seed does not find its way to the farmers in sufficiently good condition. In part this organizational deficiency has been overcome in the case of the high-yielding varieties of cereals in that their superiority is so marked and the consequent demand so high that (in the case of the nonhybrids) they spread rapidly from farmer to farmer. This inevitably leads to deterioration in quality, and cannot be relied on as farming becomes more sophisticated and as a more complex varietal pattern emerges.

Moreover, if it should become necessary at short notice to change a variety in common use (for example, if it becomes susceptible to disease), haphazard distribution is quite inadequate.

Input supply services

The rapid increase expected in the use of modern production requisites will place a considerable strain on the marketing system. For fertilizers alone, the quantity used in developing countries is projected to increase from about 5 million tons (NPK) in 1966 to 15-20 million tons by 1975.[31] Careful attention must therefore be paid to the expansion and improvement of the marketing, distribution and storage facilities for production requisites if they are to be available to farmers at the right time and place and on favorable terms. At least until the effective demand for production requisites is built up, government action is required in a variety of fields concerned with their supply.

MARKETING AGENCIES AND CHANNELS

While a large producer can maintain direct contact with wholesale suppliers of inputs, being able to absorb large quantities at one time, the small farmers who predominate in developing countries require small shipments which can only be provided by retailers, cooperatives or other suppliers close to the

[31] FAO, *Study on food production resources in agricultural development*, Document No. C 67/41. Rome, 1967. p. 46.

farms. They will also be heavily dependent on the availability of credit on reasonable terms.

In developed countries much of the trade in inputs is handled by private firms, in the case of feedstuffs occasionally under contractual arrangements with producers. Another large share is sold to farmers through multipurpose cooperatives which store fertilizers, seed, chemicals, and even tools and light machinery for ready sale to their members. In most developing countries, on the other hand, the vast majority of inputs are supplied through small-scale local traders without sufficient capital or facilities to maintain stores. The result is that supplies are frequently exhausted, prices high and fluctuating, and credit terms unfavorable. Losses, waste, and deterioration are also high because of the lack of adequate storage facilities and the need to break up normal retail packs into very small units.

The proliferation of small retailers of farm inputs, resulting from the economic and social structure in developing countries, is illustrated by the structure of the fertilizer industry. The average turnover of an Indian fertilizer distributor has been estimated to be about 50 tons per year, while a turnover of 5,000 to 10,000 tons is not unusual even for the smaller cooperatives in the southern part of the Federal Republic of Germany. In East Pakistan 11,000 retail agents in 1966/67 handled only about 230,000 tons of fertilizer. The small scale of the enterprise also implies that traders are not in a position to provide technical advice to farmers, a major service rendered by the large input distributors in developed countries. Nor are they in a position to carry out promotion campaigns. A recent survey in Ceylon, for example, indicated that not one cooperative charged with fertilizer distribution ever promoted fertilizer use or approached its members to buy.[35]

The apparent inefficiency of small-scale private trade, together with the frequent hostility of governments to private enterprise, has occasionally led to the establishment of separate government-controlled distribution channels. It is unlikely, however, that these operate more efficiently or cheaply. Under conditions of effective competition, the profit motive represents a stimulant to efficiency. Managers of cooperatives with fixed salaries will show less interest in increasing sales than private traders who can make a personal profit. It is therefore advisable for governments to give careful consideration to the contribution of private trade to the distribution of agricultural inputs.

Private enterprise is especially important in the case of machinery and implements, since highly specialized training and repair facilities must be provided. As noted above in discussing machinery and implements, governments in a number of countries have taken over the import and distribution of heavy machinery, but they have often run into serious difficulties through inadequate provision for the import of spare parts, and because the private servicing facilities were not geared to look after the type of equipment imported.

Because of the complex purchasing organization, the high degree of managerial skill and the substantial financial resources that are required, cooperatives in developing countries are generally not equipped to handle the distribution of inputs from the point of entry into the country. They generally depend on government services or the collaboration of a public body both for their establishment and for financial and managerial support. Their most effective role is in the distribution of inputs at the final sales level, to farmers, and as such they are strongly established in some countries. In Japan, for instance, they handle about 95 percent of all fertilizer sales. In some African countries, cooperatives have gradually extended their activities to the supply of production requisites, including certain equipment.

Direct government intervention in the distribution of inputs is generally restricted to the launching of programs to promote the use of new means of production. Once their use is established, government-controlled agencies such as marketing boards usually take over responsibility. Even in cases of direct intervention, use is frequently made of the services of established trading enterprises. For example, many boards or other statutory organizations employ private traders side by side with cooperatives as their buying and distribution agents. This is often the case with the grain boards in Latin America. An exception is the distribution of seed discussed above. Because of the need to guarantee authenticity and purity, seed is generally provided to producers through cooperative channels, government services or government-controlled marketing bodies.

Governments can also play a key role in controlling marketing margins and prices for some of the major inputs. This is usually done through a joint agency, combining government, cooperative, and private interests. Where this system is combined with government intervention in the marketing of agricultural produce, it may directly influence the relation between input and output prices. If margins are kept too narrow, however, this will act as a disincentive to traders who, as has happened in a number of countries, will discontinue storing and selling inputs.

Government price policies are also of particular importance where domestic production of an input

[35] E. Köpke, *Report on the marketing of subsidized fertilizer for paddy to the small cultivator in Ceylon* (FAO/United Nations Development Program report, in press).

covers only part of total demand. Where domestic production costs more than imports, governments frequently operate price pools, under which high-cost local production is indirectly subsidized by increasing the price of imported goods. This method is particularly applicable where local industry manufactures one fertilizer nutrient or one part of a compound feedstuff, while the others have to be imported.

A special system of input supply prevails where processing firms contract producers. This type of vertical integration has been practiced for some time in Europe and North America, but is now spreading to trade connections between firms in developed countries and producers in developing regions. The processing firm generally supplies seed, pesticides, and technical advice. In the Kaira District Cooperative Milk Producers' Union in Anand, India, the provision of feed concentrate, produced in a cooperatively owned feed mill, is directly linked to milk deliveries. After delivering milk at the collection center, the producer receives his daily allotment of feed (based on his average milk deliveries), and the cost of the feed is subtracted from the milk check.

Storage and transport

Because of the need for such farm requisites as fertilizers and pesticides to be applied at the right time for maximum effectiveness, storage and transport facilities are of particular importance. For example, the benefit of an initial application of pesticide may be lost if the subsequent applications are not carried out in time.

Appropriate and suitably sited storage facilities are required to ensure the availability of supplies at the right time and place. The problem of storing fertilizer, seed, feed, and agricultural chemicals can be solved fairly easily where grain storage facilities, such as multipurpose warehouses, are available. For part of the year, particularly before harvest, this storage space is at least partially empty and can be used with a minimum of precautions for storing inputs. This avoids investment in additional storage facilities and makes better use of those already in existence, resulting in lower storage costs for all the goods handled.

The main requirements for a fertilizer store under humid conditions are a solid and dry storage platform together with a certain minimum height of solid walls. Fertilizer in undamaged polyethylene bags can be stored in open sheds under tarpaulin provided it is sufficiently high off the ground to be protected.

In countries relying primarily on imports for the supply of inputs, the problem of storage commences in the ports. Losses and wastage of feed, seed and fertilizers at the point of landing can be extremely high. A further problem is to determine the correct location of the central depots from which the rural trade can be supplied. Of particular importance is the contact between ports and factories, central depots and final outlet, to ensure the constant availability of supplies. Deliveries to the individual warehouses require detailed transport planning, to avoid double haulage and consequent increased costs.

Where transport facilities are available to evacuate agricultural crops from the production region, their use for the shipment of inputs can achieve economies. In Senegal, for example, the Office de commercialisation agricole uses its transport fleet not only to collect groundnuts from the farmers but also to ship fertilizer from the port to the collecting stations.

The problem of transport organization can be illustrated in an example taken from Pakistan. Fertilizer imports in the eastern part of the country arrive at the port of Chittagong, although further sea transport is possible to Chahra, thereby avoiding the rail bottleneck Chittagong-Dacca. Rolling stock is frequently scarce, especially if imports are not sufficiently spaced. Since no storage facilities are available, fertilizer has to be dumped on the pier, necessitating double handling and resulting in increased spoilage.[36]

There are also numerous examples in Latin America of the inadequate organization for handling large volumes of agricultural inputs. In Brazil, for instance, the transport of phosphates produced in the northeast to the main consumption centers in São Paulo costs (including loading and unloading operations) much more than the product itself, even though the industry is located very close to the port of Recife. In Chile insufficient unloading capacity at the main ports constitutes a serious obstacle to the expansion of phosphate consumption, as well as increasing its price.

A further important consideration, which will also affect storage capacity and location, is the timing of shipments. In many countries feeder roads are only usable at certain times of year. The planning of shipments must take this into account, often by placing stocks in the producing areas well ahead of the time at which they will be used.

Delay in procurement overseas may also cause difficulties. In Pakistan, for example, delays in allocating foreign exchange for fertilizer imports have repeatedly resulted in the arrival of shipments at ports after sowing has already started. At present the Government considers a period of six months

[36] A. von Peter, *Fertilizer marketing in Pakistan* (FAO/United Nations Development Program report, in press).

sufficient between the allocation of funds and the time when the fertilizers are needed, but it has recently been recommended that long-term foreign exchange allocations should be arranged two to three years ahead.[37]

While the packaging of fertilizers, seed, and feed involves few problems, there are considerable difficulties in the packaging of pesticides. Normally they are packed in airtight, sealed packs guaranteeing their quality, but the normal pack is frequently too large for the individual farmer in developing countries and traders are therefore forced to break them up. This leads not only to deterioration, but also to contamination and a hazard to health. It would therefore be advisable for factories to prepare smaller packs of a size useful to farmers. These should be clearly labeled, indicating method of use, precautions to be taken during application and, where necessary, the antidotes to be used. Obviously, such packing will result in higher costs. In the Philippines the Esso Company has recently introduced the sale of seed, pesticides and fertilizer all in one bag, together with instructions as to their use: distribution is carried out in cooperation with the rural banks.

Finance and credit

The financial requirements of technological improvement are very substantial. Not only are considerable funds needed for the establishment, expansion, and operation of the many government services involved, but the credit requirements of farmers will increase rapidly. Credit is in fact a crucial component of the package that must be provided for farmers and, if the whole pace of technological advance is not to be badly slowed down, governments must carefully assess the likely development of credit needs and make plans for the necessary facilities to be available. It seems likely that as more and more small farmers, formerly producing largely for their own subsistence, take up the use of purchased inputs, the need for credit may increase more than proportionately.

Farm credit

The adoption of modern technology inevitably involves the purchase of inputs such as fertilizers, pesticides, and improved seed, and also investment in irrigation equipment, implements, agricultural machinery, and so on. In some cases, farmers may be involved in the construction of minor irrigation channels or drainage ditches as a result of major irrigation, drainage, or flood protection schemes.

Even in developed countries few farmers are able to find adequate funds for this type of investment from their own savings. This is shown, for instance, by the rapid expansion of credit used by farmers in the United States, where the total farm debt increased from $8,000 million in 1946 to $42,000 million in 1966. A substantial part of this debt has been contracted by families remaining in agriculture who wished to acquire the farm and other assets of the nearly 2.5 million farm families who have left agriculture since 1945. But this is part of the process of organizing larger units that can use more efficiently the new machines and other technology made available to farmers. During the same period bank loans to farmers rose from less than $2,000 million to about $11,000 million.

In other developed countries there has been a similar increase in the credit used by farmers. This has been made possible because in these countries credit is relatively easy of access to farmers at reasonable interest rates from commercial banks, agricultural lending institutions, and merchants.

Lack of credit facilities for farmers is one of the main bottlenecks hindering increased fertilizer consumption in developing countries. Not only is the quantity of credit insufficient but the conditions under which the farmer can obtain credit are not always appropriate for use when purchasing fertilizers. For example, the risk of crop failure means that there should be a provision in the credit agreement by which the credit period is extended considerably if there is a poor crop. In other cases, interest rates for farmers' credit may be very high, while credit may often not be available for the smallholders or sharecroppers who most need it.

In most countries there is some provision for agricultural credit through government agencies or cooperatives supplying production requisites to farmers. In Japan, for instance, the amounts needed to purchase the next year's fertilizers are blocked in the cooperative account at the time the produce is sold. In some cases finance is provided through commercial banks but only against good collateral security, and usually the arrangements are not very appropriate for the purchase of fertilizers.

In some countries credit is given in kind rather than in cash, and the repayment of the loan is tied to the sale of the agricultural produce. These two mechanisms offer the advantages of enabling the lending agency to supervise the use made of credit and reducing the problem of recovery.

Whether credit facilities to farmers will have a real impact on the use of improved technology depends mainly on the responsiveness of the farmers but also on the institutional and technical aspects of the credit system itself. One important factor is the progress that has been made in increasing the institutional sources of credit. In many developing countries significant progress has been

[37] A. von Peter, *op. cit.*

achieved in recent years in creating cooperative and similar institutions.

It is difficult to measure how much this has influenced the use of production credit by farmers. In Japan, where the channeling of production requisites is carried out through the multipurpose cooperatives, roughly 95 percent of all fertilizers and pesticides and 30 to 40 percent of animal feedstuffs pass through the cooperatives. Even though credit extended by the cooperatives represents less than half the total loans to farmers, it has certainly contributed substantially to increased borrowings for the purchase of modern inputs.

In China (Taiwan), where the use of fertilizers has also increased substantially, institutional credit under similar conditions to those in Japan accounts for about 60 percent of the total. In India and the Republic of Korea, on the other hand, the share of noninstitutional credit represents about three quarters of farmers' total loans.

Foreign finance

A major problem in financing technological improvements in the agriculture of developing countries is that many of the necessary inputs, including fertilizers, pesticides and machinery, must be imported. Obtaining the necessary supplies entails resolute decisions to allocate large quantities of scarce foreign exchange for this purpose. India is now having to allocate a fifth of its foreign exchange earnings to the import of fertilizers and fertilizer raw materials; these are also likely to represent the largest single item in Turkey's import program.

Until domestic production of agricultural production requisites reaches a much larger scale in developing countries, there will be a need for foreign assistance in financing their import. The need for such assistance is likely to increase rapidly with the accelerating pace of technological improvement in many developing countries.

There has in fact been some increase in this type of assistance in recent years. United States disbursements for this purpose rose from $56 million in 1962 to $161 million in 1966, and were expected to reach $300 million in 1967. Assistance of this kind is usually provided by the United States in the form of long-term loans, repayable in 40 years, at a low rate of interest. Similar assistance is also provided by other countries.

There are also substantial capital flows from developed to developing countries for the establishment of industries manufacturing production requisites, especially fertilizers.[38]

[38] For a full examination of these and related aspects of foreign assistance, see FAO, *op. cit.*, 1967. p. 62-91.

Incentives [39]

Even when appropriate measures of the kind outlined above have been taken to give farmers detailed knowledge of modern methods adapted to local conditions and to provide them with a reliable supply of production requisites and the credit to purchase them, much usually remains to be done for there to be any certainty that farmers will actually make use of these various services. Before doing so, farmers have first to make their own individual assessments of the relation between what they have to put in and what they can expect to get out, and governments may need to take action over a wide front to influence these relations and the decisions based on them.

Small farmers are usually reluctant to embark on changes. In addition to expenditures on such things as fertilizers or improved livestock, change means greater physical and mental effort and a degree of risk. For a farmer used to set routines and with only the narrowest margin of economic security, these are serious drawbacks. Moreover, the rewards for effort and expenditure are to be reaped in the future, if at all; the sacrifices are immediate. In these circumstances, farmers will usually require substantial incentives if they are to be induced to adopt new methods.

Price and marketing policies

Assurance that a market for increased output not only exists but can be reached at an economic cost is essential. This cannot be taken for granted in developing countries. In areas of predominantly subsistence farming there may be no established marketing channels to deficit areas. A long journey to market may cause direct loss through spoilage, and this weakens still further the farmer's bargaining position. An extensive program of feeder road construction is often needed to link potential producers with potential markets.

Furthermore, the market may be dominated by a single buyer, or by a small number acting in concert. Prices fluctuate widely not only from week to week but from day to day and even from hour to hour.

Dependability of markets and a remunerative price level are the primary incentives for farmers to undertake the expenditures on inputs needed to produce and market more. They may not be immediately effective in persuading subsistence farmers to enter the market economy, since traditional modes of life and thought are hard to alter, but with increasing urbanization and improvement in transport and communications the number of such farmers is declining

[39] For a more detailed account of this aspect, see FAO, *The state of food and agriculture 1967*, Rome, 1967, p. 75-117.

rapidly. In recent years a number of studies have been made which indicate a positive response to price increases by farmers in developing countries.[40]

Many of the small farmers' difficulties arise from the fact that they have to sell their crops immediately after harvest (if not before) at the lowest prices of the season. This usually happens because they do not have storage, or need the money at once, or both. If supplies could be released on to the market progressively, the total proceeds would almost certainly be greater and would in any case be distributed more evenly. The provision of short-term credit on reasonable terms can help. An official program enabling the farmer to obtain a substantial advance on delivery of his crop at harvest, followed by a final settlement at the end of the season, may be the most effective method and does not involve any direct subsidy.

Any action to stimulate competition in the markets will also increase farmers' returns and thus their incentive to use improved methods. One way of doing this is through the establishment of marketing cooperatives.

There is little doubt, however, that a guaranteed market with a realistic floor price constitutes the most effective incentive. It is of particular importance where farmers are using increasing quantities of purchased inputs. They will be reluctant to undertake expenditure on such purchases without the assurance that their enlarged output can be marketed at a price which, on the worst hypothesis, still covers the cost of production. The simultaneous adoption of improved methods by large numbers of farmers in a given country or area of a country will undoubtedly raise some difficult problems of marketing and price maintenance. If these problems are not satisfactorily solved, and if prices cannot be supported at the guaranteed level in the face of a bumper harvest, it will seriously prejudice the chance of getting a sustained increase in production as a result of the technological potential now available. If farmers suffer a disastrous drop in prices after investing in improved seeds, fertilizers, pesticides and other inputs, it will be a long time before they can be persuaded to risk using such methods again. While the new high-yielding cereal varieties should make it possible to reduce prices, the reduction will have to be gradual.[41]

There is, of course, much more to an incentive price policy than deciding on a suitable price level, though even that may present difficulties in view of the wide variations in costs of production between different sizes and types of farm and the financial implications for the government of any price guarantee. It is necessary to ensure that farmers, and especially those in isolated areas, actually receive the price to which they are entitled.

Where the government is able to operate its own buying points at close intervals throughout the country, this is not particularly difficult. Such a system is rather expensive, however, and requires a better organized government administration than many developing countries possess. The appointment of local traders as the government's agents is a more economical method, at least as far as immediate outlay is concerned, but is open to abuse. Small farmers, seldom visited by extension agents and often illiterate, may not be aware of the existence of minimum prices, let alone of their level. Even if they do know their rights, there may be no quick and effective way of enforcing them, and meanwhile the local buyer retains his strong monopolistic position and the farmer needs to sell without delay. Here is a function that cooperatives could well fill, provided they measure up to some minimum standard of management efficiency. In Japan, for instance, the decision of the Government to channel the marketing of all home-grown rice through the agricultural cooperatives has provided them with a solid basis for the many other valuable services (including the supply of inputs) they offer farmers today.

It is also worth noting that contract farming, mentioned above in connection with input supply services, is another method of obtaining an assured market. Under this system a private concern, usually a processor or retailer of farm products, signs detailed contracts with individual farmers for the production of specified numbers of livestock or of specified acreages of crops. The terms of such contracts vary widely, and there is no consensus of opinion about the desirability of using these methods. There are clearly some dangers for the weaker party in a contractual relationship with a powerful, integrated private undertaking. At the same time there are attractions for many farmers in being linked with an organization that provides technical guidance and credit when required and guarantees to purchase the end product. Usually no firm guarantee is given regarding the price, though it is fairly common practice to pay prevailing market prices together with a bonus for efficiency (for example, in converting feed into meat or eggs). If adequate safeguards can be devised, contract farming may well become increasingly important as a way of providing incentives to farmers in developing countries.

Input prices and subsidies

A price guarantee cannot be effective as an incentive unless it takes account of the costs incurred in achieving higher output. These costs are likely

[40] For a selected list of these studies, see FAO, *The state of food and agriculture 1967*, p. 82.

[41] These varieties will in fact give rise to complex problems of price policy. It will be necessary to maintain adequate incentives to cereal growers without developing unsalable surpluses of cereals or discouraging the production of other crops.

to consist mainly of purchases of production requisites. Lowering the price of these inputs may therefore be as much of an incentive as raising the price of the output, and may often be easier to achieve. It also has the advantage that, unlike price supports, it benefits only those producers who actually use the inputs. The exact relationship between input and output prices naturally depends on the circumstances of each farm, the crops or livestock raised, the responsiveness of the land to the application of fertilizers, and so on.

Only if there is a favorable ratio between the prices of inputs and those of the crops to which they are applied will producers be persuaded to buy the inputs. In Japan, for example, the ratio between fertilizer and paddy prices is 1:4.7, as against 1:1.3 in India. In other words, the Japanese farmer can purchase almost four times as much fertilizer by selling the same quantity of paddy. These relationships must provide at least part of the explanation of the fact that fertilizer use per hectare in Japan is 100 times as great as in India.[42]

Fertilizer subsidies of one kind or another are quite widely used in developing countries. They range from the subsidized transport of fertilizers and reduced prices for their use on specified crops to general subsidies of as much as half of the cost and in a few cases free distribution of fertilizer. They undoubtedly help to increase the use of fertilizer, but there are inherent problems. First, it is essential to ensure a regular supply before stimulating demand too strongly. Second, it often proves difficult to ensure that fertilizer distributed at subsidized prices is actually used on the crops for which the government had intended it; it may be resold at higher prices to growers of crops on which a bigger return can be expected.

Available evidence suggests that subsidies are most useful in popularizing the use of fertilizers or pesticides in countries or areas where they are little known, and where some strong inducement is initially needed to encourage farmers to experiment with them. This does not imply that farm inputs should be distributed under a permanent subsidy scheme. The higher yields obtained should more than compensate for the expense of the input, otherwise the scheme would not be worth supporting. Where financial aid is given during the initial period, therefore, governments should clearly indicate its temporary nature. It should, however, be phased out gradually, so as to avoid any sharp effect on the use of the input. An exception might sometimes be made for crops grown primarily for export which are heavily taxed to obtain funds for general development. In these cases continued production is in the interest of the economy and providing incentives through a permanent lowering of input prices might be justified.

Financial support may also be necessary at the start to keep distribution costs down until the volume of sales permits a more economic use of transport, storage and other marketing facilities.

The free distribution of inputs, even during a single growing season, is not to be recommended. Farmers frequently tend to disregard or misuse inputs provided free of charge. In consequence there is not only likely to be a waste of funds, but also poor results which, later on, will be a hindrance to general acceptance of the inputs in question.

One area where government action is immediately possible lies in the reduction of tariffs on imported goods. For example, the majority of industries producing inputs for agriculture in Latin America have been established on the basis of a virtual monopoly of the domestic market. High levels of protection, tariff and nontariff, have permitted them to develop without much interference from foreign competition. In the case of ammonia, for instance, the present industrial cost in modern, large-scale plants is around U.S.$30 per ton of nitrogen (N). The Chilean farmer has to pay about $330 per ton of N contained in the sodium nitrate he buys; the Argentine pays $450 per ton of N from ammonium sulfate; in Brazil the price goes up to $520, in Colombia to $550, and in Ecuador to nearly $600.

Another type of incentive whose effect is to cheapen production rather than to raise sale prices is a contribution by the government toward the purchase or installation of small-scale irrigation or drainage works, terracing, etc. This method has been widely and successfully used, for instance in West Pakistan, where the Government's tubewell program offers free electrification and drilling, and pipes exempt from import duty.

Other incentives

While market conditions and the sale price of farm products and the purchase price of agricultural inputs constitute the strongest influence on the farmer's incentive, other factors can be critically important and even nullify the effect of well-conceived price policies. Perhaps the most important is the question of security.

Throughout the world there are millions of farmers who do not own the land they farm. Many of them enjoy conditions of tenure that can be regarded as satisfactory but many more, particularly in the developing countries, suffer in varying degrees from the insecurity of their position. Thus they may be liable to eviction at short notice, with little or no compensation for improvements, or may

[42] These relationships were examined in detail in the 1967 issue of this report. See FAO. *op. cit.*, p. 109-114.

find their rent raised suddenly. Such insecurity of tenure militates against any investment from which benefits cannot be obtained almost immediately.

Under sharecropping, which is still the prevalent form of tenure in many areas, there may be little advantage even in investment in current inputs such as fertilizers or improved seeds. Most sharecropping contracts require the tenant himself to pay for such inputs, while the landowner takes something like half of the proceeds. Even if the return to the sharecropper still more than covers his outlays (and this seems unlikely to be the case very often), it is understandable that he may be reluctant to provide a windfall for his landlord.

Farm credit must also be mentioned in this context, though only very briefly since it has already been discussed. Many farmers in the developing countries are in a state of virtually permanent indebtedness to merchants and moneylenders, at usurious rates of interest. To undertake any increased productive effort, even of the simplest kind, involves them in seeking further loans from these sources, loans which may be granted on even more severe terms or refused altogether. The high cost of this credit has to be added to the direct expenditure on increasing production when deciding whether the effort is likely to be profitable, and the farmer's answer will very often be negative.

Reference should also be made to two more marginal incentives. Taxation is usually thought of as exclusively a disincentive, but it can be applied so as to place a heavier burden on the landowner who neglects his land and provide relief for the one who invests in the improvement of his farm. Thus unused land may be taxed at higher rates; in Thailand the rate is double the normal one, while in Guatemala the surcharge is increased by 20 percent annually up to a maximum of 80 percent above the normal tax level. Land which has been improved at the owner's expense may be exempted from paying tax at a higher rate for a period of years, as in Chile. Land can be taxed on the basis of its potential rather than the actual output achieved by the occupier; this will penalize poor performance and reward the farmer who increases production beyond the norm.

Crop and livestock insurance is not yet widely practiced in the developing countries. It tends to be costly and somewhat complex to administer. Where it exists in the developing countries it has been introduced fairly recently and often on an experimental basis. It is therefore hard to say how far it acts as an incentive to farmers to make greater efforts to increase production. It seems reasonable to suppose, however, that farmers will more willingly embark on expenditure for increased production if they know they are insured at least against the total loss of crops or livestock. The existence of an insurance scheme will also make it easier for the farmer to obtain credit on the security of his crops or livestock.

Finally, it should not be overlooked that political leadership, with clearly defined and well-publicized national policies and objectives, and effective government administration are likely to be very important in providing the encouragement and motivation needed to get farmers to adopt modern technology.

Strategy for technological improvement

There is no doubt that the potential now exists for much more rapid increases than ever before in agricultural production and productivity in many developing countries. How soon this potential can be realized, and whether progress can be sustained, will depend very much on the development of successful strategies, adapted to the conditions of each country, for making available to farmers the package of inputs and services needed for technological improvement.

The first strategy decision is whether to concentrate on expanding the cultivated area or on increasing yields from the existing area. In countries where there is heavy population pressure on the available land there is little choice in this matter. Even where there is new land to be opened up this is often a costly and lengthy process. There are thus many attractions in emphasizing the raising of yields on the existing area by means of technological improvements.

Perhaps the basic element in a strategy of technological improvement is the package approach itself. There is ample demonstration of the complementarity of the various inputs for agricultural production (in particular, improved seeds, fertilizers, and water) and of the need to introduce them in an integrated rather than piecemeal fashion. But it is also clear that the same approach is needed to the numerous services involved in agricultural development: research, extension, seed production, input supplies, marketing, storage, credit, and so on. Price policies are of crucial importance. There is a need for a macroeconomic package including these services and

policies, as well as for the microeconomic package of the inputs needed to transform the level of technology on the individual farm.

In all of these fields the government's role is crucial in most developing countries. A package approach to technological improvement is therefore certain to make heavy demands on the administrative and financial resources of governments. Rapid technological improvement in agriculture implies giving a high priority to agriculture in national development plans, as is now occurring in a number of developing countries. It may also take a large share of current resources, for example India's allocation of a fifth of its foreign exchange earnings to imports of fertilizers and fertilizer raw materials.

The appropriate strategy will clearly differ according to the stage that has been reached in a country's development. In some countries, after long years of work on trials and demonstrations and the establishment of the necessary infrastructure, the use of improved seeds, fertilizers and other modern inputs is already being adopted by large numbers of farmers. In these countries the strategy should concentrate on securing more rapid adoption of modern technology, on indentifying and removing bottlenecks, on improving efficiency in input practices and combinations, and on developing marketing and storage.

At the other extreme, there are many countries where little can be accomplished by way of technological improvement until radical changes are effected in the institutional field, especially in respect of land tenure, or where even the technological possibilites are still very limited.[43] There are also many intermediate countries where some progress has already been made but much basic spadework is still required to devise programs to develop and demonstrate improved varieties and related inputs, and particularly to persuade farmers through incentive policies and extension that it is worth their while to purchase the package of inputs needed.

Also related to a country's stage of development is the appropriate mix of foreign aid for agriculture, as between financial aid, technical aid, food aid, or production requisites. With the rapid increase in the use of purchased inputs, especially fertilizers, now occurring in so many developing countries, it is likely that aid in the form of production requisites will assume special importance in the immediate future.

For many countries it may be possible to envisage a gradual evolution from heavy reliance on food imports (including food aid), through a phase of importing large supplies of fertilizers and other production requisites, to the eventual development of domestic industries for the production of much of the necessary supplies of inputs. For some time to come there is likely to be a heavy concentration of countries in the second of these three phases, with obvious implications for foreign aid requirements.

Related to foreign aid is the question of making maximum use of research results obtained in international research centers or those of other countries which have similar conditions. The recent developments with high-yielding varieties of wheat and rice provide a striking example of how time (so important in a context of rapid population growth) can be saved by making use of research results and of planting materials developed elsewhere.

Even with maximum use of foreign aid in all its forms, however, the burden of providing a suitable package of inputs and services is bound to put a heavy strain on the financial and administrative resources of governments. For this reason they will almost always be faced with the choice of either spreading measures to promote technological improvement thinly over the whole country or concentrating on the more favored areas or more progressive producers. The latter approach is often dictated by the fact that optimum returns from improved varieties and fertilizers can only be obtained in areas of assured water supply (either through reliable rainfall or irrigation). It entails parallel measures to ensure that producers in less favored areas do not get left too far behind, but in the long run the only satisfactory solution is the development of sufficient nonagricultural employment to absorb surplus rural labor.

Package programs, concentrating on limited areas, have already been attempted in a number of developing countries, including India, Pakistan, and the Philippines. These programs are well documented, and any country attempting a similar approach should carefully study the experience obtained.

Another major strategy decision is whether sufficient technological progress can be achieved in the framework of the small farms prevalent in most developing countries, or whether it is necessary to devise new forms of land holding enabling land to be worked in large units. Many aspects of this decision are political, but it may be pointed out here that in suitable areas the new high-yielding varieties of cereals, as well as quick-maturing varieties that make possible multiple cropping, open up new possibilities for obtaining an adequate livelihood from a very small piece of land. China (Taiwan) and Japan illustrate the levels of productivity that can be obtained on small farms. Pesticide services and machinery can be used on a cooperative basis or hired from contractors. Where holdings are so small as to provide a physical obstacle to the use of

[43] For example, recent progress with high-yielding varieties has mainly concerned cereals. There is thus little to offer in the wide areas where the staple food is a root crop such as cassava or yams.

modern pest control methods, machinery or even crop rotations, a possible solution (as in the United Arab Republic) is for the land of individual farmers to be pooled for these purposes without their losing ownership rights.

For a strategy of technological improvement to succeed on a sustained basis, it must include plans to cope with the consequences of its success. It is clear from recent experience that very rapid increases in production are possible once a certain stage is reached. Marketing and storage facilities will need to be greatly expanded and improved, not only for the increased quantities of inputs but also for the increased output that may be expected, including quite sudden increases in some cases. There will be difficult problems of price policy to encourage a pattern of production in line with demand. It will be necessary to avoid distortions in the pattern of production caused by uneven technological progress for different crops, as with the advantage now suddenly enjoyed by cereals in some countries. Early attention to the livestock base is necessary if full advantage is to be taken of the larger and cheaper supplies of cereals likely to become available.

Careful study is needed of the changes that occur in the economics of crop production as technology improves. A striking example of such changes is the fact that in some countries, in complete contrast with the situation a few years ago, it is now highly profitable to grow cereals under irrigation, to fertilize them heavily, and to use expensive pesticides on them.

The problem is essentially one of planning. Questions of interrelations and of timing are of basic importance. Improved varieties of noncereal crops must be available in time to take advantage of the land released from cereal production. If the large and cheap supplies of cereals that may be expected in some developing countries are not to be wasted, the necessary livestock base must be available to take advantage of them. Such measures are essential if recent technological improvements are to raise the quality as well as the quantity of the diet.

Because such a heavy government involvement is essential in the earlier stages of technological improvement, it is advisable for the strategy to include provision for the eventual reduction of this involvement. Private industry is likely to be ready to play a larger part as the market for fertilizers and other inputs widens. Perhaps the best method of reducing government involvement is to encourage the development of cooperatives and other appropriate farmers' organizations. Such organizations can effectively meet many of the problems of input supply, credit, and marketing.

Chapter IV. IMPROVED STORAGE AND ITS CONTRIBUTION TO WORLD FOOD SUPPLIES

The slow increase in per caput food production in the developing countries has focused attention on the possibility of obtaining at least part of the needed increase in food supplies through more efficient use of the existing production. Improved storage is one of the principal approaches to making better use of what is produced.

The contribution of improved storage to the expansion of world food supplies has two main aspects. The more obvious one is the avoidance of losses of food that has been produced and could be consumed if it were adequately protected. The other vital aspect is the basic function of storage in the marketing chain from producer to consumer.

It is frequently maintained that, especially in the developing countries, large quantities of food are lost in storage because of the depredations of insects, rodents, and fungi, as well as other causes. There are widely varying estimates of such losses, but there is rarely any accompanying indication as to how far they are representative. There is as yet no adequate basis for overall estimates of the food lost in storage in a major region or in the world as a whole.

There is still less basis for assessing how much of the storage losses could economically be avoided. It is technically possible to eliminate all storage losses. But beyond a certain point this becomes so costly that it is more economic to invest in increased production that in improved storage.

Because of these difficulties, the present study does not attempt a quantitative estimate of the contribution of improved storage to world food supplies. The theme of the study is rather the essential role of storage in the marketing chain.

The ways in which access to good storage makes possible more efficient marketing are many. Storage enables the marketing system to adjust the times and places of production to the times and places of consumption, which means that the rate of flow into the market can be adapted to consumer needs. It also facilitates bulking for economical transport, thus widening the market area that can be served. The efficient operation of equipment for grinding maize or milling paddy depends on the ability to hold stocks adjacent to the plant. Storage can also facilitate quality control, sorting into lots designed to meet consumer needs, and many other marketing operations. While efficient marketing serves the consumer, the existence of storage facilities is also an element in the producer's incentive to expand his output, particularly owing to the role of storage in price stabilization schemes.

Another basic consideration is that storage is a costly undertaking and must therefore be planned and operated with the greatest care if scarce financial resources are not to be wasted. Provisional calculations made for the FAO Indicative World Plan for Agricultural Development indicate, for example, that in South America alone the production objectives for 1975 would entail additional investment in dry storage and grain elevators of the order of U.S. $620 million, as compared with 1961-63.

The study begins with an examination of the role of storage. It then goes on to discuss some of the main problems of storage in developing countries, including storage losses, the need for adequate preparation of products for storage, the changing demands for storage, and difficulties in planning storage facilities.

Although the study covers all food products (including fish), it does not attempt to deal with detailed requirements on a commodity basis. Most of the discussion concerns food grains and other durable products. In developing countries such staple products will clearly have priority in the improvement of storage facilities. A discussion of the storage of durable products begins with an analysis of the various types of storage construction and methods of pest control. Some data on costs are presented. The decisions concerning storage that have to be made by the individual farmer, at the various stages of assembly and distribution, and by the government are then examined in turn.

The consumption of perishable foods, such as fruit, vegetables, meat, eggs, and dairy products, is rising steadily in the developing countries. Meeting this demand calls for new forms of storage. The importance of these foods for protein supplies and health in general is another justification for the inclusion of a brief section on refrigerated storage

and its alternatives, following the more detailed discussion of the storage of durable products.

In a concluding section concerned with storage policy, some main factors for consideration in planning new storage facilities are suggested. The role of governments in stimulating and assisting the development of efficient storage systems is discussed. Some implications for international aid are briefly indicated.

Role of storage

The staple food requirements of a country remain more or less constant throughout the year, regardless of price or the availability of other products. The supply of staple foods, on the other hand, is subject to numerous variations, of which the largest is in the seasonal availability of local crops. Changes in yield, area planted, regional production, and the proportion of harvests actually sold all introduce elements of uncertainty and alter the conditions of supply. The role of storage is to absorb these variations in supply, so that produce may be channeled to consumers as they require it and at a reasonable price. This process is inherent in normal trading practice.

From the time a product is harvested until it finally reaches the consumer, somebody (farmer, trader, processing firm, agent, wholesaler) has to hold it in physical possession. To this extent, storage is inevitable; it can only be avoided, within the marketing process, by shifting responsibility to the next link of the chain through an ordinary sales transaction. Where proper storage facilities are inadequate, the effect of a general inability to hold stocks would be greatly reduced prices at the time of production and a very sharp rise later in the season. This seasonal variation is in fact most marked in precisely those areas where specialized trading and storage enterprises are least developed.

It is particularly important that prices should not be allowed to fall, for lack of ability to hold stocks, to a level where the livelihood of farmers, and thus future prospects of food production, may be seriously endangered. From the consumer's point of view, the role of storage is derived from the need to satisfy a continuous demand for food. Warehouses holding stocks to meet retailers' requirements are essential in all major consumer concentrations and are generally provided by the wholesale distributors. Behind these must lie central and transit storage, adapted to farm assembly or import requirements as appropriate. The development of specialized processing of agricultural products, such as grain milling and meat-packing, generally calls for a working reserve of their raw material near the processing plant, since smooth and economic operation cannot be expected if the plant must handle large quantities at one time and rest idle at another. Access to suitable storage facilities is also a great convenience at wholesale markets.

In practice, storage requirements for the efficient movement of food from producer to consumer can seldom be met in full. They are essentially dynamic, changing as production and marketing develop and as new and more varied forms of food are brought into the diet. Urbanization is proceeding rapidly in the developing countries, and increasing quantities of food will have to be channeled to the towns. This means that storage will assume a steadily increasing importance, and that it must be adapted to handle a wider range of products, including more foods of a perishable nature such as fruit, vegetables, eggs, and meat. Trends toward specialization in production will also intensify, and storage facilities will have to be adapted accordingly. This does not, however, necessarily mean further specialization in storage. Because of widespread adoption of quick-freezing for chickens and fish, for example, it is now convenient to store and market these two products together.

There are two main aspects of storage to be considered: the physical facilities needed for storage, what they cost and how they are to be paid for; and secondly, who is to run them and to undertake the business function of storing agricultural produce.

Suitable storage should be technically capable of holding produce over a period, in good condition and at reasonable cost. The storage capacity available in most countries producing the bulk of their own grain supplies will usually be large enough to hold almost twice the tonnage harvested annually. The majority of farmers have to keep the whole of their crop under cover for at least a short period, until it has been threshed and dried, and arrangements have been made for a satisfactory sale. Subsequently, the marketed proportion of the crop is held by the trade. The problems of storage are therefore not only a question of having adequate capacity, but of having suitable capacity in the right place at the time it is necessary to store the product.

Since storage is part of the marketing process, its cost makes up part of the margin between the price paid to farmers and the price charged by retailers to consumers. If improved storage facilities have

the effect of reducing storage risks and losses or of extending the market for the produce in store, then investment in those facilities is likely to be offset by corresponding economies. Under competitive marketing conditions such investment may be expected to reduce the marketing margin to an extent comparable with the benefits shared by producers and consumers.

Improved storage should not, however, be expensive storage. Overhead costs must be kept down to a competitive level. As will be shown later, channels of trade will bypass storage structures whose utilization involves higher than normal costs, no matter how technically efficient they may be. Marketing channels will also tend to ignore storage capacity incorrectly sited, since its use involves excessive expenditure on transport. Mistakes of this nature in storage planning are more usually made by newly established government marketing organizations that have had insufficient experience or have to work with inadequate data. Statistics of the production and marketing of staple foods are generally poor in the developing countries and, although a regular series of figures may be available over many years, this does not imply that they are accurate. One of the first tasks in initiating a program of storage improvement may be to strengthen a country's agricultural statistics and marketing intelligence.

Storage is undertaken within the context of a specific marketing structure, and it is important that attempts to improve this structure or the storage element within it should be made on the basis of a proper understanding of the structure, so as to avoid duplicated facilities or conflicting decision-making. Private decisions to store produce are made in the expectation of personal profit. However, to the extent that there is competition between traders, the possibility of farmers or consumers being exploited is limited. Enterprises holding stocks against a rising market recognize that they are foregoing sales opportunities which their competitors may take: if stocks are held too long, the price may pass the peak, and higher storage costs will have been incurred to no advantage.

There are, however, two cases in which a marketing system of independent enterprises in competition may fail to provide adequate storage for a country's needs: first, where the professional competence of these enterprises is low, the service afforded is poor, and the costs higher than they need be; and second, where providing against unexpected or abnormal needs — for example, maintaining reserve stocks from one year to the next against a possible short harvest — may involve investment, stockholding, and risk-bearing responsibilities greater than the trade is willing to take. In the first of these cases the government may be called upon to take measures to raise the standards of independent traders and stimulate competition and, if these do not succeed, to take over the whole responsibility for marketing and storage. Most governments, however, limit their storage responsibilities to supplementing existing systems.

The maintenance of reserve stocks is commonly undertaken by governments as a service to the community, for the purpose of mitigating the effects of a sudden food shortage. This service is all the more necessary to the extent that existing marketing channels are inefficient. The costs of maintaining reserve or buffer stocks against crop failure or for price stabilization are inevitably higher than those of shorter run trading and storage. A buffer-stock marketing organization will therefore always find difficulty in achieving the necessary level of stock turnover in a market operating at lower cost. By the same token, however, there will be less need for buffer stocks in an efficient market. The role of storage is to have food stocks available when and where they are required. It is not an end in itself. If supplies can be quickly and cheaply distributed, there will be no need to tie up capital in slow-moving reserve stocks, and funds can be released for more directly useful employment.

The purpose of this study is to reveal and appraise present deficiencies in storage, to indicate the ways in which they retard production and endanger food supplies, and to examine improvement policies, especially within the context of a developing economy, which must make the best use of its available resources in order to meet expanding and more varied food demands.

Storage problems in developing countries

Storage problems are not confined to developing countries. But it is in these countries that better storage is particularly needed and can make the greatest impact on world food supplies. Moreover, because of the scarcity of resources in these countries, investments in storage facilities, like any other investments, must be planned with the utmost care and the facilities operated in the most efficient manner possible.

This section therefore discusses some of the storage problems encountered in developing countries. It begins with an account of the food losses that result

from inadequate storage. The need for adequate preparation of products for storage and the difficulties involved in ensuring this under the conditions existing in the developing countries are then reviewed. This is followed by an account of the problems posed by the changing demand for storage and some of the special difficulties of storage planning in developing countries.

Storage losses

Popular interest in storage is focused particularly on the aspect of losses. Once food is in store, it is subject to attack by a number of biological agents, including insects, molds, rodents, and fungi. It is widely believed that losses from such sources are enormous and that a substantial addition to world food supplies could be obtained by improvements in storage. There are, however, very few reliable estimates of the losses that occur in storage, and the few that exist apply to highly specific conditions. Estimates of the losses in the world as a whole (or even for individual countries) are extremely hazardous. Furthermore, while the prevention of the losses that occur at present would bring a net addition to food supplies, the improvements in storage necessary to prevent these losses involve a cost which must be weighed against the value of the food saved and against alternative means of obtaining an equivalent increase in food supplies.

An FAO expert committee estimated in 1946 that world storage losses for cereals, pulses, and oilseeds were of the order of 10 percent (5 percent from insects and mites, 4 percent from rodents, and 1 percent from mold fungi).[1] If this were correct, it would mean for cereals alone an annual storage loss of more than 100 million tons.

[1] FAO, *Destruction of food in storage by insects, mites, rodents and mold fungi. Report of an expert committee.* Washington, D.C., May 1946.

TABLE IV-1. – ESTIMATES OF LOSSES IN STORAGE IN THE UNITED STATES, AVERAGE 1951-60

	Loss in		
	quantity	quality	value
	Percent		*Million U.S. $*
Wheat	4.0	0.1	127
Rye	1.2	0.1	1
Barley	3.5	0.1	16
Oats	1.0	0.1	8
Maize	7.5	0.2	373
Sorghum, grain	5.4	0.2	22
Rice	2.5	0.1	5
Total cereals	...	...	552
ALL CROPS	...	...	1 042

SOURCE: United States. Department of Agriculture. Agricultural Research Service. *Losses in agriculture.* Agriculture Handbook No. 291. Washington, D.C., 1965. p. 69-70.

Estimates of losses of cereals in storage in the United States are shown in Table IV-1. Comparable data for the developing countries are rare, and there has been a tendency to quote instances of exceptional damage that are not at all representative.

The most recent estimate for India is that storage losses of food grains (including pulses) amount to 6.6 percent of total production (Table IV-2). The estimate is the work of a specialist committee set up to examine the available data and assess the nature and extent of losses. This example could be followed with advantage by other countries, for it is essential that estimates of losses should be based on realistic and representative investigations. The development and adoption of standard techniques for this purpose would help to reduce the area of misunderstanding and avoid overstatements.

TABLE IV-2. – ESTIMATES OF FOOD GRAIN LOSSES [1] IN STORAGE IN INDIA

Cause of loss	Wheat	Rice	Jowar	Bajra	Maize	Millets	Pulses	TOTAL	
	Percent								*Million tons* [2]
Rodents	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.0
Birds	0.5	1.0	1.0	1.0	0.5	2.0	0.5	0.9	0.7
Insects [3]	3.0	2.0	2.0	1.0	3.0	0.5	5.0	2.5	2.0
Moisture	0.5	0.5	2.0	0.5	0.5	0.5	0.5	0.7	0.5
TOTAL	6.5	6.0	7.5	5.0	6.5	5.5	8.5	6.6	5.2

SOURCE: India. Ministry of Food, Agriculture, Community Development and Co-operation. *Summary of findings and recommendations of the Committee on Losses of Food Grains during Postharvest Handling* (interim report). New Delhi.

[1] Loss in food value only. – [2] Based on average production in 1962-64. – [3] Loss caused by insects is quantified on the basis that a kernel damaged by insects has lost half its food value.

Laboratory experiments under carefully controlled conditions can provide useful data. More realistic perhaps are estimates of weight loss made by performing small-scale experiments in the field. Estimates of weight loss due to insect attack can be misleading, however, if they are based on a stock of food which is intact for a specified period — say, for 12 months. In fact, a farmer will be constantly withdrawing supplies for his own consumption during that period, and account should be taken of this when estimates of losses are made.

Furthermore, it is not sufficient to consider weight losses alone. Loss caused by biological agents is accompanied by damage to quality — for instance, holed seeds, contamination by insects, mites, fragments, rodent hairs, and excreta of insects and rodents. Such loss of quality may be difficult to measure, and losses in nutritive value (for example, by preferential feeding on the germ and other chemical deterioration of the food) even more so. It has been estimated that damage to the quality of stored grains caused by mites is ten times greater than loss in weight.[2]

Apart from any measurable loss due to contamination, there will also be occasions when the presence of a few insects may cause the rejection of a whole package or consignment of food.

Causes of losses

It is generally accepted that the principal losses in stored food in the tropics and subtropics are caused, in decreasing order of magnitude, by insects, rodents, and fungi. Losses by rodents or fungi may be predominant in exceptional cases, and depredation by birds may occasionally be important locally.

Trials conducted in Northern Nigeria[3] indicated that unthreshed sorghum stored for nine months without being disturbed suffered a mean corrected weight loss due to insects of about 8 percent; in some cases, however, a quarter of the crop was lost. From this work it was estimated that at least 4 percent of the sorghum and millet grain in store was lost to insects each year. For sorghum, the loss in 1962 was 115,000 tons, valued at £2.6 million, and would have been sufficient to satisfy the usual cereal requirements of 1.3 million people.

In various experiments in Ghana[4] in which farmers stored maize on the cob with the sheath, losses ranged from 8 to 16 percent over storage periods varying from 53 to 161 days. When maize was stored on the cob without the sheath, weight losses after 162 days of storage were 26 percent. Shelled maize stored for similar periods showed losses in weight as high as 34 percent.

It is only in exceptionally wet conditions that bacteria cause deterioration in stored dried products. The main group of microorganisms responsible for deterioration are fungi (or storage molds), principally species of *Aspergillus* and *Penicillium*, the growth of which leads in extreme cases to food becoming obviously moldy. At that stage, quality will be visibly affected, taints may occur, and heating is also likely. When such heating occurs, there is movement of water into the areas surrounding the heated spot and increasing amounts of food are spoiled by fungi. In addition, food is damaged by the heat and there is a loss of nutritive value. Storage fungi are likely to be of particular importance in the humid tropics, especially if there are no facilities for artificially drying the crops.

Apart from the deterioration described above, it is now known that some strains of certain fungi can produce mycotoxins, some of which are highly toxic to man and animals. The presence of aflatoxin, for example, may render groundnuts unsalable for some uses. This is thought to originate with damp conditions during harvesting, but faulty storage may increase its incidence.

Losses due to storage fungi are even less well documented than those caused by insects. Further research may well indicate that, even if losses in weight are not of the same magnitude as those caused by insects and rodents, the losses in nutritive value are significant.

It has been convenient to consider separately the effects of insects and fungi on food losses, both in quantity and quality, but there is a high degree of interrelationship between the various biological agents. For example, infestation by insects and mites will render the grain more susceptible to attack by storage fungi. In turn, where such molds are present, some insects that feed on molds will be attracted; indeed, the presence of such insects may be a useful indication that the produce supports some fungus growth, even if mold is not readily visible. Where heating occurs because of insect activity, the resulting translocation of moisture may provide favorable conditions for the development of fungi. In many instances, heating will be caused by a combination of both insects and fungi.

There is little doubt that on occasion rodents are responsible for substantial losses of many stored foodstuffs. It has been shown[5] that the three common types of rat in Bombay each consume about 26

[2] J. Pulpán and P.H. Verner. Control of tyroglyphoid mites in stored grain by the predatory mite *Cheyletus eruditus* (Schrank). *Canadian Journal of Zoology*. 43. 1965, p. 417-432.

[3] P.H. Giles, The storage of cereals by farmers in Northern Nigeria, *Tropical Agriculture*, 41 (3). 1964, p. 197-212.

[4] Information supplied by J.A. Rawnsley. FAO technical assistance expert.

[5] P.J. Deoras, Rat problem in India. *Pesticides*, Bombay, 1, 1967, p. 67-70.

grams of food per day. This quantity is equivalent to one sixth to one eighth of the daily ration of grain per person in the different States of India. Mice also consume considerable quantities of grain (about 26 grams per week). Like rats, because of their wasteful feeding habits they render much grain unsuitable for milling.[6]

Using such data on the amount of food consumed by rodents, various calculations have been made of the losses they cause to stored food. Such estimates show considerable variation. The rodent population needs to be very carefully estimated in the particular area under consideration. Account should also be taken of the fact that in certain environments rats live for all or part of the year under conditions where their food is largely waste material.[7]

Preparation of products for storage

A problem in many areas is that of preparing produce adequately before storage. Generally this originates in difficult harvest conditions. Most farmers have developed techniques of drying produce on the farm, but these may be only partially effective, particularly with continuously moist conditions or with a heavy crop and limited drying and labor facilities. In other cases, lack of training and neglect are responsible, for instance when attempts are made to store grain with 20 percent moisture content in airtight containers.

Preparation for storage consists mainly of drying, but cleaning is also important. Grains must be cleaned before any secondary operations are undertaken in order to permit maximum efficiency in the secondary operations, such as drying and treating. If grains have the right moisture content at the time of storage, they will be safe from losses due to fungi, and the possibility of insect damage will be decreased.

Drying is a complex phenomenon. Basically it entails the transfer of moisture from the center of the seed to the outer portion, where it can be evaporated. Moisture will move from the center of the kernel to the outside when there is a difference in vapor pressure. Manipulating or adjusting the vapor pressure, both in the grain and in the drying air, is the key to the drying process. Raising the temperature of the grain by blowing warm, dry air through it heats the kernel and changes the water in the seed to water vapor. The equilibrium attained in drying ultimately depends on four main factors: relative humidity of the air, moisture content of the grain, air temperature, and grain temperature. The equilibrium moisture content of grain may be reached only after a very long time, since grain is a living organism and changes its physical and chemical nature according to its environment.

Once a relatively safe moisture content has been attained prior to placing the grain in storage, it may be retained by limiting the aeration or air movement through the grain. Should a buildup of moisture or heat occur as a result of moisture migration or insect infestation, so that aeration is needed to maintain a safe storage temperature, it will be necessary to regulate the relative humidity of the aerating air, in order to retain the moisture content of the grain at, or bring it down to, a safe moisture level.

There are various methods of drying grain. For "in-bin drying" grain is placed in a storage bin equipped with either ducts or a false floor that permits warm, dry air to be forced through the produce. In some instances, storage is then carried out in the same bin. This procedure is more often used in farm storage drying, because it permits multipurpose use of the structure, and the drying unit is normally smaller than for other methods.

This type of drier is sometimes called a batch drier. However, this term is more often used for special units where a relatively small volume of grain is placed in a drying machine. This may be either the tray type or screen type drier, in which thin layers of grain are dried at one time. Drying is carried out fairly uniformly throughout the layer, and when the batch is dried to the equilibrium moisture content, it is removed and placed in storage. This type of unit, frequently found on farms in developed countries, has the disadvantage of a fairly high labor requirement.

In large farm and commercial operations, there is a tendency to favor the "flow-through" type of unit, which permits full automation of the drying process. The equipment includes auger or belt conveyers for placing grain in the drier unit and for removing it and carrying it to store. Complete automation is dependent either on thermal controls or, more often, on a "humidastat," which reacts to the relative humidity of the drying air as it leaves the grain so as to control the operation of the mechanism removing the grain from the drier. The flow-through type of unit is often found in large terminal storages.

Farmers and handlers of grain in the developing countries are generally aware of the need for adequate drying. Sometimes, however, the marketing system and related institutions afford them little incentive to undertake it. Farmers may be required to hand over part of their crop to a landlord as rent or to a merchant in repayment of credit, thus deriving no benefit from the care taken in drying. Under some government pricing systems, grain is bought

[6] F.P. Rowe, Rats and mice in corn ricks, *Agriculture*, 69(7), 1962, p. 322-324.
[7] FAO, *Preservation of grains in storage*. Washington, 1948.

by weight without deduction for moisture content above an established level, which can be a direct disincentive to drying.

In some situations, farmers and local buying agencies lack the financial means to acquire the equipment made necessary by adverse harvesting conditions. Thus the successful development of a second rice crop in parts of southeast India is hindered by the need to acquire artificial driers, since harvesting must take place during a wet season. Access to the necessary equipment may depend upon government facilitation of credit on favorable terms or upon outside aid.

Changing demands for storage

The need for storage facilities to protect agricultural products against deterioration after harvest and to hold them until needed by consumers and other buyers is clear. It follows that producers are likely to be deterred from increasing their output if there is a danger that before it can be sold it will deteriorate for lack of adequate storage, or if suitable storage would cost so much as to make the crop unprofitable. Specific instances of such effects are many. For example, the San Lorenzo irrigation and settlement project authority in Peru found it necessary to provide storage for settlers' grain while awaiting sale, since heavy wastage losses would have discouraged continued production.[8]

As a problem in implementing development plans, storage difficulties probably show up mainly in the form of low selling prices immediately after harvest, though this is due more to the scarcity of finance for holding produce than of the physical means for doing so. This is certainly the case in Western Nigeria, where the purchase of maize at harvest time for a 100 percent seasonal price rise is considered the best investment for a person who has cash in hand from sales of cocoa.

Cooperatives and public agencies embarking upon produce purchasing and obliged to buy varying quantities in order to meet obligations to members or under price guarantees have found that storage inadequacies may destroy the confidence of the farmers they seek to serve. Several of the official price-stabilizing agencies for grain in Latin America have found themselves in this situation. Some of the worst cases of large-scale weevil infestation seen in Africa have occurred where governments have set up stabilization stocks without prior training of staff to ensure proper supervision.

As urbanization proceeds and incomes rise, changing consumption patterns generate new storage requirements. This has been especially notable, for example, in urban areas in the Near East which have benefited from the exploitation of petroleum resources. In some cases shipments of perishable produce from distant production areas have been obstructed by lack of suitable storage to hold them on arrival. In the absence of such storage, particularly refrigerated storage, a shipment often has to be sold in its entirety, with the result that prices decline sharply, and the producers concerned are deterred from further increasing their production.

In many developing countries the utilization of valuable livestock-raising resources is held far below its potential level by the sharp seasonality of natural grazing. This is a problem throughout the Near East and in most of Africa. It merits special attention in view of the relatively greater shortage of protein food anticipated over the coming decades and the direct contributions that an efficient livestock industry could make to the foreign exchange earning capacity of many African countries.

The seasonal loss of grazing and feed over much of the world causes the gains in quantity and quality of meat, milk products, and eggs which are made in the wet season to be lost in the dry weather. In Europe the winter shortage of natural grazing is countered by storing hay and other feedstuffs produced in the summer.

Difficulties in storage planning

While efforts are being made in almost all the developing countries to establish new storage facilities to meet development requirements, not all of these have been adapted to local conditions. Some have involved a considerable waste of scarce investment resources.

Special difficulties in storage planning in developing countries include the following:

(*a*) absence of adequate data on production, prices, transport and storage costs, market flows and existing storage;

(*b*) official ignorance of the marketing system and marketing methods, together with misconceptions about middlemen, hoarding, speculation, etc.;

(*c*) lack of a clear policy, e.g., regarding producer and consumer interests, the responsibilities of the state and of private trade;

(*d*) problems caused by the shortage of finance;

(*e*) shortage of technical expertize.

Errors in determining the location and scale of new storage units have been serious in some cases where large enterprises or governments have sought to

[8] F.R. Burdette, *Agricultural marketing with special reference to the San Lorenzo irrigation project*, FAO/EPTA Report No. 1759, Rome, 1963.

offer public storage services in areas where they have not been used previously. Many plants erected under such conditions have been wrongly located, and as a result they have either been used much less than their capacity would warrant or, if used fully, been subject to continuing operational handicaps. Examples of concrete silos which rarely hold grain are well known. There are still instances of government warehouses built ten years ago that remain empty 90 percent of the time.

Transport arrangements between production, storage, and consumption points have not always been fully investigated. It has happened that grain stores have been erected at points inaccessible to producers during certain seasons of the year owing to poor roads. The concentration of storage facilities at central locations has led to grain being brought in from the producing area after harvest and carried back to the area of production later in the season, thus incurring a double burden of unnecessary transport costs.

Often the pattern of grain handling in an area is not adapted to large-scale storage in bulk. Decisions have been made to construct highly mechanized silos which reflect cost relationships for capital and labor quite at variance with those prevailing in the country concerned.

The "push-button" type of grain store eliminates much hand labor, but it involves the employment of a skilled staff throughout the year, even if it can only be used for a limited season. The charges necessary to cover its cost may be so high as to deter commercial users and thus compound the difficulties. Maintenance problems are magnified in the developing countries, especially for the more complicated storage equipment. Many refrigerated stores in developing countries are out of action for lack of available spare parts or qualified staff to handle maintenance operations.

Some misplaced storage investments reflect the emergence of situations which seemed improbable when the project was first undertaken, such as radical shifts in demand and prices which have reversed production trends after a plant has been built, or the involuntary abandonment of a development program in which the plant would have been a key feature. In a number of cases, however, the sponsors may have relied too much on professional advisers who attached undue weight to technical as opposed to economic efficiency, or they may have condoned misplaced showmanship on the part of public authorities anxious for quick, impressive action.

Attention must also be paid to the scope for modifying storage requirements by means of developments in production and handling procedures. Sometimes seasonal pressure on existing storage facilities can be averted by measures to change the pattern of production. Thus the production of eggs has been shifted to a more uniform year-round basis by adjustments in breeding schedules, the provision of additional feed, and the use of artificial lighting. Similarly, the development of techniques for freezing and drying eggs and the growing demand for eggs in this form by caterers and manufacturers have reduced the need for the preservation of eggs in shell.

Sometimes storage difficulties are exacerbated by the government's own policies. For example, the movement sequence prescribed under a particular pricing scheme may require that supplies be moved first into local assembly storage after harvest, then into government storage, and finally into distribution and mill storage, instead of permitting part of the produce to move directly from farm to mill and thereby greatly reducing the total storage capacity required.

Storage of durable products

This section deals first with storage structures for durable products and with methods of preventing and controlling losses due to storage pests. It then discusses the improvement of storage at successive stages from producer to final consumer. Particular attention is given to economic aspects, since in the developing countries, with their scarce resources, these must always be kept in mind; they may well point to other solutions than those first apparent on the basis of experience elsewhere.

Storage construction

Construction materials

In the developing countries most storage for agricultural products has until recently been constructed by hand from simple local materials. Experience has taught people to make the best use of available material. Containers for grain may be made of straw and bamboo splits, interwoven with palm leaves or cotton stalks. A mixture of mud and cow dung

may be plastered over the plaited fabric, to prevent the grain leaking out and to exclude insects and damp. Such receptacles usually stand under cover on layers of straw or paddy husk or on raised brick or wooden platforms, for protection from ground moisture.

Unfortunately, although many of these storage structures may provide fairly adequate protection from the weather, they are not well suited to the scientific prevention of rodent damage and insect infestation. Fumigation gives good results only where godowns can be made reasonably airtight. Ease in cleaning is also important.

Soil has not proved to be an effective material for storage construction. It is extremely difficult to maintain sanitary conditions in containers in which soil is used as a primary material, and it lacks the strength necessary for large containers. It does have the advantage of low cost, however, and is still widely used in areas of temperate climate — for example, in potato storage.

The quality of storage structures made from clay can be improved in several ways. Although fibrous material can be used as a binder with clays and can reduce the size of the cracks which occur, it still leaves a porous structure which can harbor insects and permits the free movement of moisture and water vapor into the produce. Efforts are being made to incorporate an impermeable vapor barrier in the form of a sheet of polyethylene or vinyl plastic between double layers of clay. Construction is more difficult in this case, and it is essential that special care be taken at the closures to assure a relatively airtight unit. Another means of improving clay is to mix in about 20 percent of cement, to give a soil-cement type of concrete which can be worked to provide a fairly smooth inner surface. If special closures can be developed, soil-cement may provide a partial answer to improved farm storage. The very thin plastic or permeable liner, supported by a welded mesh frame, shows promise for low-cost construction.

In units using a plastic or other impermeable liner or envelope cover, it is possible to provide a hermetically sealed storage container. If grain is dried to a safe moisture level and placed in any hermetically sealed container, the natural respiration of the grain will alter the atmosphere within the container by using the oxygen and expelling carbon dioxide, so that insects cannot live in the grain. In such units the cost of storage, if not the cost of the structure, is reduced by eliminating the need for much of the usual insecticide treatment. The hermetically sealed storage unit, in the form of an underground pit, has been used with success in Argentina: a typical construction utilizes reinforced concrete to form an inner and outer shell, with a moistureproof layer between; the roof is protected by a soil cover. Careful installation of a vapor barrier is essential, but this may well answer the need for low-cost storage in those countries where cement can be manufactured and aggregate is relatively easy to obtain.

In areas with low relative humidities throughout the year or with high relative humidities associated with fairly low temperatures, so that equilibrium moisture levels in the grain are not increased, it is possible to utilize low-cost structures made of fibers, soil, or stone, provided insect-control precautions are observed. The maize crib is typical of this kind of low-cost structure. It utilizes mesh-type walls constructed no more than a meter apart and has a floor and protecting roof made of locally available materials. Roof overhangs must be sufficient to protect the grain from wind-driven rain.

Wood, together with plywood and fibreboard, is particularly well suited to the needs of low-cost storage facilities for food grains and other durable agricultural products. It is one of the most readily available materials for building and construction. When suitably treated, it is resistant to fungus and insect attack and to weathering, although added protection is required to exclude rodents, and careful construction and good housekeeping to limit pest problems. It provides better thermal insulation than concrete, and because it absorbs moisture, there is less risk of condensation within the container. Wood products can readily be prefabricated for either the rectangular or cylindrical type of bin.

The most attractive feature of these materials is their low cost. However, the initial cost is not the only factor to consider in deciding what type of construction to follow. An initially more expensive structure may be less expensive in the long run because of longer life or because of the lower cost of handling grain in conjunction with it. A low-cost structure is low-cost only if it provides protection adequate to keep grain losses to an acceptable minimum.

Among more elaborate and costly materials, concrete is commonly used for grain storage, particularly for bulk storage structures. The concrete must be of good quality, so that it will resist the passage of moisture, and it is essential to obtain a smooth, clean surface. Grain storage bins of reinforced concrete are normally constructed in either rectangular or cylindrical shape. Rectangular bins are convenient and save space, but they require substantial steel reinforcing to resist stresses at corners and in the walls. The circular bin is more economical to construct because it requires less reinforcement.

Concrete used for bin construction should have a waterproof material incorporated in it. In addition, it may be advisable in many situations to apply waterproof material to the concrete to reduce the uptake of water. Sodium hydrosilicate is one of the most useful chemicals for this purpose.

Metals also provide good materials for the construction of storage containers. They are light in relation to their strength, and their homogeneous nature permits accurate design. Aluminum or steel can be used. Steel should be treated against corrosion, and for products which are easily tainted, such as palm oil, it may be necessary to use stainless steel.

Sheet metal products may be smooth or corrugated and may be used for rectangular bins with vertical walls, for vertical cylinders, or for clear-span structures with arched roofs. The vertical cylindrical bin makes possible the most accurate design. Large, flat bulk storages will require a different type of wall construction from those in which produce is stored in bags. In bulk storage the walls must be designed to resist horizontal pressure.

There is growing interest in the use of welded metal mesh for containers used for storage of grain products. Such units require some form of inner liner which will contain the individual particles of grain. Among the materials being tried are the polyvinyl chlorides, polyethylene, fibers such as hessian and nylon, and butyl sheeting. Such materials involve special problems with closures, removal facilities, and rodent control.

Construction methods

In construction methods, questions of structural strength have been given considerable attention, but the requirements of environmental control have often been neglected. Thermal and moisture control are vital considerations for the storage of food products.

Proper foundations are of critical importance in grain storage structures because of the heavy weights involved. The soil-bearing strength must be investigated. Loading includes both that of the product and the dead load of the structure, each of which can be computed with accuracy. Estimates must be made of wind forces and other loadings.

Foundations must be so constructed as to distribute the load applied to them. They must be of sufficient depth to exclude burrowing rodents and of sufficient strength to withstand their attack. Special care must be taken in the moistureproofing of walls and foundations and in the incorporation of a moisture barrier in foundation walls.

Floors must be designed to support the total weight of stored products. It is equally important that they incorporate a vapor barrier to eliminate the movement of moisture from the soil to the stored product. Floors should be smooth and free from cracks.

Walls can be made of a wide variety of materials, but they must have smooth inner surfaces so that they can be effectively cleaned and sealed to exclude insects. They must be designed to resist the pressure exerted by the stored products and must be of sufficient strength to resist rodent attack.

Roofs are required in every type of storage structure in every area of the world. They must shield the product from rain and from the direct rays of the sun. They should be so attached to the structure as to prevent the entry of birds and flying insects. In some areas a roof that will reflect a large proportion of the light rays which cause heating will be beneficial.

All openings in a storage building should close properly and afford protection against the entry of birds and rodents. Measures must be taken to prevent rodents from climbing poles, pipes, wires, and any shafts connected with the building. Guards are needed to protect openings in foundations, outer walls, floors, roofs, eaves, grills, windows, vents, vent pipes, elevators, and spaces around pipes and wires on other installations joined to the building.

A building for bag storage will require smooth walls with uncracked finishes and special care at all corners to reduce the collection of dust and spilled produce. Pillars, which inevitably reduce the storage capacity, should be kept to a minimum, so as to facilitate stacking and pest control. Construction should make it possible to seal the building, so that there will be little leakage when it is fumigated.

A vaporproof structure is seldom warranted except for very high-priced produce. In normal construction it is therefore necessary to incorporate facilities for aeration if full moisture control is to be possible. Where there are large differences between day and night temperatures, it may be advisable to reduce the movement of heat through the structure by such practices as providing separate roofs for shade, painting the roof and walls white, and using construction materials with low rates of thermal conductivity or high thermal capacity.

Bag storage structures should be designed to control temperature, not only for the control of moisture but also for the purpose of providing suitable working conditions within. Certain insect problems are reduced if relatively high storage temperatures can be induced, but the secondary problems of moisture migration and difficulties of working within the structure preclude this approach. Since a storage structure can gain much heat through windows or skylights, it is better to provide artificial lighting where feasible.

Structures for the bulk storage of grains should be designed and constructed for this purpose. Buildings originally designed for bag storage can be adapted for bulk storage by constructing secondary walls to support the load. However, these walls use space and increase the difficulty of sanitation within the storage building.

Bulk storage frequently takes the form of a cylindrical bin, especially for smaller volumes of grain

or where the structure is divided into smaller units. As with bag storage, it is essential to provide a structure which will permit full control of moisture. Bulk units should be equipped with ducts or pipes which will permit aeration of grain that is kept in storage for more than brief periods. Ideally they should incorporate mechanical handling equipment. A flat floor requires some device to ease removal work, whereas hopper-bottom structures, though self-cleaning, are more difficult and costly to construct. Where frequent filling and emptying are required, laborsaving makes the hopper bottom more economical. If it is not possible to obtain mechanical equipment for removing the grain from storage and placing it in bags for transport or sale, it is advantageous to raise the foundation of the storage bin at least one meter above the ground surface to permit gravity emptying of most of the grain.

All of the construction materials listed above can be utilized in bulk-storage structures. However, since metal is an extremely good conductor of heat and since very thin sections are utilized, bulk-storage structures made from metal should be protected by roofs from the direct rays of the sun, or they should have integral roofs with white-colored or other reflective surfaces. With metal sheets, a suitable mastic should be used along all joints and at all bolt holes, to provide the best possible water- and gastight joint. Expansion and contraction of the metal sheets reduce the effectiveness of such seals after a time. In all bulk storage it is important to take special care at the junctures of walls and roofs, so that insects and rodents are excluded.

Pest control

The principal pests of stored food are microorganisms (mainly storage fungi), insects, mites, and rodents; occasionally birds are also important. The relative importance of these pests varies with climate and stage of development. Thus fungus attack is likely to be a particular hazard in the humid tropics. Mites are particularly important in temperate climates, whereas insects assume great significance as pests in the tropics. Rodent problems tend to be greater in developing countries which have not achieved the same standard of urban rodent control as many of the developed countries.

A few storage insect pests attack crops mainly while they are growing in the field; except in special cases, it is unlikely that field sprays will be applied to reduce infestation in storage. The siting of stores outside the flight range of the field-infesting species, coupled with thorough cleaning of the stores between harvests, can usually reduce infestation.

Attacks by insects and fungi are facilitated when the grains are damaged. Thus the mechanical harvesting and handling of paddy increase its susceptibility to attack. Incomplete harvesting may provide reservoirs of field infestation. For example, mechanical harvesting, which does not clean the ground as thoroughly as hand harvesting, may leave enough food on the ground to support a significant population of rodents, which can live in the field and perhaps make excursions to nearby food stores when field supplies are exhausted.

Generally, the growth of storage molds may readily be prevented by proper drying of the produce prior to storage. Thorough drying will prevent the growth of storage molds and any other fungi which are potential producers of mycotoxins. The formation of some mycotoxins can only be eliminated by rapid drying immediately after harvesting. After drying, rewetting must be avoided at all times. Drying is a preventive measure and cannot be replaced by the use of fungistatic agents or detoxifying processes.

Attack by insects and mites cannot be prevented economically by drying. In the rare event that produce is uninfested when it is taken into the store, there is the possibility of preventing subsequent infestation. Generally, produce will have some infestation brought in from the field or acquired subsequent to harvest. Deterioration of stored food by insects, mites and fungi is accompanied by the production of heat; regular measurement of temperature enables appropriate remedial measures to be applied at an early stage.

The control of storage pests may be based on physical or chemical methods. Storage of grain in a container sufficiently airtight to ensure that insects will die from lack of oxygen is a useful technique. No chemicals are required, so there are no problems of residues or of supervision of the application of pesticides. Airtight storage on a small scale is useful for farm storage if it is economically feasible.

Cooling to 17°C or less has been shown to reduce the rate of development of all the common grain insects to negligible proportions. It remains to be seen, however, whether this technique would be economically feasible in tropical climates.

The use of radiant energy for the treatment of various foods has been given much attention in recent years. Radiation is particularly attractive as a disinfestation measure for grain, as relatively small doses may be used to kill or sterilize insects in the grain. At these low dosages, radiation does not impart any physical or organoleptic defects to the grain. Government clearance for the consumption of irradiated wheat has already been given in the United States and the U.S.S.R.

In large installations where grain is mechanically handled and bins can be protected against reinfestation, radiation treatment is convenient and can be competitive with conventional methods of disinfestation. Such treatment appears economically feasible at present for installations where grain is mechanically handled at rates above 30 tons per hour. A pilot grain-irradiation plant recently installed in Turkey, using a cobalt-60 radiation source, should provide the opportunity for a practical appraisal of this technique.

The technique may also be applied to packaged produce in bags or other containers, but efficiency would not be as high as with bulk grain owing to the difficulty of obtaining a high absorption of energy. Special attention must also be given to the packaging, to provide barriers against reinfestation by insects.

Much insect infestation may be reduced by strict attention to hygiene, such as regular sweeping and burning of all spillage, but there is little doubt that the major attack on insects will continue to be based on the use of chemicals. Prevention and cure can be achieved by the use of insecticides, although there is room for improvement in their use. The range of insecticides which can be used on food is very limited because of the toxic hazards to man, and the quantities applied must be carefully controlled.

Although newer and safer pesticides will be developed (and new insecticides will be required to combat resistance), better results may be achieved by using smaller amounts of insecticides. The use of large amounts of insecticides on food is achieving relatively little control of pests, while the food is being contaminated with unnecessarily large amounts of pesticides. Although this is often due to the method of application, there are some pest-control measures in current use which are largely palliative, such as the spraying of stacks. A stack of bagged produce cannot be completely protected against insect infestation with a deposit of insecticide, especially in the interstices between bags, for some insects will penetrate the bags or lay their eggs between the weave.

Fumigation is an effective way of killing all stages of insects in stored produce, but it offers no protection against reinfestation. Unless special precautions are taken, it may be necessary to refumigate later, with inevitable further expenditure and (with most fumigants) an increase in residues.

More emphasis needs to be given to the use of combined chemical and physical methods of control, whereby efficient use is made of small amounts of pesticides, with minimum residues and at minimum cost. One technique which can substantially reduce the amount of insecticide to be applied is the permanent sheeting of stacks. Gasproof sheets are left in place to act as a physical barrier to insects after fumigation, thus eliminating the need for repeated fumigations and external spraying of stacks. This technique requires further investigation, as condensation may occur in certain circumstances, particularly if the produce is not adequately dried.

Excellent protection may also be provided by a porous mechanical barrier. A thick calico sheet (of tight weave to prevent insect entry or the laying of eggs) provides protection against reinfestation when gasproof sheets are removed after fumigation and obviates any condensation problems. Further research is required to show whether inexpensive, thinner cotton sheeting is effective. Improvements in packaging of both sacks and smaller packs should lead to a reduction in damage by insects and fungi. The use of shipping containers, if properly designed, may also lead to the shipping of insect-free produce and the elimination of cross-infestation on ships.

In view of the limited value of fumigation, unless it is combined with a physical method of preventing reinfestation, increasing use is being made of insecticidal spraying of the individual grains (on a small scale, dust admixture is more practical). This technique, however, is more effective when the produce is initially free of insects. One of the most difficult tasks is to improve farm storage, and this may be the most practical way of protecting the farmer's stocks (perhaps on a cooperative basis). It may also provide protection of bulk-stored grain in structures of less exacting specifications than if fumigation (requiring gastight structures) is the major method.

Storage costs

The economic principles are not difficult to lay down. The question usually asked before undertaking investment in storage facilities is: will the savings or income resulting from the new investment be sufficient to cover running and maintenance costs, interest charges on the capital employed, and amortization of the investment over the effective lifetime of the plant and equipment, and still offer net benefits to the investor? This would seem to involve nothing more than a straightforward comparison of costs and returns. In practice, however, while costs can generally be estimated fairly accurately, returns are more difficult to evaluate. They depend very much on how intensively a storage unit is used and (a factor not easily measurable) how much benefit it brings in terms of convenience over a number of years.

The cost of storage structures varies widely, depending on scale, location, construction materials, and the extent to which labor or mechanical power may be relied on. Units of 40-ton capacity made up of a welded mesh with a butyl liner, placed on a concrete slab, have been erected for U.S. $15 per ton. Cor-

TABLE IV-3. – COSTS OF GRAIN STORAGE [1]

	Capacity, in tons			
	300 A	3 000 B	5 000 C	15 000 D
	..... *U.S. dollars*			
CAPITAL COSTS				
Building and site	14 500	160 000	84 000	960 000
Machinery	10 000	117 000	10 000	500 000
Service installations	1 300	50 000	10 000	214 000
Planning and design	1 000	18 000	3 000	90 000
Supervision	700	5 000	4 000	36 000
TOTAL CAPITAL COST WITH DRIER	27 500	350 000	111 000	1 800 000
Per ton capacity	92	117	22	120
ANNUAL CAPITAL COSTS				
Depreciation: Buildings [2]	1 418	13 500	4 550	77 850
Machinery [3]	1 359	12 000	1 000	51 500
Installations [3]	177	5 100	1 000	22 000
Total depreciation	2 954	30 600	6 550	151 350
Interest [4]			4 440	
Loan amortization [5]	—	—	11 100	—
TOTAL ANNUAL CAPITAL COSTS	2 954	30 600	22 090	151 350
Per ton capacity	9.85	10.20	4.42	10.05
OTHER OVERHEAD COSTS				
Permanent staff	—	6 000	2 800	10 800
Maintenance: Buildings	70	400	250	2 400
Machinery	150	1 750	500	7 500
Installations	20	750	30	3 210
TOTAL	240	8 900	3 580	23 910
Per ton capacity	0.80	2.97	0.72	1.59
Total annual overhead costs	3 194	39 500	25 670	175 260
ANNUAL OPERATING COSTS [6]				
Seasonal staff	300	200	[7]	400
Fuel	300	1 000		10 500
Power	—	2 800		14 000
Miscellaneous	100	500		2 500
TOTAL ANNUAL OPERATING COSTS	700	4 500		27 400
Per ton	2.33	1.5		1.83

A. Village level - developed country
B. Wholesale level - developed country
C. Wholesale level - developing country
D. Harbor level - developed country

SOURCES: Examples A, B and D from International Union of Local Authorities, *Grain storage*, Technical Series 2, The Hague, 1968; example C based on an FAO project in Somalia.

[1] The developed country examples are silo storage; the developing country example is warehouse storage in bags. – [2] For A and C over 20 years; for B and D over 30 years. – [3] For A and C over 10 years; for B and D over 15 years. – [4] For A, B and D an interest element appears to have been included together with depreciation; for C interest is equalized at 8 percent. – [5] Over 10 years. – [6] On the assumption that turnover is equal to the total capacity. – [7] See Table IV-5.

rugated metal stores holding 80 to 400 tons might cost from $25 to $50 per ton. Monolithic concrete silos holding 10,000-15,000 tons could range from $45 to $70 per ton. The cost of the large units will include a more or less heavy expenditure for bulk-handling machinery, which might raise the capital cost of storage by as much as 50 percent.

The data in Table IV-3 are intended as examples of storage costs and have no general validity. In the third example (C), drawn from a developing country, a much lower capital cost has been achieved, chiefly by a smaller outlay on machinery and service installations, such as electricity, water, heating, ventilation, and sanitation. The use of local materials and cheap labor has also contributed to lower costs, although cement and roofing (being imported) are expensive. The structure itself, although adequate for its purpose, could not be expected to remain serviceable as long as those in the other examples. To a certain extent, the capital cost of the latter stores is increased for the smaller buildings because of the need to maintain a vehicle compound — whose size does not increase proportionately with the size of the store. It should be noted also that the figures given are approximate and are valid only for separate plants built on normal foundations without piling or additional civil engineering works.

These costings flatten out considerably, however, when calculated on an annual basis. The use of borrowed funds, repayable over a relatively short period, almost doubles the annual capital cost in the third example (C). The remaining overhead costs, however, including a rather high element for labor, are more advantageous in the developing countries, but they may penalize medium-scale structures where labor costs are high.

These figures represent the overhead costs that have to be met regardless of the actual quantity of grain stored. Comparative costs in terms of stock turnover are shown in Table IV-4. It is

TABLE IV-4. – OVERHEAD COSTS OF GRAIN STORAGE IN RELATION TO TURNOVER

Turnover as percentage of capacity	Capacity, in tons			
	300 A	3 000 B	5 000 C	15 000 D
Percent	..... *U.S. dollars per ton*			
0.5	21.30	26.34	10.28	23.28
1.0	10.65	13.17	5.14	11.64
1.5	7.10	8.78	3.42	7.76

A. Village level - developed country
B. Wholesale level - developed country
C. Wholesale level - developing country
D. Harbor level - developed country

SOURCES: See Table IV-3.

immediately apparent that in comparable situations the utilization of storage capacity has a much greater effect on overhead costs than the scale of the storage unit, even though large-scale structures may be associated in particular circumstances with under-utilization. Both observations, however, are a warning against erecting capacity in excess of what may reasonably be needed.

The examples from developed countries in Table IV-3 show operating costs to be roughly a fifth of the overhead capital costs for the village and harbor-level structures, and about a ninth for the wholesale level storage (assuming in all cases that the annual turnover is roughly equal to the storage capacity employed). This has the effect of bringing medium-scale storage more nearly into line with the others. These examples do not, however, take into account the cost of holding stocks. This aspect is covered in the figures in Table IV-5, drawn from the grain-marketing project in Somalia treated in the third column of Tables IV-3 and IV-4.

In this case the cost of finance is almost a third of the total storage costs. On the other hand, if the store were to have an annual turnover equal to twice its capacity, both the overhead cost and the cost of finance per ton would be halved; other costs per ton, being proportional to the turnover, would remain the same. However, it must be borne in mind that overheads vary with capacity utilization, whereas the cost of finance depends on the length of time the produce is stored.

When planning the construction of new storage facilities, transport must also be taken into account. Small stores imply short distances. Depending on the area of distribution, there will often remain the alternatives of multiplying small units or consolidating storage in large structures. In the latter case, any additional transport costs arising from the double movement of grain will have to be set against possible economies of scale.

The cost of shrinkage or other forms of loss has not been taken into account, but this factor will weigh heavily where the type of storage available is inadequate.

TABLE IV-5. – COST PER TON OF STORING RED SORGHUM IN SOMALIA

	Som. shillings	U.S. dollars
FINANCE FOR PURCHASE, BAGGING AND TRANSPORT		
Purchase of grain at Som. sh. 22.00 per bag of 95 kg	231.58	32.42
Bags: 11 at Som. sh. 3.20	35.20	4.93
Transport: 60 km at Som. sh. 0.30 per ton/km	18.00	2.52
Field labor	3.00	0.42
TOTAL	287.78	40.29
STORAGE COSTS FOR 5.000 TONS FOR 12 MONTHS		
Cost of finance (Som. sh. 287.78) at 7 percent	20.14	2.82
Overhead costs [1]	36.71	5.14
Other costs [2]	11.57	1.62
TOTAL	68.42	9.58

SOURCE: FAO project in Somalia.
[1] From Table IV-3. – [2] Depending mainly on grain quality and seasonality of business.

Farm storage

In the developing countries the majority of the population still lives in rural areas and draws its food supplies either from a family plot or a farmer nearby. It is therefore probable that roughly half of the basic grains produced do not leave the area of production. Even when commercial development intensifies and more of a farmer's output is intended for the market, he may still keep a substantial proportion in his own hands well into the postharvest season. One consideration is security against future uncertainties; another is the normal economic motivation of holding part of his salable output for a price rise later in the season.

Certain disadvantages are inherent in storage on the farm. Many traditional structures are not easily adapted to efficient pest-control techniques. Multi-purpose barns increase the risk of infestation by rats or insects. Unless drying facilities are also available, there may be a danger of large quantities of grain going musty and deteriorating badly in value. Control of moisture and temperature, cleaning, fumigation, and rodent control involve specialized skills. Poor communications during the wet season in many tropical countries may prevent the evacuation of stocks over a period of months.

On the other hand, these disadvantages may to some extent be outweighed by the extra care that the farmer will devote to his own stocks. There is also an overall economic interest in encouraging and assisting the development of efficient farm storage. The load on other storage during the immediate postharvest peak is greatly reduced if part of the market supply is held in farm storage for some months. Whereas central storage generally involves direct investment costs, farm storage includes a higher input of local materials and labor, for which there may be little alternative employment. The burden on transport facilities is also lessened, both

by reducing the likelihood of hauling the produce back to the producing area later in the year and by spreading the demand through the season, which makes possible a fuller utilization of a smaller total investment in transport vehicles and facilities.

In developed countries, monthly price increments subsequent to the harvest are considered a normal inducement to the producer to participate in the task of holding grain in order to even out deliveries to consumers. Comparable policies, coupled with advisory and financial assistance in the construction of improved farm storage facilities, merit consideration in the developing countries.

A major problem in these countries is that many farmers are under severe pressure to sell their marketable surplus as soon as it becomes available. Holding the surplus in store is feasible only if it can become a basis for credit. Supervision by credit agencies of stocks in the hands of small farmers involves obvious difficulties. Some governments in developing countries have initiated programs to establish local storage where farmers may deposit grain and receive credit against it or use it as collateral, as in India and the Republic of Korea. Others have preferred to concentrate upon direct purchasing at harvest time and to shoulder the consequent heavier burden of central storage and financing.

Local assembly and community storage

The part that storage plays in the movement of grains from producer to consumer varies from area to area, depending on the extent and direction of the marketing channels. In largely subsistence societies the grain produced may not leave the village. Each family will maintain its own stocks for seed and for consumption through the year, and perhaps hold over reserves from abundant seasons. Under such circumstances each family has its own store. In areas with a tradition of common storage, it may be possible to store all the grain of a village in one unit, owned cooperatively or communally. This concentration may afford opportunities for economies from bulk storage and fumigation, provided the different owners feel that their individual interests are adequately protected.

A common difficulty is low utilization of capacity. Full use of storage space has been difficult to achieve under the program of the Indian Central Warehousing Corporation, for instance, because of the absence of uniform grading procedures and the need to keep individual lots separate and accessible on demand.

At the present time, structures for storing produce in bags are found in many developing countries because of the availability of labor, the small size of the units handled or supplied by one producer, and the potential for rehandling or redistribution without the need for new containers. Where storage is to be short-term, as is the case when purchases by a marketing board are held for a limited period during the harvest season, the main requirement may be for a moistureproof slab and roof, and a fence to guard against theft. For long-term storage, it is essential to provide conditions which will permit full moisture control and facilitate control of insects and rodents. The capacities of structures will determine the amount of mechanical equipment which may be used to advantage.

Opportunities for the multipurpose use of such facilities merit consideration when deciding on their design. The Federation of Agricultural Consortia in Italy decided on warehouse rather than bin or silo structures because of a complementary seasonal demand for grain storage and farm supplies, such as fertilizer, seeds, and machinery. A similar trend can be anticipated in many developing countries, as farmers increase their purchases of such inputs in order to obtain higher yields.

Distribution and transit storage

Central distribution and transit storage normally involve the storage of large quantities of grain, which must frequently be handled quite rapidly. The need for rapid movement favors the utilization of bulk-handling procedures. Hence, more often than not, terminal storage utilizes a number of silos, each with capacities of from 100 to 400 tons of grain. The structure will incorporate equipment for bulk unloading of ships, cleaning, weighing and delivery of the material to the storage bins, fumigation, treatment, aeration, drying, and shipping. Conversely, if grain is to be exported, the structure may have facilities for delivery by truck or train for the filling process and equipment for loading ships.

Access to convenient storage facilitates the assembling of small lots from a number of producers or local buyers into lots adapted to particular orders. The cleaning, testing, and drying of grain, and sometimes the husking and shelling of maize, can often be carried out most economically at local buying plants, to which the producer can deliver his grain directly after harvest. If grain arrives for storage with a high moisture content and contains much foreign material, then arrangements for drying and cleaning will be needed. However, these may be either power-driven machinery or simple hand sieving and sun drying. The extent of mechanical equipment to be installed in a grain-storage plant should be related to the turnover of grain during the year and the cost of labor. In such plants, advantage can also be

taken of specialized equipment for moving grain from place to place and weighing it accurately — for example, hand trucks, conveyers, bagging scales, and automatic scales. The type of storage and ancillary equipment most suited to this type of enterprise depends very much on the terms on which grain is sold in wholesale channels and the type of transport used. If it is to be sold to buyers applying exacting moisture content, cleanliness and other quality standards, then cleaning and sorting equipment will be necessary. If expensive hired transport vehicles are employed, then space to accommodate a load, ease of access, and speed of loading will be important considerations. In most export marketing these facilities are essential.

If the grain is milled into flour or polished rice before sale to the final consumer, another specialized demand for storage is created. In developing countries the first specialized grain-storage units to be installed by private initiative are generally associated with flour mills. For efficient operation of the mill there must be sufficient stocks on hand for a substantial running period. To repay investment in milling machines the operator needs a regular clientele of retail buyers. Again, he must have stocks of the milled product on hand if he is to retain their patronage throughout the year. Mills and associated storage warehouses in the main towns are a normal feature of the grain marketing system in the Philippines, Thailand, and other parts of Asia.

Warehouses to handle grain and flour along with other goods are frequently constructed at ports or railway terminals. Generally they are used mainly for storage of food in transit, as the risk of infestation or contamination from other goods may be quite serious. Food stores must maintain high standards, and be specially constructed for the purpose they serve; these limitations have an important bearing on their utilization and operational cost. Nonetheless, it is sometimes forgotten that a large part of a country's immediate food supplies consists of stock-in-trade, which normally includes consignments in transit (whether actually moving or lying in a goods shed or warehouse in the process of shipment). These stocks have a rapid rate of turnover, so that the storage cost will tend to be rather low, both in terms of cost per unit stored and low risk of loss.

While supplies in the pipeline obviously have to be replaced, they nevertheless constitute a first line of reserve in an emergency, allowing time for special supplies to be brought in. This multipurpose aspect of general warehouses and stores on the usual routes of communication suggests that transit storage should have the first priority, especially in countries which rely to a significant extent on imports or are especially prone to local harvest failures. But as transit storage is a service which does not involve a change in the ownership of stocks, it is essential that proposals for new structures should be discussed in the light of the demands that are likely to be placed on them in the normal course of trade. This will depend to a certain extent on the charges levied; preferential rates may lead to trade stocks being maintained on a somewhat higher level than might otherwise be the case.

Pipeline stocks may be expected to cover normal supply for perhaps two to six weeks, or even more if a country is normally dependent on imports. The remaining storage facilities, holding whatever portion of the local harvest is intended for local consumption, will depend on the degree of self-sufficiency normally attained. Their capacity might have to be adequate to cope with as much as 10 months' supplies, and they will be distributed at farm and wholesale levels as may be customary.

Useful for the efficient undertaking of longer term storage to meet consumption needs is a system of warehousing credit certificates. Grain in storage is particularly sound security when it is fully protected and cannot be removed from the store without the consent of the person or agency which has loaned money on it. The warehouse operator has sole custody of commodities stored with him, and he issues to the depositor a certificate of storage which defines the commodity exactly. The products are then placed under government seal and can be removed only upon surrender of the warehouse receipts. Such receipts are then acceptable as a basis for credit. This is simpler still where grain is stored in standard grade lots, since the warehouse operator can return an equal quantity of a comparable grade from another source, rather than exactly the same grain as was deposited. This is most advantageous where grain is stored in bulk and permits much fuller use of storage capacity.

The same system may be applied to processor, merchant, or cooperatively owned warehouses. A specific part is locked off from the remainder and placed under government bond and supervision. In this way the owner of grain can obtain short-term credit on it without incurring the cost of removing it from the warehouse in which it is normally stored. In northern India this sytem has been adapted to pit stores built by specialized grain traders. They are recognized by banks, which hold the key until the credit is repaid.

Stabilization storage by government agencies

Governments are increasingly accepting the responsibility of ensuring an uninterrupted supply of essential foods for the entire population, which implies having adequate stocks conveniently available

at all times. In the developed countries, where the wants of the population are fairly accurately reflected by the price system, the commercial marketing structure will cater for most foreseeable social needs. In many cases, therefore, governments in these countries are content to satisfy themselves that adequate stocks are in practice being maintained, but they would not normally have physical possession of them.

In a predominantly subsistence agriculture especially, swings in output between one harvest and the next have a more than proportionate effect on marketed supplies, since farmers will tend to hold back for their own needs approximately the same quantities each year. This means that a poor harvest may lead to a fairly dramatic fall in the quantities supplied to the market, with a consequent increase in price. If crop forecasting techniques are not well developed, this kind of situation may become apparent rather suddenly, leaving inadequate time for taking measures to extend the line of trade from alternative sources. As a result, buffer-stock capacity is often maintained for the purpose of meeting unexpected deficiencies and thus helping to avoid undesirable price increases to consumers.

Where supplies may vary greatly from harvest to harvest as a result of climatic factors, and where many consumers maintain no stocks of their own and are dependent on what the market offers, special measures may be necessary to maintain stabilization stocks in public hands. This is especially important in countries where purchases of basic food grains make up a large percentage of the total cost of living. The stabilization of supplies and prices is thus an integral function of the Provincial Food Bureau in China (Taiwan). It may also be undertaken by special agencies operating on a smaller scale as a supplement to existing grain marketing systems in private or cooperative hands. Thus a reserve stock of undisclosed but substantial quantity is maintained by the Government of Malaysia.

Since food deteriorates even in the best of storage, arrangements have to be made for a continual stock turnover, and many governments make a virtue of this necessity by linking it with a form of assistance to farmers. While many government storage programs were initiated to protect consumers against the effects of short supplies, it is now generally recognized that they can also be operated to provide an incentive to producers. The government or its agency builds up its buffer stock by purchasing from farmers at harvest time when market offerings are greatest. In this way it can implement a producer price stabilization program, assuring the farmer of an outlet at a preannounced minimum price.

The Superintendency of National Supplies (SUNAB) in Brazil was set up to support prices to producers (partly by financing farm storage), and it is also responsible for assuring adequate domestic food supplies. The Soil Products Office (TMO) in Turkey generally carries over a reserve stock of about 300,000 tons of grain, for the purpose of protecting both farmers and consumers against price instability. These are only examples from the many countries where public agencies undertake the storage of grain for stabilization purposes as a trading operation alongside existing marketing structures. In some countries, especially in Africa, such agencies have been assigned a monopoly of all but very minor commercial movements.

Access to adequate storage is essential for a government or for a marketing board operating such a program on a government's behalf. Where such stabilization programs are needed most, the existing storage facilities are generally inadequate. To operate effectively, a board most often has to build a certain amount of storage specifically for use in its buying and holding operations.

Some new storage in production areas, particularly those where prices tend to be low, is almost always needed, since its lack is usually one of the causes of low prices. Pressure on limited transport facilities usually means that the stocks purchased must be held in production areas for some time. If the intake season is normally dry, temporary storage in bags on stack platforms or in light sheds can be employed. Permanent storage to hold stocks for seed and local consumption later in the year will be needed in areas where small producers oversell to meet immediate cash needs.

In importing countries the main storage plants would be located at ports, to facilitate off-loading from ships (unless there are particular reasons for immediately moving stocks inland), and in the more vulnerable consumption centers. Where there are marginal imports and exports, more emphasis should be given to storage at convenient transport centers in the main production areas. A beginning should be made with a few economically constructed plants located where the need is certain, with the locations of others to be determined when experience has indicated the points of maximum advantage. Account should always be taken of existing storage which can be rented.

Estimates of the total storage capacity to be provided for a buffer-stock program should be based mainly on the following considerations:

(*a*) the total quantity marketed on the basis of the average output of good crop seasons, and the storage available for it (including that owned by trade and on farms);

(*b*) the quantities and types of produce that are expected to be purchased by the agency and stored in particular areas;

(*c*) the quantities to be imported or exported by the agency;

(*d*) the buffer or reserve stocks to be maintained by the agency between seasons or years, taking into account the time required for imports to arrive;

(*e*) the likelihood of economic use of stores by private traders if not needed by the agency.

Thus, the National Supply Institute of Colombia (INA) normally buys 125,000 tons of basic foods domestically and imports over 200,000 tons. Its own storage capacity amounted to 118,000 tons in 1963, but it could also call on public warehouse capacity of 250,000 tons. These facilities, however, have proved inadequate to serve its established goal of stabilizing supplies and prices.

The decision on stock levels (and thus on the possibility of needing additional storage capacity) is to a great extent influenced by existing policy on production and prices and by the means chosen to implement it. Such policy may emphasize either the guarantee of stable and reasonable prices to producers or the assurance of supplies to consumers at prices they can afford. Alternatively the attack may be concentrated on reducing marketing costs.

Since prices can rarely be controlled successfully by administrative fiat, producer price incentives usually imply the setting up of an official buying organization, such as exists in many countries. The buying organization may have monopoly powers, or its purpose may be to intervene in order to hold prices at a guaranteed floor level. It may operate through agents or maintain its own buying organization.[9] Each of these methods has different implications for storage, and it may indeed be the storage implications that largely determine the buying policy.

Monopoly buying, assuming it is competently organized and capable of being enforced, has an obvious attraction in the planning of storage, since it permits greater certainty of utilization and the maximization of economies of scale. But apart from the inherent difficulties of administering a monopoly scheme, which involves the complete displacement of the existing trade channels, such a decision is difficult on grounds of cost. The use of agents can shift the responsibility for financing storage away from the government, although it does not necessarily solve the question.

A selective buying program, depending on the official price level, may be expected to purchase only a proportion of the crop, possibly with private buyers taking up the bulk of it at the established price or, at times, even a higher price. To be fully effective as a production incentive, the buying price should be fixed at the producer level, which requires a field buying organization that may have to be virtually countrywide. It will, however, seldom be feasible to establish a permanent network of buying and storage facilities, whose employment will inevitably vary with the size of the crop. Indeed, the utilization of storage facilities in a selective buying scheme may fluctuate to a greater extent than the harvest itself; if the policy is successful, traders will come to rely on obtaining their supplies at predictable prices through the government organization, thus tending to establish their own direct farm purchases and stock holdings at fairly constant levels, depending on individual trading circumstances. It would then fall on the official channel to absorb the full extent of harvest fluctuations within its own share of the market.

In planning for the necessary storage facilities, a selective buying organization would take account of the normal range of harvest figures as well as the factors determining its customary share of the market. The most important of these factors is cost. A recent attempt in Mauritius to support the price of potatoes was based on a margin of cost to the board in excess of normal trade costs excluding storage. Traders were thus able to conduct quick transactions, over a fairly extended season, at a higher purchase price and a lower sales price than those of the board, which was consequently left with the problems of storage and surplus disposal but with little opportunity to trade. The result with an exceptionally large crop was a significant loss, even though the available storage was fully used.

It is not always fully appreciated that an organization which aims to remove produce from the market faster than it would normally be taken up at the fixed or floor price will have to store it for a somewhat longer period and with a less immediately obvious sales opportunity in view than is usually the case with private traders. The operation will be successful only if the commercial efficiency of the organization is at least equal to that of the traders, if its storage costs are somewhat lower, and if the purchase price for the product is set at a realistic level in line with production costs and the prevailing levels of demand within the country. There is fundamentally little purpose in a scheme which has the effect of accelerating the transfer of produce out of farm storage, unless the real objective is to reduce storage costs (including losses) or to stimulate production. So many attempts at price stabilization have been unsustained or have failed in their purpose, or (as is becoming more common) have resulted in embarrassing surpluses, that the absolute necessity of unambiguous policy directives and skilled management should need no further emphasis.

There are two ways of consolidating the storage facilities of a government buying organization:

[9] For an account of the different methods of implementing producer price incentives, see FAO. *The state of food and agriculture 1967*. p. 90-100.

by contracting out the primary buying or by purchasing only at the wholesale level. Tanzania, for example, makes use of its extensive network of primary cooperative societies. The grain buying organizations in Dahomey, Jordan, and Morocco purchase largely through commercial channels. In South America, extensive use is made of agents.

Although many governments in developing countries appear, for the moment, to be inclined toward direct intervention as a means of achieving price stabilization, it may be that an indirect approach, with the intention of reducing the customary levels of storage risk and cost, could lead to an equally or possibly more effective use of national resources. The supply of credit on favorable terms to traders, cooperatives, municipalities, or public agencies for the erection of improved facilities is a fairly obvious solution, but has frequently resulted in expensive structures that are never or hardly used. This has been the fate of large grain-storage silos erected in the major urban areas of Ghana and many of the village storage tanks put up some years ago in Lesotho and Niger. In these cases the lack of utilization was chiefly due to the inappropriateness of the structure (since grain is typically bagged in developing countries for transport and marketing); also, the silos were not integrated with the normal trading channel. These examples are, however, intended rather as a warning than a deterrent to government assistance with storage finance. The principle is a good one, and with proper preliminary studies of feasibility, it can reduce much of the risk inherent in marketing, with the prospect of beneficial effects on prices and thus subsequently on production.

As long as officially maintained grain stocks are efficiently administered, there is little to distinguish their management from that of ordinary commercial transactions. While its social responsibilities will lead to additional costs, it should normally be possible for the storage organization to obtain countervailing economies. If, however, national food reserves are called upon for famine relief (that is to say, for free distribution), it will be essential to replenish immediately the cash or food reserves of the organization if it is to continue operating at its former level. The National Organization for Storage and Farm Machinery (ENAM) of Somalia successfully purchased grain over two seasons. Subsequently, at the instance of the government, it had to release its stocks without payment in order to meet severe food shortages in some parts of the country and could not continue operations.

As with any kind of investment, a storage construction program must earn its priority in competition with other uses of scarce government funds. It does not necessarily follow, however, that the government, having decided on its overall policy, would have to make the investment itself. It may prefer to work wherever possible through the normal trading channels, either by offering inducements to hold stocks (such as are made by SUNAB to Brazilian farmers) or by direct regulation. Hong Kong importers, for example, are obliged to maintain a certain percentage of their import quotas as a reserve stock. Lebanon is also proposing to implement a regulation calling on mills to hold reserves in store. In both cases, storage obligations are imposed as a condition of receiving an import or milling license.

Storage of perishable products

Products such as fruit, vegetables, fish, and meat, being subject to rapid deterioration (especially under tropical conditions), can be stored in their natural state for any appreciable length of time only at artificially maintained low temperatures. Although the basic storage function remains the same as for other food products, the technical and marketing problems of refrigerated storage are of a different order and require separate treatment.

Refrigerated storage is simply a general description. The maintenance of perishable produce under refrigeration calls for precise regulation of temperature and humidity in accordance with the nature of the product. Table IV-6 shows the optimum storage conditions for selected products.

There are three broad classifications of refrigeration according to temperature range: restorative cooling (somewhere between 15°C and 20°C), normal cold storage (a few degrees plus or minus 0°C), and freezing (which may be in the range of about – 12°C to – 30°C).

Each type of refrigeration has been devised to fulfill particular purposes depending upon the kind of agricultural perishables and the length of storage period. Restorative cooling is used at terminal markets for short-term storage of fruit and vegetables, often of tropical origin, which are unable to withstand low temperatures — for example, bananas, pineapples, mangoes, avocados. The second type of cold storage is intended for keeping the more robust

TABLE IV-6. – OPTIMUM STORAGE CONDITIONS OF SELECTED FRESH PERISHABLES

	Temperature		Relative humidity	Expected storage life	Remarks
	°C	°F	*Percent*		
Apples (Cox's Orange Pippins)	3.5	38	90	3 — 4 months	Storage life can be extended by controlled atmosphere
Apples (Golden Delicious)	–1 — 0	30 — 32	90	6 months	In South Africa and the United States
Pears (Alexander Lucas)	–1 — 0	30 — 32	90	5 — 6 months	In the Federal Republic of Germany
Oranges	–1 — 1	30 — 34	85 — 90	2 — 3 months	Storage life in Florida, depends on variety
Bananas, green	11.5 — 14.5	53 — 58	90 — 95	10 — 20 days	Depends on variety, Lataean types at higher temperature
Bananas, colored	13 — 16	56 — 61	85 — 90	5 — 10 days	
Tomatoes, ripe	0	32	85 — 90	1 — 3 weeks	To be consumed immediately after storage
Potatoes, early	3 — 4	37 — 39	85 — 90	A few weeks	Storage in darkness to prevent greening
Potatoes, late:					
Ware	4.5 — 10	40 — 50	88 — 93	4 — 8 months	Storage in darkness
Seed	2 — 7	36 — 45	85 — 90	5 — 8 months	Temperature depending on variety
Beef	–1.5 — 0	29 — 32	90	Up to 3 weeks	4 to 5 weeks if very strict hygienic requirements are observed
Lamb	–1 — 0	30 — 32	90 — 95	10 — 15 days	
Pork	–1.5 — 0	29 — 32	90 — 95	1 — 2 weeks	
Chicken, eviscerated	0	32	Over 95	7 — 10 days	If relative humidity is lower, water and vaporproof wrapping necessary
Fish	–1.1 — 3 –30 — –18	30 — 35 –28 — 0		4 — 14 days 3 — 12 months	Known as chilled storage

SOURCE: International Institute of Refrigeration, *Recommended conditions for cold storage of perishable produce*, 2nd ed., Paris, 1967, p. 30-57.

fruit and vegetables such as apples, pears, and potatoes in good condition up to about six months. Freezing concerns meat, fish, and poultry above all, as well as frozen fruit and vegetables to be kept for as long as one year.

The eating quality of the product at the time the consumer prepares it for the table is a key factor. For example, quality losses during storage and distribution can result in frozen fish products which do not satisfy the consumer. Studies in the United States have shown that about half of such quality defects can be traced to inadequate storage, transport, and retailing; the balance is due to the use of low-quality fish.

Trends in developed countries

The past 20 years have seen a considerable expansion in the use of refrigeration in the industrialized countries. With rising levels of living have come changing patterns of food consumption. While starchy foods have declined in importance, a stronger demand for animal products, fruit, and vegetables has arisen. Combined with an insistence on higher standards of hygiene and quality, an ability to pay for out-of-season produce, and a preference for timesaving techniques, this shift toward more perishable food products has inevitably made use of and stimulated new developments in cold storage.

In industrialized countries, most agricultural perishables are now subject, in one form or another, to refrigerated storage, complementing the services of the seasonal fresh produce market. For long-term storage the most important in volume are apples and potatoes, which are still stored in order to even out seasonal supplies. Lack of such storage in Hungary, for example, has been recognized as an obstacle to effective marketing of the apple crop and better satisfaction of consumer demand throughout the year. Major investments in refrigerated storage for apples have been made in Italy. However, where international supplies can be drawn upon freely (as distinct from dependence on domestic supplies because of a lack of foreign exchange), such storage is likely to decline in importance. The off-season availability of apples from the southern hemisphere and early potatoes from north Africa significantly reduces the need to maintain long-term stocks in Europe.

Similarly, most refrigerated storage of meat, dairy products, eggs, and poultry is short-term in the first instance. Improvements in production techniques are generally the most economic approach to the

reduction of seasonal fluctuations in supply. In some countries meat is held under refrigeration for some time before retail sale in order to make it more tender.

The technique of quick-freezing, which efficiently retains the taste and nutritional value of food products, has been encouraged by widespread changes in systems of food distribution. To a much greater extent than was previously possible, stocks are now held by retail shops and also by consumers in their own homes. The need to avoid a break in the cold chain means that handling has to be reduced to a minimum. Since processing firms depend to a great extent on the selling power of a trade name, they will generally retain ownership of their stocks in fairly large depots and will themselves distribute supplies directly to retail stores. Thus, although stocks in the pipeline are fairly large (owing to the use of retail sales cabinets and home refrigerators and freezers), turnover after leaving the main depot is fairly quick. The expansion of quick-freezing has been assisted by declining costs as production capacity increases and wider markets appear.

The further development of refrigerated storage in industrialized countries seems likely to be characterized less by a greater variety of fresh agricultural perishables to be stored than by more sophisticated preparation. The trend toward prepared meals will continue, including not only single parts of meals prepared and stored in a frozen state, but also complete meals, on trays, for instance, ready to be consumed after heating. Thus, as is already occurring in the United States, the convenience aspect will gain further importance and be a main determinant of the demand for refrigerated storage space.

Scope and limitations in developing countries

The conditions under which refrigeration is employed in developing countries may be very different from those commonly found in industrialized countries. These conditions will affect the type of equipment chosen, the scale of enterprise, and the manner in which it is operated.

Though there are many refrigeration techniques, the principle of liquid evaporation is still the most widespread for food refrigeration. Other methods are either less profitable or applicable only in specific conditions, although they might have wider usefulness in the future. The main method of liquid evaporation is the cyclical condensation and evaporation of special refrigerants (commonly ammonia or halogenated hydrocarbons) by electrically powered mechanical compression.

For many developing countries particular requirements must be fulfilled by the refrigeration equipment. The lack of qualified technicians for the maintenance of refrigeration equipment is a major difficulty. In the choice of refrigerant, a number of factors have to be taken into account. The pungent odor of ammonia facilitates leakage detection in the plant. The halogenated hydrocarbons are more expensive than ammonia and being odorless are more difficult to detect. On the other hand, halogenated hydrocarbons are more commonly used in plants of small or average capacities (household and commercial refrigerators, small cold rooms, air conditioners), so that these refrigerants are widely stocked, whereas ammonia is to be found only among large users or in the larger towns. Furthermore, air transport of ammonia and methyl chloride bottles is prohibited (halogenated hydrocarbons are allowed), creating difficulties for distant users.[10]

In developing countries it is often impossible to maintain a constant voltage in the electricity supply. As this is necessary for the efficient functioning of the compressors, there may be cases where an electricity generator has to be added to the refrigeration scheme. It must also be borne in mind that in hot climates insulation requirements (which may account for more than 20 percent of capital costs) are necessarily higher. Even if insulation is adjusted according to exterior temperatures, the energy consumption of the refrigeration system will still be higher than in cooler climates.

In extreme cases, where the difference between condensation and evaporation temperature is more than 60°C, compression must be carried out in two stages, since the power consumption of a single compressor would become uneconomically high. As air-cooling of the condenser is applicable only for very small refrigeration units, sufficient water must be provided for water-cooling. Where absolute reliance cannot be placed on the normal supply, a closed water circuit becomes imperative. Closed circuits involve higher water losses in hot climates. Sometimes it may be necessary to purify the water if the life of the equipment is not to be shortened by corrosion.

An additional factor concerns the management of trade stocks. The rotation of goods on the "first in, first out" principle is a well-known and simple method of preserving the quality of frozen products during storage and should normally be standard practice. But in multipurpose stores, and as inventories have become more complex, this essentially simple method has become difficult to maintain. The training of supervisors and skilled workers to carry out these functions is particularly important in the frozen fish industry. The system of stock rotation breaks down if cold stores are allowed to

[10] International Institute of Refrigeration, *Refrigeration techniques in developing countries*, Paris, 1964, p. 53.

become overcrowded. Losses due to incorrect technical methods or imperfect management are among the hazards faced by developing countries in the introduction of cold storage. Alternatively, developing countries may have to bear the extra costs of sending local staff for special training or of employing foreign staff.

Refrigeration costs

All these factors mean that the costs applicable in developed countries are unlikely to be valid wherever the prevailing skills and industrial circumstances are widely different. The technical problems of refrigerated storage in developing countries usually increase costs, which in any event are high because of the need to import equipment and special materials. Table IV-7 gives an indication of the investment costs of refrigerated storage space in a number of developing countries.

The comparison of actual investment costs in different countries may be misleading. Many of the costs depend on the particular layout of the storage scheme under local circumstances. In general, however, it is true that the lower the temperature, the smaller the capacity, and that the greater the variety of products stored, the higher the investment costs per unit of refrigerated storage space; the same holds for the operating costs per unit of stored commodity.

The operating costs of a cold store, as for all storage, depend to a great extent on the degree of utilization, as is seen in Table IV-8. Though the capital costs per cubic meter of storage space tend to diminish with larger capacity, the costs per ton of perishable produce stored increase considerably if the capacity cannot be fully utilized.

While the primary purpose of refrigerated storage is the preservation of perishable foodstuffs, it must also be an economic operation. Many investments in cold storage facilities do not provide adequate economic returns. The building and operating costs of refrigerated stores are substantial and should be carefully evaluated against the potential benefits. Storage operations have to be planned as part of the overall marketing process for the product concerned, and the particular demand and supply conditions will therefore determine not only the purpose and method of storage but also its optimum capacity and location.

The rapid quality deterioration that fresh fish has in common with other perishables is accentuated by frequent and often unpredictable variations in supply. Freezing can help to balance supply and demand by allowing the disposal of incidental surplus catches during periods of more favorable marketing conditions. Whether the costs of such an operation are covered by higher sales prices is, however, a question that must be carefully investigated in the light of the individual circumstances of each case. It is unlikely that freezing and cold storage can be widely adopted as a method of disposing of occasional surplus fish supplies, though they may play a role for some high-value fish and shellfish with a well-established demand pattern.

With the expanding market for frozen fish in many countries and its increasing share in the total fish supplies, the indirect influence on the fresh fish trade will become more distinct. Growing consumer acceptance of frozen fish will facilitate its use as a substitute for fresh fish in periods of scarce supply, thus reducing the speculative elements inherent in the fresh fish trade. On the other hand, frozen fish

Table IV-7. - Costs of construction of cold stores in developing countries

	Year of construction	Capacity	Commodity stored	Temperature	Construction costs [1]				
					Building	Insulation	Refrigeration equipment	Total	Per cubic meter
		m^3		°C	..... *U.S. dollars*				
Lebanon		40 000	Fruit	0 — 5	620 000	500 000	500 000	1 620 000	41
Syrian Arab Republic	1964	7 600 3 800	Meat, fish Fruit, vegetables, butter	−18 0	290 000	131 000	132 000	553 000	49
Iran	1961	8 338	Meat, fish	−25 and 0	523 000		140 900	663 000	80
	1962	1 506	Fruit, meat	−18	191 900		57 630	249 530	165
Kuwait	1962/63	1 440	Fruit, fish	0 and −18	96 387	44 640	70 100	211 127	147
United Arab Republic	1963	5 000	Meat, fish	−25	200 500	304 704		505 204	101
	1964	350	Meat, fish	−25	29 279	81 144		110 423	315
Jordan	1949–57	1 764	Meat, butter, ice cream, eggs, fruit	−18 and 0	210 000		112 000	322 000	182

Source: FAO. *Marketing and refrigeration of perishable produce in the Near East: Report on the FAO Regional Conference on the Marketing and Refrigeration of Perishable Produce in the Near East held at Beirut, Lebanon. 20-28 September 1965.* Rome. 1966. p. 67.

[1] The distinction between building, insulation, and equipment costs has not always been made on the same basis.

TABLE IV-8. – APPROXIMATE RUNNING COSTS OF A SELECTED COLD STORE OF ABOUT 10,000 CUBIC METERS (353,150 CUBIC FEET) AT DIFFERENT RATES OF INTEREST, DIFFERENT UTILIZATION OF CAPACITY AND DIFFERENT COSTS OF ELECTRICITY

Costs of electricity (U.S. dollars per kW)	0.02			0.02			0.10
Rate of interest (percent)	8			12			12
	U.S. dollars						
FIXED COSTS PER YEAR							
Amortization and interest:							
Building [1]	[2]28 519			[2]37 486			[2]37 486
Equipment [3]	[2]24 590			[2]29 203			[2]29 203
Maintenance and repairs:							
Building [4]	2 800			2 800			2 800
Equipment [5]	3 300			3 300			3 300
Administration [6]	16 600			16 600			16 600
Interest on working capital [7]	1 280			1 920			1 920
Other [8]	13 000			13 000			13 000
Subtotal	90 089			104 309			104 309
Capacity utilization (percent)	25	50	75	25	50	75	50
VARIABLE COSTS ON THE BASIS OF DIFFERENT CAPACITY UTILIZATION							
Power [9]	6 000	12 000	18 000	6 000	12 000	18 000	60 000
Water and auxiliary materials [10]	500	1 000	1 500	500	1 000	1 500	3 000
Office expenses [11]	1 500	3 000	4 500	1 500	3 000	4 500	3 000
Unforeseen expenses	1 200	2 400	3 600	1 200	2 400	3 600	2 400
Subtotal	9 200	18 400	27 600	9 200	18 400	27 600	68 400
TOTAL OPERATING COSTS	99 289	108 489	117 689	113 509	122 709	131 909	172 709
Quantity stored annually (ton/month) [12]	9 000	18 000	27 000	9 000	18 000	27 000	18 000
Cost of storage per ton/month	11.03	6.03	4.36	12.61	6.79	4.89	9.59

SOURCE: H.J. Mittendorf. Some economic considerations on planning cold storage and refrigerated transport facilities in developing countries for internal marketing of meat, eggs, fruit and vegetables. in *Refrigeration applications in tropical countries: international symposium at Abidjan (Ivory Coast), December 1964.* Supplement to the *Bulletin of the International Institute of Refrigeration.* Paris. 1965. p. 204-205.

[1] Capital outlay U.S.$280.000. amortization 20 years. – [2] Capital recovery factor: 8 percent/20 years 0.1019. 8 percent/10 years 0.1490. 12 percent/20 years 0.1339, 12 percent/10 years 0.1770. – [3] Capital outlay U.S.$165,000. amortization 10 years. – [4] One percent on building costs. – [5] Two percent on equipment costs. – [6] One third manager's salary U.S.$1.640. one accountant's salary U.S.$3,000. two workmen U.S.$4.320. one secretary U.S.$1.640. – [7] Based on U.S.$16.000. – [8] Taxes, insurance and miscellaneous. – [9] Based on a power consumption of about 10 kW per m³/month. – [10] Assumed water consumption of about 1.000 m³ at a price of U.S.$0.033 per cubic meter; other expenses: lubricating oils, refrigerants, brine, cleaning, disinfection materials. – [11] Telephone, travel, miscellaneous. – [12] It is assumed that 3,000 tons of commodities can be stored.

is subject to the changing conditions of wider, largely international markets. In the recent past the accumulation of frozen fish holdings in some countries has had adverse effects on international market prices, sometimes accelerated by speculative reactions of purchasers or advanced releases from storage because of the producers' needs for cash. In other instances, quality considerations have given rise to sudden cut-price offers.

The development of freezing at sea in the last two decades has placed growing emphasis on the preprocessing function of cold stores and has allowed more regular capacity utilization of canning or smoking plants. A large part of the catch of the Ghana fishing fleet is smoked in the traditional manner after removal from the cold-storage facilities at Tema. In general, the potential role in developing countries of short-term refrigerated storage of fish seems greater than that of long-term storage.

A cost/benefit analysis should properly first consider the alternatives to refrigerated storage. It is often possible to attain the desired purpose of refrigerated storage by cheaper means, such as evening out the seasonality of egg production or developing holding and fattening stations for cattle. Unfortunately, the development of holding ranches in many parts of the African savanna, for example, is complicated by the necessity for strict controls against the transmission of infectious diseases. Canning meat provides a means of storage for transport to markets

which eliminates this risk, but it is costly, particularly when the cans must be carried to distant inland points, and brings lower market returns than fresh meat. In this context, the possibilities of avoiding or reducing the storage period by better handling, quicker transport, or more efficient marketing must also be considered. Furthermore, costs and consumer preference studies may show that the desired preservation effect can be achieved by simpler means, such as salting and smoking, or by more appropriate packaging.

Refrigerated storage should not be regarded from too narrow a viewpoint. Handling costs increase with shorter storage periods. It must also be kept in mind that perishables deteriorate so rapidly after removal from cold storage as to prevent them from being passed through the ordinary marketing channels for freshly harvested produce. A subsequent refrigeration chain may have to be established, or measures may have to be taken to ensure immediate sale of the product for consumption. Trial shipments of tomatoes from Jordan to Kuwait established that less damage was experienced with ordinary vehicles than with refrigerated trucks when the contents passed through the normal fresh market after unloading.

Future prospects

In developing countries there are at present two main applications where cold storage is profitable to a significant degree. The first is export marketing. Perishable products for shipment overseas in refrigerated vessels tend to concentrate in storage space at the export harbors. This storage is part of a refrigeration chain which supplies markets, chiefly in industrialized countries, where the price that can be obtained is high enough to justify the costs. Cool-storage capacity exists in Lebanon for almost the entire apple crop, which exceeds 90,000 tons. Most of this is situated at the main ports of Beirut and Tripoli, with about a 20,000 ton capacity in the Bekaa valley production area. Meat is shipped in a frozen state from South America to Europe. Exports of frozen prawns have earned valuable foreign exchange for a number of developing countries, including India, Pakistan, and the United Arab Republic. The range of commodities that can be exported in quantity under refrigeration is, however, limited. Most tropical perishables are very sensitive to chill and do not keep long if stored at relatively low temperatures. There is some likelihood that the range of products may widen as air transport becomes less costly, but this would be true only for high-value products shipped in small quantities to special markets with a quick turnover. Within these limitations, and with the development of demand for traditionally exported perishables, the need for large-scale refrigerated storage will grow mainly near export harbors and for short-term refrigerated storage near international airports.

The second major application of refrigerated storage in developing countries concerns the supply of imported perishables. These are mostly high-quality commodities that are not produced locally and reflect a consumption pattern which is often completely different from that of most of the population — for example, the consumption pattern of high-income groups, including foreigners. These products are chiefly chilled meat, poultry, cheese, butter, eggs, and temperate fruit such as apples. To an increasing extent, however, this type of import includes the whole range of quick-frozen foods.

Here, as in export marketing, refrigerated storage is, though not exclusively, part of a refrigeration chain extending from overseas production centers to individual refrigerator-owning households. Refrigerated storage for this purpose is thus available in harbor towns and in European-style shops in urban areas with a concentration of high-income households. To a much greater extent, however, import-oriented cold storage tends to be multipurpose and is thus less specialized than is usually the case with cold storage used in export marketing.

The expansion of the fishing industry in many developing countries may also see a wider use of refrigerated storage. At present the absence of a proper cold chain has tended to restrict its use to coastal areas, where in any event there are good supplies of fresh fish. Inland areas have mainly relied on traditional methods of salting, drying, or smoking, and there is often a strong preference for locally cured fish. But, with the gradual establishment of cold stores for other reasons, the preservation of fish will offer an obvious means of increasing the utilization of such facilities and thus reducing their unit costs.

With the exception of fish, there are few examples of refrigerated storage playing a significant role in the internal marketing of locally produced perishables in developing countries. In the State of Bihar, India, about 40,000 tons of table and seed potatoes have been stored regularly since 1960. The purpose is to even out fluctuations between the two annual harvesting seasons. Costs have been 108 rupees (U.S. $22.68) per ton for an average storage period of two to three months.[11] However, more often than not, refrigeration schemes designed for storing seasonally produced local perishables for internal marketing have neglected to take proper account of the converse seasonal underutilization of capacity which these expensive buffer stocks inevitably entail.

[11] India, Government of Bihar, Department of Agriculture, *Report on the survey of cold storages in Bihar*, Patna, 1960.

Since in many developing countries agricultural production seasons are not so clearly defined by climatic conditions as in temperate zones, the substitution of off-season products imposes fewer difficulties. This, combined with low incomes, inclines and permits the population to turn to different products as they become available. In west African countries, for example, oranges, bananas, mangoes, or pineapples are on the market fresh throughout the year. The introduction of early and late varieties can further contribute to smoothing out seasonal fluctuations in the supply of fresh fruit and vegetables.

In many cases cost/benefit analyses which have considered the whole range of factors influencing profitability will indicate only a limited use of refrigerated storage in internal marketing. There is some scope in wholesale markets for refrigerated storage of fruit and vegetables. The rapid price decline often observed toward the evening could be reduced by overnight storage of unsold products. In the dairy industry too, small-scale refrigerated storage has been used with success at the village level in several developing countries. In areas where city milk plants have fresh milk collection points, but are unable to transport the milk to the plant within a reasonable time after milking, chilling centers have been established to hold the milk until collection takes place.

In conclusion, it is to be expected that refrigerated storage will become more important in developing countries as urbanization progresses and higher incomes lead to a changing pattern of tastes. The development of export markets for perishable products will also contribute to this process. However, lack of proper cold-chain facilities, high costs, low average incomes, and a shortage of technical expertise all combine to limit the immediate possibilities for profitable investment in cold storage in developing countries. The broad consumer preferences are at present rather strongly attached to traditional means of preservation and are based on a seasonal availability of foods. Cheaper and efficient alternatives to refrigeration have in many cases not yet been exhausted.

Storage policy

Technical considerations taken into account, the final decision as to what storage methods and facilities to use, how to operate and where to locate them is an economic one. This must be so because it involves the use of financial resources, and the benefits to be derived from the adoption of any particular form of storage and mode of operation must be weighed against the alternative use of the resources. No standard answer is to be expected. Each set of circumstances calls for an analysis designed to determine what is most advantageous, taking into account the size and nature of the available funds, the comparative urgency of competing claims, and the level of development.

Planning new storage facilities

The most immediate benefits are savings in physical losses and quality deterioration, increased ability to hold produce in order to take advantage of seasonal rises in price, and greater efficiency in the marketing channels associated with this storage.

The overall extent of the losses that could be avoided by better storage is not clear. The reliable information available is limited in coverage. Each new storage proposal necessitates specific studies of the losses involved under existing practice and the extent to which they would be reduced by investment in new installations and the adoption of new techniques.

Increased ability to obtain higher prices later in the season is another economic advantage to be set against the cost of building and operating adequate storage. If grain is sold soon after harvest, this advantage would normally be slight. However, prices are generally much higher later in the season. Storage for this purpose is of particular interest at the farm level, but the opportunity to take advantage of it may be limited by indebtedness. Another consideration for the farmer is that investment in storage facilities may yield a much slower return than investment in inputs such as fertilizer, which matures annually and may imply a smaller initial outlay.

Thus savings on physical losses and deterioration in quality and the ability to hold grain safely while awaiting higher prices are basic objectives of all programs to improve storage facilities. The returns on these grounds alone may not, however, justify the acquisition of specialized materials and equipment. Their acquisition is more attractive to trading enterprises and processors, who can integrate them with other marketing operations and so use them more intensively. Specialized equipment is also more attractive to large public marketing organizations and governments which expect to buy, sell, and store on a large scale. They can finance large initial capital

investments at lower cost because of the better security they offer. They may also value highly the opportunity to simplify their operations by avoiding the administrative task of supervising a large number of small storage units of the traditional type.

The location of new storage installations calls for very careful consideration. For farmers and wholesale traders or millers who are contemplating the construction of a new storage building, the issues are relatively simple. Convenience for the operations with which the storage will be associated and availability of a technically suitable and low cost site are the major considerations. Other practical points are freedom from risk of flooding or drainage problems and easy access for the vehicles likely to be used in moving produce in and out, preferably by paved road or railway in the case of commercial plants. Adequate space around the building for free movement and possible expansion is also important.

The next factor to consider is economy in the use of transport. Storage should be located at points chosen in the light of prevailing marketing movements. Account should be taken of planned new developments in rail, water, or road transport and in processing facilities, such as flour mills. Import and export needs must also be considered. If substantial imports or exports are foreseen, the construction of grain storage with bulk loading and unloading equipment at ports or rail terminals will usually be advantageous.

If a government program of maintaining buffer stocks to help stabilize prices is contemplated, the need to locate storage facilities where they will best serve such programs is important. For example, if a government wishes to ensure certain minimum prices to producers, it will need sufficient facilities in the production areas to enable farmers to deliver their grain without high costs; otherwise the farmers will be unable to take full advantage of the government program.

The risk of errors of the kind indicated earlier can be reduced by preconstruction surveys in which economists or marketing specialists work jointly with architects and engineers. Even when this precaution is taken, there is still the administrative problem of making sure that the survey recommendations are not subsequently set aside in favor of a proposal having greater publicity value or one presented by influential local groups.

The type and size of storage plant to build are influenced by many economic factors. If the amount of grain to be stored is small, capital scarce, and labor plentiful and cheap, a very simple type of storage plant is often the most economic. The type of construction depends on the costs of the different types of materials. In some countries, concrete silos may be most economical, in others bolted steel silos, and in still other situations smaller galvanized bins or multipurpose warehouse-type stores.

In developing countries, where capital is likely to be scarcer than labor and time, and excessive expenditure on one project may cut out several others, there is probably much to be said for selecting the initially less expensive of the practicable alternatives. To build technically advanced and expensive warehouses and mills, which are then only partially utilized because no money is available to establish complementary facilities, is indeed unwise. It might be more desirable to accept a slight sacrifice in the operating efficiency of individual units if, by so doing, the minimum capital requirement for optimum economic development could be better approximated and development extended over a wider area.

If the plant is situated at an important terminal market, where it would be filled and emptied a number of times during the year, this could justify a substantial investment in mechanical equipment for loading and unloading and for transferring grain from drier to bin and from one bin to another. Speed in handling may permit fuller use of the storage capacity and more efficient marketing. If, on the other hand, the plant is one where the grain is put in once a year and removed only once a year, or at even longer intervals, there would be much less need for mechanical handling equipment.

A critical factor in the internal design of storage units is whether the grain must be kept in separate lots, each easily accessible for movement in and out of the store. This applies especially to stores intended to serve a number of different grain owners. It is still a factor, however, in units owned by trading enterprises and stabilization agencies when a number of different types and qualities of grain are handled and mixed orders must be satisfied.

In planning the location, size, and type of storage facilities in any country or area, it is important to determine just how they will fit into the marketing system. Objective study of the prevailing methods and organization of marketing must necessarily precede decisions on storage construction. Only within this framework can realistic estimates be made of the extent to which new storage will be used. At the same time, account should be taken of changes that may arise from commercial development and from government action.

Ownership and management

The ownership of storage facilities is often an issue in developing countries, where it is felt that merchants able to store essential commodities have profited from this strategic position by manipulating market releases and raising prices. Usually, the

ownership of storage facilities is not solely responsible for apparent high margins which may be caused by a combination of marketing defects, including a lack of alternative storage capacity and trading competition and the high cost of credit and risk of loss. However, the maintenance of competition requires that ownership should not be concentrated in a few hands. For this reason it is sometimes advisable that a significant proportion of the total storage available for politically sensitive commodities such as food grains be held in farm, cooperative, or government ownership, thus ensuring some diversity of interest.

At the farm level in the developing countries, the most economical storage is likely to be simple in design and of a kind which the producer himself can build out of local material. If the producer is adequately informed on insect control and carries out the necessary maintenance, he is likely to be the most efficient operator of such a unit.

More controversial is the question of who should own and operate storage units intended to serve communities and permit economical access to such facilities as artificial drying in humid areas. In some countries, this has been arranged through local cooperatives or farmers' associations under government supervision. Responsibility for adequate management must be clearly assigned. Good management is often best assured through the traditional authority in the groups concerned. In many countries, governments provide cooperatives with credit on favorable terms for the construction of storage. Precautions must be taken, however, against the tendency for easy access to finance to result in the construction of plants which are more expensive than necessary and rarely used to capacity.

Local trading and milling enterprises are likely to build the storage needed to meet the requirements of their business. Since the funds for this must generally be obtained on the commercial loan market, expenditure tends to be restricted to the necessary minimum in terms of both capacity and construction materials. Consequently, such enterprises often require more storage at certain times and try to meet this need by renting space elsewhere. Though occasional trade requirements can generally only be met at higher costs, municipalities and railway authorities often provide storage for such public use. Higher operating costs, because of less intensive use of space, are set against benefits from increased trade in the market and town concerned and from greater use of the transport service offered.

Where grain storage is undertaken directly by governments, a special department or agency is usually established to operate the stores. It should maintain its own accounts according to approved business procedure and employ a properly qualified staff. While storage for stabilization purposes is usually financed entirely by government capital, storage set up as a public service might be operated by a joint government and private company. Participation by grain trading enterprises which are potential users of the stores provides additional assurance that the stores will be built and operated in accordance with practical marketing requirements. Participation by the government should ensure that the stores are not used in the interests of particular traders.

In developing countries especially, it may be essential for the government to help in the financing of storage construction because of its ability to take a longer and wider view of the return on investment and because political risks may deter outside investors.

This points to the particular need for objectivity on the part of governments and international lending and aid agencies when deciding on the kind of storage they will help to finance. Examination of a number of instances of low capacity utilization of publicly financed storage suggests that a main cause has been the reluctance of government planners to agree that responsibility for operation of the plant may be in the same hands as ownership of the produce passing through it. In most cases this reflects embarrassment over the possibility that existing traders would be strengthened by access to public finance for facilities that are to be used in close conjunction with their marketing operations.

Government services

The importance of skilled storage management should be kept in mind at all stages. Storage is an economic and technical service that requires competent planning and day-to-day maintenance by trained personnel. Governments, such as those of India, Iraq, and Turkey, which have undertaken extensive storage construction programs, have established special training programs for plant managers, fumigators, advisers on farm storage, and other specialists. Other government services which have proved effective in improving storage construction and procedures are the publication of technical information and the furnishing of practical advice by extension specialists.

Government initiative in facilitating access to credit for storage improvements is usually needed. It is particularly important for cooperative storage involving long-term investments that are beyond the reach of membership financing. Constructive regulation of warehousing, including charges and credit arrangements, is another government responsibility. Appropriate insurance coverage and steps to safeguard against loss by fire and theft should also be required.

Regulations designed to maintain high standards in the operation of public storage reduce the risk factor in its cost. In India, a food grains storage committee has been formed to prepare codes of storage practice, covering such matters as standard structural types, measures to reduce or eliminate loss and waste, and ratproofing of godowns.

The bonded warehouse system, which has proved its value as a marketing and credit facility, depends on government sponsorship and supervision. Such a system is set up by statute and operates under constant government inspection.

Another field in which governments can facilitate storage operations, as well as help the whole marketing system function more efficiently, is in the provision of better information regarding stocks, impending supplies, movements, consumption and prices. Public provision of such widely needed data is efficient because it narrows the range of information which producers, farmers, cooperatives, traders and store operators must find themselves. As regards government responsibilities for stabilizing supplies and prices, improving the crop and market intelligence service can sharply reduce the need to invest in extra storage to hold expensive stocks.

It appears that many governments know little about the food storage capacity of their countries beyond the installations they maintain directly. While pragmatic response to observed pressure on existing facilities is often more realistic than ill-informed overall planning, it is still a piecemeal approach and may not take adequate account of probable changes in trends, which call for continuing forecasts of planting intentions and harvest yields. The need to maintain large local reserve stocks often reflects the lack of a system for early warning of impending shortages.

National food reserves

The establishment of national food reserves is a subject that has received much attention in recent years, especially in connection with the use of surplus foodstuffs. Following a detailed study carried out by FAO,[12] a resolution adopted by the Economic and Social Council of the United Nations (ECOSOC) in 1961 recommended the use of surplus foodstuffs in building national food reserves to meet emergency situations, and to combat price increases resulting from local food shortages or from increased demand.

National food reserves are defined in the FAO study as "stocks held or controlled by the government on a continuing basis and subject to replenishment." They thus cover a very wide range, and most such reserves are in fact multipurpose. Most of the main questions and problems concerning national food reserves have already been dealt with, but a few points may be emphasized in this concluding section.

Until their recent depletion, the substantial surplus stocks of grains available in North America provided, in effect, a world reserve from which sudden emergency requirements could comfortably be met.[13] There may, however, be a sizable time gap involved in the movement of supplies from such a central reserve to areas affected by shortage, particularly to isolated areas in developing countries or to areas in which communications have been disrupted. For effective relief of emergency situations, prompt mobilization of supplies from well-located reserves is necessary. It is the filling of this time gap that is the major role of a national reserve scheme.

The position varies greatly, however, from country to country. On the one hand, in India and Pakistan for example, food emergencies due to drought and flood have been frequent, while the distance from import suppliers and difficult internal communications intensify the need for substantial reserves for use until imports can be arranged and distributed. In the Central American countries, on the other hand, shipments can be obtained quickly from North America when local shortages occur.

It will be apparent from the earlier discussion that the establishment of a national food reserve is a costly undertaking, even if the initial supplies of the necessary foodstuffs can be obtained in the form of food aid. The cost of constructing and maintaining the necessary storage generally falls on the government concerned. This cost is increased by the need to decentralize storage facilities in the areas where local shortages are most likely to occur. The establishment of a food reserve of 6 million tons planned in India (where the storage capacity owned by the Government totaled about 2 million tons in early 1967) clearly involves a very heavy investment in storage, on which the return will be largely indirect.

Most developing countries find the maintenance of long-term food reserves too expensive in relation to other uses of capital and tend to rely on international aid for help with food supplies when the need arises. Few countries have therefore used the food aid available under bilateral programs or on a multilateral basis through the United Nations/FAO

[12] FAO. *National food reserve policies in underdeveloped countries*, Commodity Policy Studies No. 11, Rome, 1958.

[13] In connection with the possible future availability of such a world reserve, the policy of the United States Government is of particular interest. Under bills introduced in early 1968 it is proposed to establish minimum reserves to meet domestic and export needs and foreign aid commitments, and as a buffer stock for emergencies or against exceptional crop fluctuations. The recommended targets are for a total carryover (including farm stocks) of about 15 million tons of wheat (compared to about 12 million tons in mid-1967) and 40 million tons of feed grains (34 million tons in 1967).

World Food Program to establish national reserves. An additional problem is that the replenishment of such reserves must be by commercial purchases. Where the reserve is used to even out small seasonal fluctuations in supplies and prices, this generally causes no difficulty and the operation should be self-financing. Where, however, disbursements have to be made free of charge or at less than cost, as in many cases of national emergency, the problem of replenishment becomes paramount.

International aid

As noted above, the international assistance available for the establishment of national food reserves in developing countries has thus far consisted mainly in the provision of the initial food stock. However, with the possibilities for rapid increases in production opened up in many developing countries through the use of the new high-yielding cereal varieties, it may become necessary to reconsider the role of international assistance in establishing national food reserves. A number of developing countries may have grain surpluses which would provide the basis for establishing such reserves if financial assistance could be obtained for the construction of the necessary storage facilities. In countries which have come to rely heavily on imports in recent years, the storage system is in effect "facing the wrong way," and international assistance will be needed for the substantial remodeling required to deal with a situation of approximate self-sufficiency.

Apart from the question of national food reserves, a major conclusion for international programs of technical and financial assistance is the need to maintain an objective approach in their assistance to countries seeking help in the financing of additional storage, and to furnish advice which takes full account of differences in marketing and handling procedures and in the relative scarcity of capital and labor. Too many of the misplaced or wasteful investments in storage in the developing countries reflect efforts to sell a specific storage design, recommendations based on engineering concepts of efficiency suited to countries where large volumes of grain are handled in bulk, and credits tied to purchases from a predetermined source.

While it would be useful to have more reliable and internationally comparable information on storage losses, this is essentially a task for research institutions. The role of international organizations in this respect is primarily to stimulate work at the national level and to promote the development and adoption of standard techniques.

Of more immediate concern to governments is the determination and implementation of specific storage measures that can help to make the food that is needed available to consumers. International assistance has a major role to play in making the necessary investments possible by appropriate financing, in ensuring that storage investments are well directed, in research on the development of storage facilities better suited to conditions in developing countries, and in furnishing advisory and training support.

ANNEX TABLES

EXPLANATORY NOTE

FAO index numbers of agricultural, fishery, and forest production and trade

Production index numbers [1]

The indices of agricultural production have been recalculated on a calendar year basis. They are therefore not comparable with the indices for crop years published in the 1966 and prior issues of this report.

The indices are calculated by applying regional weights, based on 1952-56 farm price relationships, to the production figures, which are adjusted to allow for quantities used for feed and seed. The indices for food products exclude coffee, tea, tobacco, inedible oilseeds, animal and vegetable fibers, and rubber.

For fishery production, quantities are weighted by the average unit values of fishermen's landings in 1957-59. For forest production, roundwood production is weighted by 1952-56 prices.

Trade index numbers

The indices of agricultural trade have been revised, and are not comparable with those published in previous issues. The main change is the inclusion of 16 additional commodities or commodity groups, making a total of 70, which are estimated to cover about 80 percent of world trade in agricultural products.

In calculating the indices of the volume of exports and imports of agricultural products, the volume figures for individual products are weighted by average unit values in 1957-59.

Average unit values are calculated on a regional basis, using quantity and value data covering a minimum of 85 percent of the region's total trade in each product. The unit values for individual products are weighted by the average volume of trade in 1957-59.

As far as possible, the indices for trade in fishery and forest products are calculated in the same way as those for agricultural products.

Regional coverage

The coverage of most of the regional groupings is self-explanatory. It should be noted, however, that western Europe is defined as including Yugoslavia, and the Near East as extending from Cyprus and Turkey in the northwest to Afghanistan in the east, and including from the African continent Libya, the Sudan, and the United Arab Republic. For China (Mainland) no estimates are included until more complete data are available.

Indices of the trade of eastern Europe and the U.S.S.R. are so far available only for the period 1955 to 1966. Because of difficulties concerning exchange rates and the pricing of barter transactions, the trade of these countries has been priced at the world average export unit values.

[1] For full details, including a list of weights, see FAO, *Production Yearbook 1967*, Rome, 1968, p. viii and 667-671.

ANNEX TABLE 1A. – TOTAL AGRICULTURAL PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices. average 1952-56 = 100														
WESTERN EUROPE	93	101	101	102	103	106	109	112	119	118	126	128	129	130	133
Northwestern Europe	94	99	103	101	103	104	102	108	120	117	127	127	128	129	130
Austria	91	101	98	103	107	109	120	109	124	129	131	140	139	124	135
Belgium-Luxembourg	94	97	104	106	99	103	105	101	115	116	123	130	120	117	118
Denmark	95	101	99	103	103	111	108	107	116	118	125	117	120	122	121
Finland	98	104	103	96	98	108	107	111	127	124	117	133	134	142	137
France	89	99	106	102	103	102	105	109	124	120	133	131	132	141	135
Germany, Fed. Rep. of	95	100	102	101	102	103	112	106	121	109	123	128	126	118	127
Ireland	94	97	105	99	105	113	104	100	111	123	119	121	122	115	121
Netherlands	99	98	99	106	98	103	111	110	125	121	133	127	131	128	136
Norway	97	100	99	98	107	104	100	98	106	105	105	105	100	104	98
Sweden	103	104	102	92	100	99	96	97	101	100	104	97	104	102	95
Switzerland	98	101	105	100	97	101	110	107	114	115	111	112	111	108	113
United Kingdom	95	98	100	99	108	108	107	113	121	122	132	133	140	143	146
Southern Europe	90	104	98	105	103	111	113	123	116	122	125	129	131	132	142
Greece	79	102	100	107	111	127	119	125	117	140	133	151	157	162	169
Italy	92	103	96	105	104	102	115	116	109	119	121	114	123	126	130
Portugal	87	106	105	102	101	106	100	101	103	106	117	121	118	128	113
Spain	102	97	102	97	102	105	107	115	116	120	124	140	126	126	140
Yugoslavia	70	117	90	121	102	145	121	166	144	132	138	152	157	147	182
EASTERN EUROPE AND U.S.S.R.	90	94	96	105	115	118	128	130	132	135	138	133	145	148	165
NORTH AMERICA	99	99	97	101	103	98	106	107	110	109	112	119	117	119	120
Canada	110	104	79	99	108	92	97	99	107	90	114	127	118	130	144
United States	98	98	99	101	103	99	107	108	110	111	112	118	117	118	118
OCEANIA	96	97	97	104	106	102	117	119	123	125	133	137	142	136	150
Australia	96	97	97	104	106	100	119	119	124	126	134	139	145	134	153
New Zealand	96	97	98	102	106	107	114	120	122	124	130	131	135	141	145
LATIN AMERICA	94	95	100	103	107	111	119	118	121	128	131	133	136	141	140
Central America	95	92	100	106	108	122	129	127	132	140	138	138	149	158	157
Cuba	121	97	95	92	95	108	107	114	117	127	104	89	96	116	102
Guatemala	93	99	100	102	106	115	118	129	133	136	167	173	177	200	183
Honduras	99	104	95	96	106	111	119	122	122	126	136	140	149	166	151
Mexico	81	88	102	113	115	130	141	133	140	147	152	160	173	174	182
Panama	91	98	101	107	104	113	121	124	121	131	131	136	140	159	165
South America	94	96	100	103	107	110	116	116	118	125	129	132	132	136	136
Argentina	98	95	101	96	110	102	111	104	97	107	111	125	122	107	119
Brazil	92	95	99	107	106	116	124	133	137	145	150	144	143	166	157
Chile	92	97	99	105	108	105	117	112	114	119	118	126	127	121	123
Colombia	99	97	99	103	102	103	112	117	121	120	128	128	133	141	133
Peru	93	97	104	104	101	102	109	112	125	128	131	134	138	132	135
Uruguay	96	109	101	98	95	97	87	78	90	91	97	99	109	108	94
Venezuela	92	98	98	106	107	115	116	123	135	140	150	162	172	182	191

ANNEX TABLE 1A. – TOTAL AGRICULTURAL PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES (*concluded*)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
FAR EAST [1]	92	97	100	104	107	108	112	117	121	126	129	131	135	133	135
Burma	100	97	98	99	106	94	109	116	116	119	130	131	140	133	117
Ceylon	94	94	102	108	102	106	108	111	117	121	128	132	138	133	138
China (Taiwan)	89	101	100	101	108	118	124	123	123	129	128	133	146	159	166
India	90	100	100	104	107	107	111	115	121	125	126	128	131	124	123
Indonesia	93	98	105	102	103	104	108	109	110	109	116	108	117	114	119
Japan	97	86	95	113	110	113	118	117	118	120	129	127	132	133	137
Korea, Rep. of	72	98	110	114	106	116	124	126	125	136	121	136	171	170	184
Malaysia: West Malaysia	94	95	99	106	106	108	112	117	123	131	132	139	141	151	159
Pakistan	99	96	100	99	105	106	104	112	116	119	119	128	127	130	128
Philippines	93	97	99	101	109	114	115	115	123	124	134	138	139	135	151
Thailand	89	106	87	105	113	93	108	114	130	139	146	158	157	167	191
NEAR EAST	93	99	98	100	110	115	119	123	124	124	136	140	143	146	149
Cyprus	91	113	103	99	94	104	94	108	106	121	136	134	127	174	168
Iran	90	97	99	102	112	118	120	127	123	132	130	139	136	146	147
Iraq	83	105	120	87	105	124	107	93	101	115	128	105	118	126	127
Israel	83	85	105	103	124	133	137	169	175	186	204	211	245	255	252
Libya	98	101	96	100	105	148	128	124	129	133	162	182	170	171	174
Syria	87	98	114	84	116	134	92	99	93	111	155	143	154	151	115
Turkey	99	107	86	100	108	106	123	125	126	127	134	140	146	141	158
United Arab Republic	95	92	102	103	107	115	116	120	127	112	135	136	141	147	146
AFRICA	93	97	101	102	107	107	110	115	122	119	127	131	134	135	135
Northwest Africa	90	102	107	94	107	95	105	102	108	84	102	109	106	109	86
Algeria	91	100	108	96	106	98	90	97	101	79	92	93	82	92	68
Morocco	89	101	108	97	105	89	111	104	108	88	115	121	123	129	106
Tunisia	94	109	104	80	114	102	137	110	132	91	103	132	137	112	95
South of Sahara [2]	93	96	100	103	107	109	111	118	124	125	131	134	138	140	142
Ethiopia	93	99	102	103	103	108	105	122	126	135	138	140	145	148	151
South Africa	82	96	106	107	109	115	111	118	124	134	137	144	138	136	145
WORLD [1]	94	98	99	103	107	107	114	117	120	121	126	129	132	133	138

NOTE: Country indices are calculated by FAO on a uniform basis employing regionally constant weights. They may differ from national indices produced by the countries themselves because of differences in concepts of production, coverage, weights, time reference, and methods of calculation. They are not yet available for 1967. All of the indices shown in this table (for regions and subregions as well as individual countries) refer to calendar years and are therefore not comparable with the indices for crop years published in earlier issues of this report.

[1] Excluding China (Mainland). – [2] Derived by subtraction of subtotal for northwest Africa from regional total.

ANNEX TABLE 1B. – PER CAPUT AGRICULTURAL PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
WESTERN EUROPE	94	101	101	102	102	104	106	108	113	112	118	118	118	118	120
Northwestern Europe	95	100	103	101	101	102	104	103	114	110	118	117	117	116	116
Austria	91	101	98	103	107	109	120	108	122	126	128	136	134	118	128
Belgium-Luxembourg	95	97	104	105	98	101	103	98	111	111	117	123	113	109	109
Denmark	96	101	98	102	102	109	106	104	112	113	118	110	112	113	111
Finland	101	106	103	95	96	104	103	106	120	116	109	123	123	129	124
France	91	100	106	102	101	100	101	104	117	112	122	118	118	124	118
Germany, Fed. Rep. of	97	101	102	100	100	100	107	100	113	100	111	115	112	103	110
Ireland	94	96	105	99	106	115	106	103	115	128	123	125	126	117	123
Netherlands	101	99	100	105	95	100	105	103	116	111	120	113	115	110	116
Norway	98	101	99	97	105	101	96	94	100	98	98	97	92	95	89
Sweden	104	105	102	91	99	97	93	94	98	96	99	92	98	95	88
Switzerland	100	102	105	99	95	97	105	100	105	103	97	96	93	90	92
United Kingdom	95	98	100	99	107	106	105	111	117	118	126	126	132	133	135
Southern Europe	92	104	98	104	102	108	110	118	111	116	117	121	121	121	129
Greece	81	103	100	106	109	124	115	120	111	131	124	141	146	150	155
Italy	93	104	96	104	103	100	113	113	105	114	115	108	115	117	120
Portugal	87	106	105	102	100	105	98	99	100	102	111	115	111	119	104
Spain	104	98	102	97	100	102	104	110	110	113	116	130	116	115	127
Yugoslavia	72	119	90	119	99	140	116	157	135	123	127	138	141	130	159
EASTERN EUROPE AND U.S.S.R.	93	96	96	103	111	113	120	121	120	122	123	117	126	127	141
NORTH AMERICA	103	101	97	99	100	93	98	98	98	96	98	102	99	99	99
Canada	116	107	79	96	103	85	87	86	91	75	94	103	94	101	110
United States	102	100	99	100	99	94	99	99	99	98	98	102	100	99	98
OCEANIA	101	100	98	101	101	95	107	106	107	107	111	112	114	106	116
Australia	100	99	97	102	101	93	109	106	108	108	113	115	117	106	119
New Zealand	101	99	98	100	102	100	104	108	108	107	109	108	109	112	113
LATIN AMERICA	100	98	100	101	102	103	106	103	102	105	104	104	102	103	100
Central America	100	95	100	103	102	112	114	109	110	113	108	105	109	112	108
Cuba	127	99	95	90	91	101	98	103	103	110	88	74	78	91	78
Guatemala	99	102	100	99	100	105	104	111	110	110	131	132	130	143	127
Honduras	105	107	95	93	100	101	106	105	102	102	107	106	109	118	104
Mexico	87	91	103	110	108	118	124	113	115	117	117	119	124	121	123
Panama	96	101	101	104	98	104	108	108	102	107	103	104	104	114	114
South America	100	99	100	100	102	101	104	102	101	104	104	104	101	101	98
Argentina	101	97	101	94	106	96	103	95	87	95	96	107	103	89	97
Brazil	98	98	99	104	100	106	110	114	114	117	118	110	106	119	110
Chile	97	99	99	102	102	97	106	99	98	100	97	102	100	94	93
Colombia	105	100	99	100	96	94	99	100	100	97	99	97	97	100	91
Peru	97	100	104	102	97	95	99	99	107	107	106	105	105	98	97
Uruguay	99	111	101	97	93	93	83	73	82	83	87	87	94	92	80
Venezuela	100	102	98	102	99	103	100	103	109	109	113	118	121	124	126

ANNEX TABLE 1B. – PER CAPUT AGRICULTURAL PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES (*concluded*)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
FAR EAST [1]	95	99	100	102	103	102	104	106	107	109	109	108	109	105	104
Burma	104	99	98	97	103	89	102	106	104	105	112	111	116	108	93
Ceylon	99	97	102	105	97	99	98	98	101	102	104	105	107	101	102
China (Taiwan)	96	105	100	98	101	107	108	104	100	101	97	98	104	110	112
India	93	102	101	102	103	101	103	104	107	108	106	106	105	98	95
Indonesia	97	100	105	100	99	98	99	98	97	94	98	89	94	90	91
Japan	100	87	95	111	107	109	113	112	111	112	119	116	120	119	122
Korea, Rep. of	73	99	110	114	103	110	113	112	108	115	99	108	132	128	135
Malaysia: West Malaysia	99	98	99	103	100	99	100	100	103	105	103	106	104	109	111
Pakistan	103	98	100	97	100	99	96	101	101	102	99	104	100	100	96
Philippines	99	101	99	99	103	104	102	99	103	100	105	105	101	95	103
Thailand	95	109	87	102	107	86	96	99	109	114	115	121	117	121	134
NEAR EAST	98	101	98	98	105	107	107	109	107	104	111	111	110	110	109
Cyprus	94	114	103	97	92	99	88	100	97	110	122	119	113	153	146
Iran	95	99	99	99	106	109	107	111	104	109	104	108	103	108	105
Iraq	88	109	121	84	99	113	95	81	85	93	101	80	88	91	89
Israel	88	88	106	101	116	117	117	140	141	145	152	151	169	169	164
Libya	102	104	98	98	99	135	112	105	106	105	123	133	121	117	114
Syria	92	101	115	82	110	123	83	85	78	90	122	109	113	107	79
Turkey	105	111	86	97	102	98	110	108	106	104	106	109	110	103	113
United Arab Republic	100	94	102	101	102	107	105	107	110	95	111	109	111	112	109
AFRICA	97	100	102	100	102	100	100	102	106	101	105	105	105	104	100
Northwest Africa	95	104	107	92	102	89	96	90	94	71	85	90	85	85	66
Algeria	94	102	108	94	102	92	83	87	88	67	78	80	69	75	54
Morocco	94	104	108	95	99	82	100	90	91	72	92	94	94	96	76
Tunisia	97	111	104	79	110	97	129	102	119	80	90	112	115	92	76
South of Sahara [2]	98	99	101	101	102	102	101	104	108	105	108	108	108	107	106
Ethiopia	96	101	102	101	100	102	98	112	114	120	120	121	123	123	124
South Africa	87	98	106	104	104	106	100	104	107	113	113	116	109	104	109
WORLD [1]	98	99	99	101	103	102	106	106	107	106	108	108	109	107	109

NOTE: See explanatory note to Annex table 1A.

[1] Excluding China (Mainland). – [2] Derived by subtraction of subtotal for northwest Africa from regional total.

ANNEX TABLE 2A. – TOTAL FOOD PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
WESTERN EUROPE	93	101	101	102	103	106	110	113	119	119	126	128	129	130	134
Northwestern Europe	94	99	103	101	103	105	108	108	120	117	127	128	129	129	130
Austria	90	101	98	103	107	110	120	110	124	130	132	141	139	124	135
Belgium-Luxembourg	93	97	105	105	99	104	107	103	116	117	124	131	120	118	120
Denmark	95	101	99	103	103	112	109	107	117	119	125	117	120	122	121
Finland	98	104	103	96	98	108	107	111	127	124	118	133	135	143	137
France	89	99	107	102	103	102	105	110	124	120	133	131	132	142	135
Germany, Fed. Rep. of	95	100	102	101	102	103	112	106	122	109	123	129	127	118	127
Ireland	94	97	105	99	105	113	103	99	111	122	118	120	122	114	121
Netherlands	98	98	100	106	98	104	112	112	126	123	135	128	132	129	138
Norway	97	100	99	98	107	104	99	98	105	105	104	104	100	103	97
Sweden	102	104	102	92	100	99	96	97	101	100	104	97	104	103	95
Switzerland	98	101	105	100	97	101	110	107	114	114	111	112	111	108	113
United Kingdom	95	98	100	99	108	108	107	113	121	122	132	134	141	143	146
Southern Europe	90	104	98	105	103	111	114	123	117	122	125	129	131	132	143
Greece	82	106	101	102	109	124	118	127	118	138	128	144	155	162	172
Italy	91	103	96	105	104	103	117	117	110	122	123	115	125	128	132
Portugal	86	106	105	102	101	106	100	101	103	105	117	122	119	129	113
Spain	103	97	102	97	101	105	107	114	115	117	121	139	125	125	139
Yugoslavia	70	119	89	120	102	145	122	169	147	135	141	154	159	149	185
EASTERN EUROPE AND U.S.S.R.	91	94	96	104	114	118	129	131	133	137	140	134	146	149	167
NORTH AMERICA	99	98	97	101	104	101	109	109	111	110	114	121	120	122	127
Canada	112	105	78	99	106	91	96	98	105	88	114	127	118	130	144
United States	98	97	99	102	104	103	111	111	112	113	114	120	120	121	125
OCEANIA	97	100	98	104	101	99	117	115	123	123	135	138	145	137	156
Australia	96	100	99	105	100	96	120	115	125	125	139	143	150	139	164
New Zealand	98	99	97	101	105	106	111	116	118	120	125	127	133	134	138
LATIN AMERICA	93	95	100	102	109	112	117	116	118	125	126	132	137	140	140
Central America	98	94	99	102	107	121	127	129	131	142	136	135	146	156	153
Cuba	123	97	95	91	95	108	108	114	116	127	101	88	95	117	102
Guatemala	98	102	100	98	103	104	108	111	116	116	134	134	138	141	153
Honduras	101	104	94	94	106	108	116	118	120	127	131	134	142	152	147
Mexico	83	91	102	109	115	132	141	140	142	153	157	163	178	181	185
Panama	90	97	100	107	106	115	121	125	121	130	131	135	141	161	165
South America	92	95	100	102	110	109	115	112	115	121	124	131	135	135	137
Argentina	96	94	101	97	111	102	110	103	96	107	111	126	123	106	120
Brazil	88	95	102	105	111	118	122	125	131	137	141	145	154	170	166
Chile	91	97	99	105	108	105	118	112	114	119	118	128	128	122	124
Colombia	98	96	96	104	106	104	108	113	115	115	123	122	132	140	135
Peru	94	99	104	104	99	102	109	111	123	126	126	128	135	129	134
Uruguay	92	109	102	100	97	98	85	77	89	91	95	97	112	112	93
Venezuela	91	95	99	107	109	118	116	124	137	142	156	166	179	190	198

ANNEX TABLE 2A. – TOTAL FOOD PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES (*concluded*)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
FAR EAST [1]	91	98	100	104	107	108	113	118	123	127	129	132	136	134	135
Burma	100	97	97	99	107	93	111	118	118	121	132	133	143	136	120
Ceylon	97	89	103	113	99	102	102	111	117	121	131	136	150	130	140
China (Taiwan)	89	102	100	101	108	117	123	122	122	129	127	131	145	159	166
India	90	101	100	104	106	106	111	116	121	125	125	128	130	124	123
Indonesia	90	98	106	102	104	105	110	111	113	110	117	109	119	114	119
Japan	98	86	95	112	110	113	118	118	120	121	131	128	133	134	139
Korea, Rep. of	70	99	110	114	106	118	126	128	128	139	122	139	174	172	185
Malaysia: West Malaysia	87	96	103	104	110	112	117	118	134	147	148	157	150	164	170
Pakistan	97	99	102	97	105	107	105	115	120	121	120	130	130	132	127
Philippines	94	98	99	101	108	113	114	114	121	121	130	136	135	133	149
Thailand	90	108	85	104	113	90	105	110	124	132	143	154	149	154	180
NEAR EAST	92	100	98	100	110	115	119	122	123	124	134	138	139	141	146
Cyprus	91	113	105	97	94	104	96	109	109	125	138	136	128	178	171
Iran	91	96	99	101	113	119	120	126	120	128	128	135	131	139	143
Iraq	83	107	121	85	104	123	106	91	99	114	129	104	116	126	127
Israel	83	85	105	102	124	131	135	165	167	175	192	204	236	238	234
Libya	100	101	96	99	104	151	125	121	131	131	161	184	172	173	176
Syria	92	106	116	74	112	130	80	87	77	96	144	128	130	125	94
Turkey	99	109	84	99	108	107	124	125	127	128	134	140	139	136	151
United Arab Republic	85	93	104	106	112	115	112	117	124	117	137	139	141	147	152
AFRICA	93	98	102	101	106	106	108	113	120	117	124	128	130	130	130
Northwest Africa	90	101	107	93	108	95	107	103	110	85	104	111	108	110	86
Algeria	90	98	108	96	109	98	91	99	102	81	94	95	84	92	66
Morocco	88	101	109	97	105	89	112	104	109	88	117	123	126	132	108
Tunisia	95	109	104	79	115	102	139	110	133	91	104	133	138	111	93
South of Sahara [2]	94	97	101	103	106	108	109	115	121	123	128	131	134	134	138
Ethiopia	93	100	102	102	103	107	104	122	126	130	132	135	139	141	144
South Africa	79	96	108	108	110	118	111	119	128	139	145	153	146	140	154
WORLD [1]	94	98	99	103	107	108	115	117	121	122	126	129	133	134	140

NOTE: See explanatory note to Annex table 1A.

[1] Excluding China (Mainland). – [2] Derived by subtraction of subtotal for northwest Africa from regional total.

ANNEX TABLE 2B. – PER CAPUT FOOD PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
WESTERN EUROPE	94	102	101	101	102	104	106	108	114	112	118	118	119	118	120
Northwestern Europe	95	100	103	101	101	102	104	104	115	110	118	117	117	117	116
Austria	91	101	98	103	107	109	120	108	122	127	129	136	134	119	129
Belgium-Luxembourg	94	98	105	105	98	102	104	100	112	112	118	124	113	110	111
Denmark	96	101	98	102	102	109	106	104	112	113	119	110	112	113	111
Finland	101	106	103	95	96	105	103	106	120	116	109	123	123	130	124
France	91	100	107	101	101	99	101	104	117	112	122	118	117	125	118
Germany, Fed. Rep. of	97	101	102	100	100	100	107	100	114	100	112	116	112	103	110
Ireland	94	96	105	99	106	115	106	102	114	127	123	124	125	117	123
Netherlands	101	99	100	105	95	101	107	105	117	112	121	114	116	112	118
Norway	99	101	99	97	105	101	96	94	100	98	97	97	92	94	88
Sweden	104	105	102	91	99	97	93	94	98	96	99	92	98	96	88
Switzerland	100	102	105	99	95	97	105	100	104	103	96	95	93	90	92
United Kingdom	95	98	100	99	107	106	105	111	117	118	126	127	133	134	136
Southern Europe	92	105	98	104	102	108	111	119	111	116	118	121	121	121	129
Greece	84	107	100	101	107	121	114	121	111	130	120	134	144	149	157
Italy	92	104	96	104	103	101	114	114	106	117	117	109	117	119	121
Portugal	87	106	105	102	100	105	98	99	100	102	112	115	112	120	104
Spain	104	98	102	96	100	102	103	109	109	111	113	129	115	114	125
Yugoslavia	72	120	89	118	100	141	117	160	138	125	129	139	142	132	162
EASTERN EUROPE AND U.S.S.R.	94	96	96	103	111	113	122	122	122	123	124	118	127	128	142
NORTH AMERICA	103	100	97	100	101	96	101	100	100	98	99	104	101	102	104
Canada	118	108	78	96	101	84	85	86	90	74	94	103	94	101	110
United States	101	99	100	100	101	97	103	102	101	100	99	104	102	102	104
OCEANIA	102	103	98	101	97	92	107	103	107	105	113	113	116	108	121
Australia	100	103	99	103	96	90	109	103	110	107	117	118	121	110	128
New Zealand	103	101	96	99	101	99	102	104	104	104	105	104	107	106	108
LATIN AMERICA	99	98	100	100	103	103	105	101	100	103	101	102	104	102	100
Central America	104	97	99	99	101	111	113	111	109	114	106	102	107	111	105
Cuba	128	99	95	89	91	101	99	102	102	110	86	73	77	92	78
Guatemala	105	105	100	95	97	95	95	95	97	93	105	102	102	101	106
Honduras	107	107	94	92	100	99	103	102	100	102	102	101	104	108	100
Mexico	88	94	103	106	108	120	124	119	117	122	121	122	128	126	124
Panama	96	100	100	104	100	105	108	108	102	106	103	103	104	115	115
South America	98	98	100	100	104	101	103	98	98	100	100	103	103	101	99
Argentina	100	96	101	95	107	96	102	94	86	94	96	108	104	88	98
Brazil	94	98	102	101	104	108	108	107	109	111	111	111	114	122	116
Chile	96	99	99	103	103	97	107	99	98	101	98	103	101	94	94
Colombia	104	99	97	101	99	95	96	97	95	93	96	92	97	99	93
Peru	98	101	104	102	95	95	99	98	106	105	102	101	103	96	97
Uruguay	95	111	102	99	94	94	81	72	82	82	85	85	98	96	79
Venezuela	99	99	99	103	101	105	100	103	110	110	117	121	126	129	130

ANNEX TABLE 2B. – PER CAPUT FOOD PRODUCTION: COUNTRY, SUBREGIONAL AND REGIONAL INDICES (*concluded*)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966 (Preliminary)
	Indices, average 1952-56 = 100														
FAR EAST [1]	95	100	100	102	103	102	104	107	108	109	109	109	110	105	104
Burma	103	99	97	97	104	89	104	108	105	107	114	112	118	110	95
Ceylon	102	91	103	110	94	95	93	98	100	101	107	108	116	98	104
China (Taiwan)	96	106	100	97	101	106	108	103	99	101	96	97	104	110	112
India	93	103	100	102	102	100	103	105	107	108	106	105	105	98	95
Indonesia	94	100	106	100	100	99	102	100	100	95	98	89	96	90	92
Japan	100	87	94	111	107	109	114	112	113	113	121	118	120	120	123
Korea, Rep. of	72	100	111	114	103	111	116	114	111	117	100	111	135	130	136
Malaysia: West Malaysia	92	98	103	102	104	102	104	102	112	119	115	119	111	118	118
Pakistan	101	102	102	95	101	100	97	103	105	103	100	106	103	102	95
Philippines	100	101	99	99	102	103	101	98	101	98	102	103	99	94	102
Thailand	95	111	85	101	107	82	93	95	104	107	113	118	111	111	126
NEAR EAST	96	103	98	98	105	107	108	108	105	104	109	110	107	106	107
Cyprus	94	115	105	95	92	100	90	100	100	113	124	121	114	156	148
Iran	96	99	99	99	107	109	107	110	102	105	103	106	99	103	103
Iraq	88	110	121	83	98	113	94	78	83	93	102	80	86	91	89
Israel	88	87	106	100	116	115	115	137	135	136	143	146	162	159	151
Libya	104	104	97	97	98	137	110	102	107	103	123	135	122	118	116
Syria	97	109	116	72	106	120	71	76	64	78	113	97	96	89	65
Turkey	105	112	84	97	102	99	111	108	107	105	107	109	105	100	108
United Arab Republic	89	95	104	104	107	107	102	104	108	99	113	112	110	112	113
AFRICA	97	100	102	99	102	99	99	101	104	99	103	103	102	100	97
Northwest Africa	94	103	108	91	104	89	97	91	95	72	87	91	87	86	65
Algeria	94	100	108	94	104	92	84	88	89	69	81	82	71	76	53
Morocco	93	104	109	94	100	82	101	91	92	72	93	95	96	98	77
Tunisia	98	111	103	77	111	97	131	103	120	80	90	114	116	91	74
South of Sahara [2]	98	100	101	100	101	101	99	102	105	104	105	105	105	102	102
Ethiopia	96	102	102	101	99	102	98	112	114	115	115	116	118	117	117
South Africa	83	98	108	106	104	109	100	105	110	117	119	123	115	108	116
WORLD [1]	97	100	99	101	103	102	106	106	108	107	108	108	109	108	111

NOTE: See explanatory note to Annex table 1A.

[1] Excluding China (Mainland). – [2] Derived by subtraction of subtotal for northwest Africa from regional total.

ANNEX TABLE 3A. – WORLD [1] PRODUCTION OF MAJOR AGRICULTURAL COMMODITIES

	Average 1948–52	Average 1953–57	Average 1958–62	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
Wheat	155.13	188.15	223.53	228.77	219.38	220.86	211.47	237.18	217.77	252.09	239.54	282.56	266.97
Barley	46.86	62.29	73.77	70.21	68.30	77.08	69.57	83.67	86.07	93.26	88.92	99.47	104.74
Oats	60.18	59.27	54.14	60.92	54.80	57.18	49.16	48.64	45.77	42.74	44.95	46.55	44.75
Maize	125.33	140.85	180.00	161.34	177.51	185.64	186.63	188.86	198.96	191.55	200.85	213.28	233.97
Rice (milled equivalent) [2]	72.34	84.20	100.74	92.91	97.73	103.30	104.52	105.27	111.84	115.37	107.08	107.30	120.27
Sugar (centrifugal)	31.98	39.93	50.07	48.81	48.21	53.87	50.36	49.09	53.14	63.97	61.04	62.21	63.27
Apples [3]	13.40	13.73	18.04	20.93	13.93	21.04	14.89	19.42	18.25	19.11	19.06	18.89	20.10
Citrus fruit	15.30	18.16	21.19	20.13	20.73	20.96	23.09	21.03	22.61	24.84	26.37	30.39	27.56
Bananas	12.94	14.29	17.54	15.87	17.14	17.92	18.24	18.53	20.26	21.95	23.53	23.54	23.74
Olive oil	0.95	1.12	1.26	1.13	1.24	1.41	1.51	1.00	1.96	0.98	1.29	1.31	1.31
Soybeans	8.67	12.10	18.46	17.66	16.44	17.02	20.66	20.54	21.24	21.15	25.45	27.98	29.28
Groundnuts	7.46	9.51	11.86	11.48	10.67	11.69	12.25	13.19	13.31	13.83	13.21	13.62	15.55
Cottonseed	12.17	14.55	15.86	14.45	15.28	15.96	16.20	17.39	18.53	18.53	18.78	17.15	16.59
Copra	2.64	3.17	3.10	2.92	2.73	3.34	3.39	3.12	3.28	3.34	3.29	3.45	3.20
Total vegetable oils and oilseeds (oil equivalent)	12.98	15.72	18.50	17.71	16.95	18.42	19.65	19.74	20.83	20.58	21.84	22.16	22.25
Coffee	2.22	2.66	4.19	3.56	4.15	4.24	4.42	4.59	4.21	3.52	4.56	3.87	4.39
Cocoa	0.76	0.82	1.09	0.91	1.04	1.17	1.15	1.17	1.21	1.52	1.22	1.33	1.32
Tea	0.58	0.71	0.84	0.79	0.81	0.83	0.89	0.90	0.92	0.97	0.98	1.03	1.03
Wine	18.91	21.72	24.71	23.80	24.94	24.32	21.96	28.51	25.81	28.51	28.78	27.42	28.23
Tobacco	2.72	3.14	3.24	3.02	3.23	3.23	3.16	3.57	3.83	4.18	3.83	3.88	4.03
Cotton (lint)	6.69	7.92	8.63	7.81	8.36	8.72	8.74	9.52	10.10	10.11	10.21	9.39	8.99
Jute [4]	2.14	2.11	2.63	2.60	2.27	2.18	3.31	2.79	2.95	2.88	2.84	3.23	3.21
Sisal	0.32	0.46	0.58	0.54	0.58	0.58	0.60	0.63	0.64	0.65	0.65	0.66	0.67
Wool (greasy)	1.79	2.12	2.45	2.34	2.47	2.45	2.50	2.49	2.55	2.52	2.52	2.59	2.63
Rubber	1.73	1.88	2.07	1.97	2.07	2.02	2.12	2.16	2.12	2.25	2.38	2.44	2.49
Milk (total)	255.44	295.26	336.62	324.11	329.90	338.04	343.77	347.29	345.17	351.73	367.06	375.18	382.06
Meat [5]	39.81	50.05	59.35	55.48	57.58	58.66	61.50	63.63	65.78	65.76	68.25	71.19	73.78
Eggs	8.76	10.72	12.64	11.75	12.26	12.59	13.18	13.43	13.50	14.05	14.26	14.61	15.20

[1] Excluding China (Mainland). – [2] Paddy converted at 65 percent. – [3] Excluding U.S.S.R. as well as China (Mainland). – [4] Including allied fibers. – [5] Beef and veal, mutton and lamb, pork, poultry meat.

ANNEX TABLE 3B. – REGIONAL PRODUCTION OF MAJOR AGRICULTURAL COMMODITIES

	Average 1948–52	Average 1953–57	Average 1958–62	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
WESTERN EUROPE													
Wheat	30.32	36.29	41.37	39.08	42.66	39.62	37.62	47.87	41.54	46.90	48.64	44.46	51.68
Barley	10.93	15.77	21.74	17.73	20.35	22.14	22.54	25.92	28.50	29.57	30.91	32.64	38.16
Oats	14.84	14.85	12.87	12.88	12.57	13.29	12.96	12.63	12.62	11.98	11.86	11.82	13.12
Rye	6.65	7.10	6.53	6.99	7.17	7.04	5.40	6.03	5.85	6.35	5.40	4.86	5.54
Maize	7.18	10.04	13.15	11.08	14.32	14.83	13.13	12.38	15.15	15.41	14.86	18.29	17.32
Sugar (centrifugal)	5.13	6.80	8.12	8.19	7.32	9.93	7.81	7.34	8.56	10.17	9.04	9.40	9.90
Potatoes	76.32	79.14	74.38	72.43	72.75	79.78	72.99	73.94	80.56	68.36	63.10	65.02	67.98
Apples	8.55	8.25	11.24	13.45	7.24	13.70	7.99	12.08	10.22	10.58	10.96	10.23	11.61
Citrus fruit	2.09	2.43	3.36	2.91	3.28	3.27	4.07	3.25	4.26	4.30	4.54	5.12	4.95
Olive oil	0.77	0.90	1.00	0.79	1.06	1.10	1.24	0.81	1.64	0.64	1.05	1.05	1.08
Rapeseed	0.46	0.33	0.42	0.46	0.45	0.27	0.38	0.52	0.41	0.64	0.76	0.60	0.87
Total vegetable oils and oilseeds (oil equivalent)	1.04	1.12	1.28	1.06	1.34	1.32	1.52	1.16	1.97	1.05	1.47	1.45	1.55
Wine	13.14	14.91	16.68	16.02	16.66	16.62	14.20	19.91	16.67	19.74	19.38	18.51	19.06
Tobacco	0.25	0.31	0.26	0.30	0.31	0.26	0.20	0.25	0.33	0.36	0.35	0.30	0.33
Cotton (lint)	0.04	0.09	0.16	0.11	0.14	0.14	0.20	0.21	0.20	0.15	0.16	0.21	0.20
Milk (total)	79.77	92.55	102.69	97.63	98.09	103.73	106.34	107.69	107.19	107.43	111.00	113.30	114.84
Meat [1]	8.14	11.28	13.76	12.38	12.88	13.68	14.52	15.31	15.53	15.65	16.16	16.71	17.39
Eggs	2.13	2.72	3.34	3.09	3.24	3.32	3.45	3.58	3.72	3.94	3.85	3.96	4.12
EASTERN EUROPE													
Wheat	[2]10.8	11.8	13.2	11.9	14.0	12.9	13.6	13.9	13.5	14.4	18.6	18.1	18.2
Rye	[2]11.1	10.5	11.1	11.2	11.9	11.5	11.3	9.7	10.0	10.2	11.5	10.6	10.8
Barley	[2]4.1	4.9	5.8	4.8	5.7	6.3	5.9	6.4	6.1	6.1	6.9	7.0	6.9
Oats	[2]5.1	5.2	5.3	5.3	5.2	5.5	5.4	5.1	4.8	4.0	4.2	4.6	4.6
Maize	[2]5.7	9.4	10.4	8.1	11.5	11.3	10.6	10.4	12.1	13.0	11.3	14.8	13.5
Sugar beet	[2]20.2	23.2	28.1	27.0	23.2	33.9	29.8	26.8	31.1	34.0	33.4	37.7	...
Potatoes	[2]54.0	61.6	61.8	58.9	60.5	64.3	64.1	61.2	69.7	73.5	64.1	72.1	68.6
Meat (total) [1,3]	2.6	[3]3.5	4.2	4.1	4.1	4.2	4.5	4.4	4.3	4.6	5.0	5.1	5.1
Milk (total)	20.2	24.2	28.9	28.0	29.0	29.3	29.7	28.7	28.6	29.1	30.7	33.0	33.3
Eggs [4]	[2]9.4	11.8	16.4	14.3	15.4	16.8	18.0	17.3	17.1	18.3	19.3	19.8	20.2
U.S.S.R.													
Wheat	[6]30.5	51.3	69.4	76.6	69.1	64.3	66.5	70.8	49.7	74.4	59.7	100.5	76.2
Rye	[6]17.1	15.0	16.5	15.7	16.9	16.4	16.7	17.0	11.9	13.6	16.2	13.1	15.5
Barley	[6]6.4	9.5	14.4	13.0	10.2	16.0	13.3	19.5	19.8	28.6	20.3	27.8	28.1
Oats	[6]12.7	11.7	10.7	13.4	13.5	12.0	8.9	5.7	4.0	5.5	6.2	9.2	8.5
Millet	[6]1.7	3.0	2.6	2.9	1.3	3.2	2.9	2.8	1.8	3.5	2.2	3.1	3.0
Maize	[6]5.8	6.7	11.7	10.2	5.7	9.8	17.1	15.5	11.1	13.8	8.0	8.4	7.5
Pulses	[6]1.0	0.8	2.2	0.9	1.1	1.4	2.3	5.4	6.6	8.6	4.7	4.9	4.8
Cotton (raw)	[6]3.4	4.1	4.4	4.3	4.6	4.3	4.5	4.3	5.2	5.3	5.7	6.0	6.0
Flax (fiber)	[6]0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.5	0.5
Sugar beet	[6]20.6	29.3	50.9	54.4	43.9	57.7	50.9	47.4	44.1	81.2	72.3	79.0	86.8
Oilseeds, total	[6]2.4	[7]3.1	4.8	5.2	3.4	4.3	5.3	5.5	4.9	6.6	6.1	7.0	7.4
Sunflowerseed	[6]1.9	3.0	4.2	4.6	3.0	4.0	4.8	4.8	4.3	6.1	5.4	6.2	5.4
Potatoes	[6]76.9	80.6	82.3	86.5	86.6	84.4	84.3	69.7	71.8	93.6	88.7	87.9	88.8
Milk, total	[6]35.1	44.3	61.7	58.7	61.7	61.7	62.6	63.9	61.2	63.3	72.6	76.0	79.3
Meat, total [1,3]	[6]4.7	6.5	8.7	7.7	8.9	8.7	8.7	9.5	10.2	8.3	10.0	10.7	11.4
Wool (greasy)	[6]0.2	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4
Eggs [4]	[6]12.1	18.7	27.1	23.0	25.6	27.4	29.3	30.1	28.5	26.7	29.1	31.7	33.7
NORTH AMERICA													
Wheat	44.51	40.86	46.07	50.50	42.53	50.98	41.25	45.11	50.90	51.27	53.47	58.22	57.62
Barley	10.09	13.16	13.38	15.57	13.85	13.55	11.00	12.93	13.36	12.04	13.21	15.16	13.48
Oats	25.19	24.74	22.09	25.67	20.55	22.89	19.05	22.31	21.00	17.88	19.85	17.41	16.04
Maize	74.70	74.76	93.68	86.01	97.93	99.90	92.13	92.45	103.01	89.85	105.26	106.27	121.83
Sorghum	3.90	6.94	13.96	14.76	14.11	15.75	12.20	12.96	14.87	12.44	17.09	18.16	19.45
Rice (milled equivalent) [5]	1.25	1.56	1.61	1.32	1.58	1.61	1.60	1.95	2.07	2.16	2.25	2.51	2.64
Sugar (centrifugal)	2.95	3.36	3.91	3.57	3.67	3.93	4.10	4.27	5.11	5.29	4.90	4.94	4.91

ANNEX TABLE 3B. – REGIONAL PRODUCTION OF MAJOR AGRICULTURAL COMMODITIES (*continued*)

	Average 1948–52	Average 1953–57	Average 1958–62	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
Potatoes	12.49	12.42	13.98	13.92	12.76	13.62	15.32	14.15	14.39	13.12	15.33	16.42	15.92
Apples	2.71	2.63	3.02	3.12	3.08	2.67	3.10	3.15	3.22	3.43	3.40	3.19	3.14
Citrus fruit	6.48	7.30	7.10	7.45	7.28	6.93	7.88	5.95	5.66	6.93	7.99	10.48	7.29
Soybeans	7.40	10.58	16.59	15.97	14.69	15.24	18.65	18.39	19.16	19.27	23.23	25.54	26.69
Cottonseed	5.28	5.17	5.22	4.35	5.44	5.34	5.42	5.57	5.62	5.66	5.52	3.59	2.84
Total vegetable oils and oilseeds (oil equivalent)	2.70	3.22	4.18	4.07	3.77	4.06	4.46	4.51	4.74	4.75	5.66	5.58	5.53
Tobacco	1.02	1.01	0.98	0.88	0.89	0.98	1.03	1.14	1.15	1.08	0.92	0.96	1.02
Cotton (lint)	3.11	3.01	3.03	2.51	3.17	3.11	3.12	3.24	3.34	3.31	3.26	2.09	1.66
Milk (total)	59.40	63.43	64.40	63.98	63.39	63.96	65.35	65.62	65.16	66.00	64.66	62.88	62.59
Meat [1]	13.22	15.99	18.32	16.61	17.71	18.04	18.85	18.89	19.84	21.08	21.01	22.00	23.13
Eggs	3.93	4.11	4.14	4.16	4.25	4.10	4.09	4.12	4.07	4.14	4.17	4.20	4.46
OCEANIA													
Wheat	5.30	4.43	6.95	5.96	5.57	7.69	6.98	8.57	9.17	10.31	7.32	12.86	7.81
Sugar (centrifugal)	1.04	1.44	1.69	1.64	1.60	1.55	1.55	2.13	2.06	2.29	2.30	2.69	2.72
Wool (greasy)	0.69	0.84	1.01	0.97	1.02	1.00	1.04	1.04	1.09	1.09	1.07	1.12	1.14
Milk (total)	10.23	11.23	11.80	11.38	11.66	11.95	11.67	12.17	12.36	12.71	13.16	13.29	13.80
Meat [1]	1.65	1.92	2.28	2.25	2.22	2.13	2.32	2.51	2.58	2.64	2.57	2.51	2.41
LATIN AMERICA													
Wheat	7.96	10.38	9.57	10.70	9.52	8.09	9.64	9.88	12.95	16.46	9.84	10.39	12.45
Maize	15.26	18.29	23.65	21.56	22.32	23.58	24.73	26.04	26.42	28.23	31.07	32.26	35.29
Rice (milled equivalent) [8]	2.97	3.70	4.81	4.04	4.26	4.93	5.28	5.53	5.54	5.98	6.99	5.80	6.73
Sugar (centrifugal)	12.53	13.79	16.68	16.75	17.17	18.08	16.15	15.31	16.38	18.76	19.01	20.08	18.79
Citrus fruit	3.74	4.16	4.88	4.55	4.69	4.81	5.02	5.33	5.62	5.66	5.81	6.17	6.17
Bananas	7.28	8.97	11.18	10.30	11.16	11.53	11.43	11.47	12.34	13.86	14.86	14.78	14.82
Groundnuts	0.35	0.54	0.94	0.78	0.79	0.83	1.04	1.28	1.11	1.01	1.38	1.53	1.33
Cottonseed	1.45	1.94	2.34	2.29	1.88	2.23	2.46	2.85	2.95	3.03	3.06	2.99	2.73
Sunflowerseed	1.02	0.62	0.80	0.94	0.49	0.92	0.67	0.97	0.59	0.57	0.84	0.94	1.25
Copra	0.09	0.17	0.24	0.23	0.23	0.24	0.27	0.27	0.24	0.24	0.24	0.24	0.24
Palm kernels	0.10	0.12	0.16	0.15	0.14	0.16	0.18	0.20	0.21	0.22	0.24	0.24	0.24
Total vegetable oils and oilseeds (oil equivalent)	1.11	1.19	1.67	1.54	1.45	1.58	1.73	2.03	1.87	1.93	2.11	2.16	2.08
Coffee	1.87	2.10	3.25	2.80	3.32	3.24	3.45	3.43	2.92	2.28	3.13	2.59	2.92
Cocoa	0.26	0.31	0.31	0.32	0.36	0.29	0.29	0.29	0.29	0.30	0.33	0.34	0.34
Tobacco	0.30	0.37	0.42	0.38	0.40	0.43	0.44	0.48	0.52	0.51	0.56	0.52	0.50
Cotton (lint)	0.80	1.09	1.30	1.25	1.05	1.24	1.36	1.58	1.65	1.68	1.62	1.74	1.58
Sisal	0.08	0.12	0.18	0.16	0.18	0.18	0.20	0.21	0.21	0.21	0.24	0.23	0.23
Wool (greasy)	0.33	0.34	0.34	0.34	0.34	0.35	0.34	0.34	0.35	0.36	0.35	0.37	0.36
Milk	13.83	17.46	19.38	18.79	18.93	19.52	19.83	19.84	20.26	21.48	22.02	21.50	22.89
Meat [1]	6.24	6.93	7.76	8.05	7.42	7.36	7.82	8.16	8.45	8.03	8.23	8.65	8.77
Eggs	0.55	0.83	0.92	0.89	0.87	0.91	0.99	0.95	0.96	1.02	1.07	1.11	1.12
FAR EAST [9]													
Wheat	11.52	13.70	16.35	13.39	15.94	16.54	17.27	18.61	16.51	16.20	19.13	16.38	17.88
Maize	6.61	8.36	11.64	10.16	10.58	11.18	12.47	13.76	12.77	14.46	13.18	14.28	14.75
Millet and sorghum	13.29	16.80	17.89	18.24	17.29	18.00	17.01	18.92	18.33	19.40	15.24	17.95	20.30
Rice (milled equivalent) [8]	64.12	74.28	89.14	82.83	86.72	91.48	92.70	91.98	98.15	101.02	91.91	92.48	103.92
Sugar (centrifugal)	3.17	4.89	6.27	5.73	6.24	6.79	6.51	6.10	6.79	7.95	8.47	6.53	7.26
Sugar (noncentrifugal)	4.03	5.78	7.71	7.48	7.05	7.76	7.85	8.40	8.76	9.64	8.61	9.12	9.53
Pulses [10]	7.16	8.77	10.30	8.69	11.41	10.06	10.87	10.49	10.20	8.96	10.37	8.48	7.83
Soybeans	1.02	1.22	1.28	1.27	1.30	1.31	1.30	1.22	1.15	1.12	1.08	1.03	1.06
Groundnuts	3.81	4.97	6.08	6.24	5.66	6.06	6.25	6.44	6.49	7.19	5.53	5.82	7.36
Copra	2.23	2.63	2.48	2.33	2.13	2.75	2.73	2.46	2.65	2.70	2.68	2.87	2.62
Total vegetable oils and oilseeds (oil equivalent)	4.06	5.01	5.35	5.17	4.90	5.50	5.63	5.60	5.76	5.84	5.53	5.60	5.99
Tea	0.53	0.65	0.74	0.71	0.72	0.72	0.78	0.77	0.78	0.82	0.82	0.83	0.84
Tobacco	0.60	0.77	0.85	0.73	0.84	0.84	0.85	1.00	1.04	1.12	1.09	1.11	1.21
Cotton (lint)	0.90	1.24	1.29	1.24	1.08	1.36	1.28	1.49	1.61	1.50	1.44	1.51	1.69
Jute [11]	2.02	1.97	2.50	2.48	2.14	2.05	3.16	2.65	2.76	2.74	2.85	3.00	3.05

ANNEX TABLE 3B. – REGIONAL PRODUCTION OF MAJOR AGRICULTURAL COMMODITIES (*concluded*)

	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
Rubber (natural)	1.65	1.75	1.90	1.82	1.90	1.84	1.95	1.98	1.93	2.05	2.18	2.23	2.28
Milk (total)	22.55	25.97	29.37	27.98	28.69	29.41	29.99	30.77	31.63	32.43	33.13	33.82	34.50
Meat [1]	1.98	2.46	2.92	2.80	2.87	2.85	2.97	3.11	3.20	3.30	3.42	3.64	3.77
Eggs	0.44	0.74	1.05	0.86	0.91	0.99	1.18	1.30	1.36	1.52	1.55	1.56	1.65
NEAR EAST													
Wheat	11.00	15.34	16.70	16.73	16.34	16.47	15.79	18.15	18.74	17.45	18.43	18.56	20.70
Barley	4.74	6.35	6.36	6.48	6.00	6.12	6.00	7.22	7.66	6.35	6.75	6.56	7.13
Maize	2.56	3.11	3.45	3.42	3.30	3.56	3.39	3.57	3.64	3.72	3.86	4.13	4.07
Rice (milled) [8]	1.33	1.48	1.74	1.37	1.72	1.83	1.52	2.24	2.44	2.32	2.28	2.45	2.68
Sugar (centrifugal)	0.42	0.66	1.01	0.85	1.02	1.19	0.99	1.01	1.16	1.47	1.24	1.49	1.73
Pulses [10]	0.80	0.87	0.90	0.90	0.87	0.91	0.79	1.05	0.96	1.14	1.14	1.07	1.12
Citrus fruit	0.87	1.23	1.54	1.41	1.52	1.57	1.51	1.68	2.05	2.10	2.29	2.40	2.57
Dates	1.01	1.29	1.41	1.42	1.21	1.38	1.47	1.52	1.49	1.35	1.48	1.65	1.58
Olive oil	0.08	0.10	0.12	0.13	0.09	0.11	0.18	0.09	0.16	0.18	0.10	0.20	0.13
Cottonseed	1.21	1.46	1.88	1.63	1.82	1.92	1.80	2.23	2.23	2.31	2.50	2.28	2.36
Total vegetable oils and oilseeds (oil equivalent)	0.41	0.53	0.67	0.64	0.64	0.65	0.72	0.68	0.79	0.84	0.80	0.86	0.81
Tobacco	0.12	0.15	0.15	0.15	0.17	0.18	0.14	0.12	0.16	0.25	0.19	0.22	0.23
Cotton (lint)	0.65	0.77	1.01	0.88	0.99	1.04	0.95	1.22	1.18	1.29	1.38	1.31	1.31
Wool (greasy)	0.08	0.10	0.12	0.11	0.12	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12
Milk (total)	7.93	8.68	10.23	10.11	10.44	10.25	10.04	10.33	10.40	10.74	11.06	11.58	11.85
Meat [1]	0.85	1.11	1.37	1.25	1.30	1.37	1.44	1.49	1.51	1.51	1.54	1.58	1.60
AFRICA													
Wheat	3.16	4.04	3.84	3.98	3.77	4.26	2.87	4.31	4.81	4.67	4.41	3.05	4.45
Barley	3.18	3.31	2.71	3.39	2.78	2.92	1.54	2.93	3.20	2.56	2.60	1.63	2.57
Maize	7.49	10.03	12.41	10.62	11.71	12.26	12.92	14.61	14.50	12.87	13.15	14.57	19.54
Millet and sorghum	7.21	7.76	9.37	8.35	8.83	9.62	9.70	10.42	10.98	11.44	11.31	11.37	12.04
Rice (milled equivalent) [8]	1.62	1.87	2.17	2.05	2.11	2.26	2.12	2.29	2.31	2.45	2.29	2.49	2.55
Sugar (centrifugal)	1.36	1.88	2.36	2.23	2.34	2.03	2.53	2.67	3.02	3.00	2.95	3.72	3.94
Pulses [10]	1.35	1.45	1.41	1.42	1.43	1.46	1.32	1.42	1.57	1.62	1.67	1.58	1.63
Citrus fruit	0.85	1.19	1.60	1.37	1.53	1.69	1.67	1.73	1.83	2.13	1.97	2.03	2.12
Bananas	0.67	0.89	0.95	0.91	0.96	0.95	0.95	1.00	1.06	1.09	1.14	1.17	1.18
Olive oil	0.09	0.11	0.12	0.18	0.08	0.19	0.08	0.09	0.15	0.14	0.12	0.05	0.10
Groundnuts	2.38	3.15	3.69	3.31	3.19	3.70	3.94	4.30	4.40	4.26	4.76	4.70	5.24
Total vegetable oils and oilseeds (oil equivalent)	2.24	2.71	2.94	2.87	2.77	3.02	2.97	3.05	3.16	3.14	3.22	3.16	3.12
Coffee	0.28	0.44	0.76	0.62	0.66	0.81	0.75	0.93	1.03	1.02	1.19	1.04	1.19
Cocoa	0.50	0.50	0.76	0.57	0.66	0.87	0.83	0.85	0.90	1.19	0.86	0.96	0.94
Wine	1.71	2.30	2.18	2.07	2.58	2.29	2.02	1.93	2.07	1.83	2.39	1.44	1.63
Tobacco	0.13	0.16	0.20	0.18	0.20	0.21	0.20	0.20	0.19	0.26	0.25	0.24	0.22
Cotton (lint)	0.21	0.27	0.30	0.31	0.31	0.32	0.28	0.27	0.33	0.34	0.37	0.43	0.43
Sisal	0.22	0.30	0.37	0.35	0.37	0.38	0.37	0.40	0.41	0.42	0.40	0.41	0.42
Rubber (natural)	0.06	0.10	0.14	0.13	0.14	0.15	0.14	0.15	0.15	0.16	0.15	0.17	0.17
Wool (greasy)	0.13	0.17	0.17	0.17	0.18	0.17	0.18	0.17	0.17	0.17	0.19	0.17	0.18
Milk (total)	6.46	7.41	8.09	7.57	8.02	8.20	8.32	8.29	8.35	8.56	8.67	8.87	8.96
Meat [1]	1.67	1.85	2.14	2.00	2.05	2.08	2.28	2.27	2.28	2.35	2.39	2.44	2.46
Eggs	0.30	0.33	0.39	0.36	0.38	0.40	0.41	0.42	0.44	0.46	0.47	0.47	0.47

[1] Beef and veal, mutton and lamb, pork, poultry meat. – [2] 1949-52. – [3] Slaughtered weight. – [4] Thousand million units. – [5] Average 1955-57. – [6] 1940. – [7] 1953. – [8] Paddy converted at 65 percent. – [9] Excluding China (Mainland). – [10] Dry beans, dry peas, broad beans, chick-peas, lentils. – [11] Including allied fibers.

ANNEX TABLE 4. – TOTAL CATCH (LIVEWEIGHT) OF FISH, CRUSTACEANS AND MOLLUSKS IN SELECTED COUNTRIES[1]

	1938	1948	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	1966
	Thousand metric tons													%
WORLD TOTAL	21 000.0	19 600.0	31 500.0	33 200.0	36 700.0	40 000.0	43 400.0	46 900.0	48 200.0	52 500.0	53 400.0	57 100.0	59 400.0	100.0
A. *1966 catch: 5 000 000 tons and more*	...	4 650.0	11 570.0	13 150.0	15 850.0	18 610.0	21 050.0	23 240.0	23 370.0	25 740.0	25 270.0	27 040.0	29 380.0	47.4
Peru	23.4	84.1	511.0	961.2	2 186.6	3 569.1	5 291.0	6 957.5	6 899.0	9 116.5	7 461.9	8 789.0	10 100.0	15.4
Japan	3 677.7	2 518.5	5 407.3	5 504.7	5 884.1	6 192.7	6 710.5	6 866.9	6 698.5	6 350.7	6 907.7	7 102.2	7 700.0	12.4
China (Mainland)	...	...	3 120.0	4 060.0	5 020.0	5 800.0	...	...	...	...	...	...	...	...
U.S.S.R.	1 523.0	1 485.0	2 531.0	2 621.0	2 756.0	3 051.0	3 250.0	3 616.5	3 977.2	4 475.8	5 099.9	5 348.8	5 777.2	9.4
B. *1966 catch: 1 000 000 tons and more but less than 5 000 000 tons*	...	9 070.0	11 200.0	10 920.0	11 370.0	11 600.0	12 140.0	12 860.0	13 130.0	14 300.0	15 320.0	16 550.0	16 130.0	29.0
Norway	1 127.8	1 422.2	1 745.8	1 442.3	1 575.2	1 543.0	1 523.0	1 331.7	1 387.9	1 608.1	2 307.3	2 865.0	3 214.2	5.0
United States	2 260.1	2 416.6	2 759.8	2 703.4	2 890.8	2 814.7	2 931.9	2 972.9	2 777.0	2 647.1	2 724.3	2 514.6	2 400.0	4.4
Chile	32.2	64.6	213.1	225.8	272.6	339.6	429.8	638.6	761.9	1 160.9	708.5	1 383.5	1 048.0	2.4
India	...	...	1 233.0	1 064.6	823.2	1 161.4	961.0	973.7	1 046.3	1 320.0	1 331.3	1 367.6	...	2.4
Spain	408.5	547.2	777.2	844.9	859.1	969.9	988.0	1 107.5	1 125.3	1 203.5	1 341.5	1 363.0	1 162.0	2.4
Canada	836.8	1 052.9	997.1	1 007.6	1 054.4	934.5	1 019.6	1 123.5	1 197.6	1 211.0	1 262.3	1 346.0	1 289.8	2.4
Iceland	327.2	478.1	502.7	580.4	640.8	592.8	710.0	832.6	784.5	972.7	1 199.0	1 240.3	895.3	2.2
South Africa and South West Africa	68.4	188.5	583.6	655.7	747.6	867.6	1 010.8	1 061.1	1 170.8	1 255.2	1 342.4	1 182.2	...	2.1
United Kingdom	1 198.1	1 206.1	1 014.7	999.0	988.9	923.8	892.6	944.3	960.9	974.3	1 047.3	1 068.4	1 026.1	1.9
Indonesia	475.5	...	732.0	691.0	758.1	760.7	910.8	947.0	936.2	940.0	1 066.8	1 201.6	...	2.1
Denmark and Faeroe Islands	160.1	318.6	638.9	704.7	760.9	690.6	757.6	928.6	984.9	1 010.2	985.5	1 016.2	1 243.7	1.8
C. *1966 catch: 500 000 tons and more but less than 1 000 000 tons*	3 680.0	2 150.0	3 210.0	3 500.0	3 600.0	3 680.0	3 730.0	4 020.0	4 240.0	4 610.0	4 700.0	4 900.0	5 130.0	8.6
France	643.6	512.8	595.9	611.8	703.1	734.2	750.9	744.3	742.3	780.4	767.6	804.8	819.9	1.4
Korea, North	925.2	...	291.5	...	...	...	...	...	...	...	...	...	...	...
Philippines	80.9	195.1	407.5	447.3	457.6	465.8	476.1	505.3	565.6	623.5	685.7	726.0	769.2	1.3
Thailand	161.0	161.0	234.5	196.3	204.7	220.9	305.6	339.7	418.7	577.0	615.1	708.1	849.4	1.2
Korea, Rep. of	844.2	293.8	409.3	403.6	392.7	455.2	460.8	469.2	529.6	599.5	640.4	701.1	...	1.2
Germany, Fed. Rep. of	777.2	414.0	791.7	725.4	768.0	674.0	619.0	632.7	647.2	624.3	632.7	657.3	661.5	1.2
Portugal	247.2	292.1	479.5	466.0	427.8	475.1	500.0	525.6	539.7	603.7	553.6	506.0	...	0.9
D. *1966 catch: 100 000 tons and more but less than 500 000 tons*	2 170.0	2 560.0	3 760.0	3 800.0	4 010.0	4 240.0	4 510.0	4 730.0	5 280.0	5 620.0	5 720.0	6 090.0	6 070.0	10.7
China (Taiwan)	89.5	83.5	208.0	229.7	246.3	259.1	312.2	327.0	350.7	376.7	381.7	425.3	458.1	0.7
Pakistan	...	...	282.8	283.7	290.1	304.5	319.1	330.5	345.0	360.6	379.0	412.0	417.0	0.7
Brazil	103.3	144.8	212.2	211.9	239.1	251.0	275.1	379.4	411.4	330.8	373.2	...	...	...
Viet-Nam, Rep. of	180.0	...	135.0	143.0	153.5	240.0	250.0	255.0	378.6	397.0	375.0	380.5	...	0.7
Burma	...	...	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	360.0	0.6
Netherlands	256.2	294.1	300.8	313.8	319.6	314.7	346.1	321.9	361.0	387.8	377.0	353.1	314.6	0.6
Poland	32.5	47.1	138.8	145.1	162.2	183.9	185.5	179.6	226.7	264.3	297.5	334.9	338.9	0.6
Italy	181.2	182.8	247.7	245.7	253.5	249.5	282.4	257.0	272.0	298.3	323.5	334.3	337.3	0.6
Angola	26.5	113.2	395.5	278.2	267.4	252.0	241.5	269.3	239.7	355.8	256.7	327.5	292.1	0.6
Sweden	129.2	193.9	222.1	238.0	268.0	254.7	267.3	292.6	340.2	372.1	364.6	314.4	338.3	0.6
Morocco	43.7	68.6	151.5	172.7	151.5	162.9	178.4	171.4	184.1	199.6	214.9	303.4	250.2	0.5
Viet-Nam, North	...	...	129.4	156.0	205.5	232.0	222.9	288.7	...	...	...	...	...	...
Malaysia	...	144.9	138.9	139.9	146.5	169.4	181.2	201.0	230.8	241.1	253.3	296.3	367.1	0.5
Mexico	17.1	68.4	117.5	163.9	192.4	197.9	225.4	218.6	243.0	249.0	256.4	285.6	...	0.5
Argentina	55.3	71.2	82.5	84.2	89.9	104.6	101.9	101.4	130.5	168.2	205.0	250.8	240.9	0.4
Germany, Eastern	...	...	96.5	93.2	105.6	114.4	130.1	150.1	189.4	224.9	230.9	222.7	...	0.4

ANNEX TABLE 4. – TOTAL CATCH (LIVEWEIGHT) OF FISH, CRUSTACEANS, AND MOLLUSKS IN SELECTED COUNTRIES [1] (*continued*)

	1938	1948	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	1966
	Thousand metric tons													%
Cambodia	...	...	...	...	...	...	148.3	145.8	157.5	164.6	165.8	163.3	...	0.3
Senegal	...	...	75.5	85.9	99.8	122.1	126.9	133.4	120.7	121.4	131.4	159.2	173.7	0.3
Greece	25.0	33.6	75.0	80.0	82.0	87.0	110.0	110.0	115.0	117.0	124.0	...	...	...
Turkey	76.0	...	116.7	101.2	96.7	89.4	82.3	60.6	130.7	121.7	135.7	122.7	...	0.2
Venezuela	21.7	92.3	83.7	78.3	83.3	84.7	84.9	94.9	97.3	110.5	119.3	116.8	107.3	0.2
Ceylon	...	24.0	38.5	40.7	48.3	57.8	74.0	83.9	92.6	101.6	94.3	106.4	115.6	0.2
E. *1966 catch: 50 000 tons and more but less than 100 000 tons*	560.0	680.0	1 070.0	1 110.0	1 160.0	1 100.0	1 170.0	1 260.0	1 320.0	1 360.0	1 420.0	1 480.0	1 600.0	2.6
Chad	...	...	...	...	...	65.0	...	80.0	80.0	...	100.0	100.0	110.0	0.2
Muscat and Oman	...	...	...	...	...	...	100.0	100.0	100.0	100.0	...	...	...	...
United Arab Republic	38.1	42.8	75.2	80.0	85.6	88.5	92.0	118.0	128.0	115.0	94.0	...	...	...
Tanzania: Tanganyika	16.0	22.0	55.0	55.0	60.0	60.0	60.7	60.2	74.0	...	92.9	92.0	118.4	0.2
Mali	...	...	...	...	...	...	...	...	...	...	90.0	...	...	...
Australia	33.5	38.9	55.3	54.3	58.8	61.0	62.4	67.2	70.8	76.6	79.6	88.7	90.8	0.2
Congo (Dem. Rep. of)	0.9	17.5	122.4	136.7	153.4	77.0	75.0	77.0	69.5	75.0	81.0	84.0	93.2	0.1 [3]
Uganda	...	11.0	51.3	54.7	55.6	62.6	63.3	69.6	69.9	70.5	76.3	83.3	88.4	0.1
Hong Kong	...	34.3	67.2	69.5	67.0	62.3	63.6	70.8	75.1	76.3	81.8	83.2	86.9	0.1
Ghana	...	...	28.4	30.9	36.0	31.8	40.5	48.7	62.8	79.1	72.5	79.1	110.5	0.1
Panama	0.7	0.7	6.5	6.8	14.8	10.9	11.4	14.4	13.4	25.7	39.3	72.4	72.1	0.1
Finland	44.4	46.1	64.1	61.4	65.9	64.4	73.3	68.5	83.6	63.1	73.1	70.6	...	0.1
Belgium	42.5	70.8	62.9	64.0	57.5	63.7	61.6	59.9	61.9	59.4	59.8	62.7	63.9	0.1
Nigeria	...	...	...	...	...	58.5	48.5	59.0	59.0	59.0	...	...	...	...
Cameroon	18.0	22.0	53.6	57.8	...	48.8	53.7	55.3	56.6	57.0	58.5	...	...	...
Colombia	10.0	15.0	30.1	25.0	21.1	29.7	43.0	47.8	45.2	50.5	53.3	57.3	64.6	0.1
Ivory Coast	...	...	30.0	40.0	40.0	44.0	44.5	43.0	45.0	54.5	61.5	59.0	66.9	0.1
Madagascar	...	...	...	25.5	27.0	28.0	29.0	30.5	35.9	44.8	44.1	52.1	...	0.1
Southern Yemen	...	20.0	22.6	21.5	24.4	22.3	47.4	53.8	55.3	52.0	52.0	...	...	0.1
New Zealand	27.0	35.7	39.0	39.3	41.5	44.3	43.1	41.3	40.8	44.2	48.4	55.7	...	0.1
F. *1966 catch: 5 000 tons and more but less than 50 000 tons*	350.0	390.0	580.0	620.0	660.0	650.0	690.0	710.0	760.0	810.0	870.0	930.0	940.0	1.6
Ecuador	1.8	3.4	26.4	31.1	35.9	44.3	38.6	42.6	50.3	46.3	53.5	48.2	...	0.1
Yugoslavia	16.8	21.2	30.7	31.4	29.4	30.9	37.3	30.3	34.4	38.3	41.9	45.5	47.9	0.1
Greenland	4.7	21.0	30.8	32.0	33.2	34.6	41.8	43.3	33.3	38.3	40.6	44.5	44.5	0.1
Cuba	10.0	8.3	22.0	21.9	28.2	31.2	30.5	35.0	35.6	36.3	40.4	43.2	...	0.1
Zambia	...	...	26.2	26.9	20.9	19.5	20.4	22.2	40.1	42.3	40.1	40.1	38.5	0.1
Ireland	12.6	25.3	36.6	36.5	38.6	42.8	32.1	29.0	27.6	31.9	35.7	39.7	50.5	0.1
Romania	...	...	...	...	20.6	18.2	27.5	33.4	36.1	34.3	37.6	36.5	48.4	0.1
Sierra Leone	...	...	...	17.7	...	...	22.8	26.0	28.1	29.9	32.6	32.2	33.6	0.1
Kenya	...	...	25.5	22.0	22.6	12.6	13.5	18.4	20.1	20.7	23.4	27.9	27.6	—
Bulgaria	5.6	6.4	5.1	6.1	6.1	8.7	8.1	9.6	7.5	13.2	19.8	26.8	41.8	—
Hungary	7.0	4.0	12.3	13.0	14.4	14.9	19.3	21.0	21.0	22.7	24.8	26.7	28.3	—
Tunisia	9.6	12.2	14.0	15.2	14.8	16.3	21.5	20.6	25.8	21.4	22.8	25.8	...	—
Ryukyu Islands	12.0	7.7	13.1	16.6	21.4	14.4	16.0	17.8	17.4	21.7	24.0	25.2	29.3	—
Israel	1.7	2.5	11.6	12.6	13.2	13.8	14.9	16.4	17.5	18.7	19.5	24.5	22.0	—
Saudi Arabia	...	...	...	...	...	...	16.2	18.3	19.6	20.2	18.6	19.9	21.6	—
Maldive Islands	...	...	...	...	...	...	12.0	12.0	12.0	12.0	...	22.4	...	—
Algeria	21.2	30.0	22.2	18.8	22.5	25.6	30.7	14.4	16.9	17.3	18.2	20.3	...	—
Sudan	8.8	11.4	9.9	19.2	16.2	16.5	17.3	18.6	...	...	...	...	...	...
Laos	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dahomey	...	...	23.0	23.0	28.0	28.0	28.0	30.0	25.0	26.0	20.0	18.8	35.6	—
Iraq	3.5	4.0	...	...	...	...	...	9.0	11.3	19.2	12.5	18.3	...	—
American Samoa	...	...	7.6	13.3	12.7	12.6	...	...	...	...	...	...	...	...
Malawi	...	...	...	...	...	...	6.3	11.5	13.7	13.2	18.9	17.5	...	—
Jamaica	4.5	...	7.1	7.8	8.3	8.5	11.5	11.9	13.9	16.0	16.6	16.9	...	—

ANNEX TABLE 4. – TOTAL CATCH (LIVEWEIGHT) OF FISH, CRUSTACEANS, AND MOLLUSKS IN SELECTED COUNTRIES[1] *(concluded)*

	1938	1948	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)	1966
	Thousand metric tons													%
Burundi	...	2.3	9.7	11.5	11.0	9.2	5.3	7.2	10.6	9.7	13.3	16.6	...	—
Guinea	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Uruguay	3.6	3.5	6.9	5.4	5.9	7.8	8.7	7.5	8.1	12.2	15.8	...	...	...
Congo (Brazzaville)	...	...	...	...	...	...	8.6	11.6	11.5	12.6	14.0	14.2	13.6	—
Guyana	...	...	3.1	3.5	3.0	5.7	7.4	7.9	9.2	10.4	12.0	12.3	13.9	—
Trucial Oman	...	...	...	...	...	...	12.0	12.0	12.0	12.0	12.0	12.0	...	—
Spanish North Africa	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Singapore	1.5	2.3	13.8	12.3	11.5	9.2	9.7	11.5	12.5	10.4	11.0	18.5	18.2	—
Liberia	...	...	1.2	1.4	1.7	1.2	2.3	2.6	4.0	7.9	11.5	11.8	...	—
Czechoslovakia	3.0	3.5	...	8.1	8.6	8.8	9.9	10.1	9.7	10.6	11.0	11.5	11.7	—
Trinidad and Tobago	2.7	...	2.9	4.2	7.2	7.2	7.7	7.5	7.9	10.0	11.0	...	...	...
Tanzania: Zanzibar	7.5	7.7	8.8	8.8	8.8	9.1	10.0	10.6	10.2	10.2	10.0	...	...	...
Macau	...	7.2	8.0	6.0	6.6	5.8	7.3	7.8	8.7	8.6	9.4	10.7	...	—
Ethiopia	...	...	13.5	27.9	34.7	19.1	17.2	14.0	8.9	11.7	15.2	12.8	10.8	—
St. Pierre and Miquelon	1.9	2.2	7.9	8.3	9.4	10.3	13.6	8.1	8.2	8.7	9.9	10.5	8.3	—
El Salvador	...	...	...	2.5	2.7	5.2	5.7	6.0	6.3	9.2	9.6	10.6	9.9	—
Iran	...	...	...	...	...	...	8.0	8.0	8.0	8.0	...	...	...	...
Barbados	0.5	1.0	4.1	4.5	4.4	5.2	4.6	4.7	4.3	3.6	4.0	7.3	7.1	—
Kuwait	...	...	...	...	...	...	4.8	4.4	6.8	...	...	...	...	...
Mozambique	...	...	4.8	5.6	7.5	6.5	5.4	5.3	5.5	6.7	...	...	...	...
Niger	...	...	...	...	...	3.4	4.2	6.0	9.0	6.3	...	...	...	...
Virgin Islands (U.S.)	0.3	...	...	...	...	...	...	...	3.0	5.0	6.2	7.0	...	—
Togo	3.0	3.1	4.0	3.4	...	...	...	4.3	3.0	5.0	6.0	7.0	...	—
Guatemala	0.4	0.6	...	0.3	0.4	0.8	1.3	2.1	2.0	2.7	2.1	3.0	2.5	—
Puerto Rico	1.4	2.3	2.7	2.8	2.9	3.1	3.3	3.5	4.2	4.6	5.0	5.0	5.1	—
French Polynesia	...	...	1.9	1.8	2.2	2.6	2.7	3.9	4.7	4.2	4.7	...	...	...
G. *1966 catch: less than 5 000 tons. 102 countries*	60.0	70.0	80.0	80.0	90.0	90.0	90.0	90.0	100.0	110.0	110.0	110.0	110.0	...

[1] Countries arranged in order of 1966 catch.

ANNEX TABLE 5. – WORLD [1] AND REGIONAL PRODUCTION OF MAJOR FOREST PRODUCTS

	Unit	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
		Million units												
WORLD [2]														
Fuelwood	m^3	779	776	791	784	790	772	779	783	810	822	814	812	805
Industrial roundwood	"	905	927	915	913	972	989	976	997	1 010	1 068	1 098	1 102	1 107
Sawn softwood	"	234.0	235.8	231.7	241.8	259.2	258.5	256.8	259.3	266.8	278.9	283.4	279.1	279.9
Sawn hardwood	"	61.3	64.1	59.5	62.0	65.1	67.1	68.2	69.6	72.6	78.0	78.8	81.1	81.4
Plywood	"	10.8	11.2	11.7	12.9	14.7	15.3	16.4	18.2	20.1	22.3	24.2	25.3	26.4
Fibreboard	t	3.2	3.3	3.4	3.7	4.1	4.3	4.6	4.9	5.3	5.8	6.1	6.0	6.1
Mechanical wood pulp	"	15.3	16.1	16.2	15.9	17.1	18.0	18.4	18.9	19.5	20.5	21.6	22.7	23.4
Chemical wood pulp	"	30.9	33.1	33.7	33.7	37.4	40.5	43.5	45.4	49.4	53.9	56.0	59.9	61.0
Newsprint	"	11.0	11.9	12.1	11.9	12.8	13.7	14.1	14.3	14.6	16.0	16.5	17.6	17.9
Other paper and paperboard	"	44.9	47.2	48.2	49.2	54.0	57.5	61.0	63.9	68.1	73.3	77.5	82.7	84.5
EUROPE														
Fuelwood	m^3	101.4	101.5	109.5	105.1	105.3	101.9	101.1	97.3	95.9	93.0	89.7	88.2	86.0
Coniferous logs	"	93.4	87.3	83.5	87.7	83.6	93.0	94.4	93.4	88.5	96.4	97.5	97.4	97.0
Broadleaved logs	"	23.9	24.4	25.1	26.8	26.4	27.6	29.7	30.5	31.1	33.2	33.2	34.0	35.0
Other industrial roundwood	"	86.3	89.2	92.9	87.8	87.5	94.5	101.3	104.1	98.9	104.1	105.0	103.4	104.0
Sawn softwood	"	54.4	52.7	52.4	52.6	51.4	55.7	56.0	55.3	53.9	56.5	56.8	56.4	55.5
Sawn hardwood	"	10.9	11.2	11.8	12.1	12.2	13.0	13.9	14.1	14.4	15.2	15.4	16.2	16.4
Plywood	"	2.0	1.9	2.1	2.2	2.3	2.7	2.7	2.9	3.2	3.3	3.3	3.3	3.3
Fibreboard	t	1.21	1.29	1.41	1.48	1.55	1.79	1.90	2.04	2.19	2.46	2.53	2.49	2.59
Particle board	"	0.26	0.37	0.48	0.58	0.84	1.20	1.49	1.83	2.29	2.71	3.34	3.82	4.20
Mechanical wood pulp	"	4.71	4.99	5.13	5.12	5.47	6.02	6.25	6.27	6.46	6.84	7.10	7.37	7.40
Chemical wood pulp	"	8.37	8.67	9.20	9.11	9.83	11.06	11.85	12.08	13.15	14.53	15.39	15.52	15.60
Newsprint	"	3.11	3.43	3.52	3.52	3.81	4.22	4.36	4.32	4.38	4.73	4.97	5.20	5.20
Printing and writing paper	"	3.59	3.68	3.93	4.08	4.30	4.87	5.28	5.37	5.84	6.32	6.68	7.30	7.40
Other paper and paperboard	"	9.60	10.00	10.79	11.11	11.97	13.39	14.08	14.64	15.84	16.85	17.62	18.06	18.40
U.S.S.R.														
Fuelwood	m^3	121.8	120.2	123.6	124.1	127.7	108.0	97.7	97.0	102.3	108.4	104.5	101.7	100.0
Industrial roundwood	"	212.1	222.1	237.8	250.9	270.1	261.5	253.3	255.7	267.3	276.9	273.6	271.7	273.0
Sawn softwood	"	64.3	65.1	69.4	79.6	88.4	89.8	88.7	88.8	90.4	94.3	94.2	90.8	91.0
Sawn hardwood	"	11.3	11.5	12.2	14.1	15.6	15.8	15.6	15.7	16.0	16.6	16.6	16.0	16.0
Plywood	"	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.7	1.7	1.8	1.9
Fibreboard	t	0.05	0.07	0.09	0.11	0.17	0.21	0.28	0.31	0.35	0.38	0.44	0.47	0.50
Particle board	"	...	...	...	0.02	0.05	0.10	0.17	0.22	0.28	0.39	0.52	0.67	0.85
Mechanical wood pulp	"	0.72	0.77	0.81	0.83	0.87	0.93	1.03	1.12	1.15	1.23	1.16	1.30	1.50
Chemical wood pulp	"	1.74	1.85	1.97	2.09	2.19	2.28	2.42	2.60	2.76	2.97	2.67	2.99	3.20
Newsprint	"	0.36	0.36	0.38	0.39	0.40	0.43	0.49	0.54	0.56	0.63	0.74	0.88	1.00
Other paper and paperboard	"	2.05	2.22	2.41	2.57	2.69	2.79	2.95	3.13	3.29	3.49	3.94	4.32	4.75
NORTH AMERICA														
Fuelwood	m^3	61.9	59.8	58.3	55.8	54.0	49.4	48.3	39.4	36.8	38.4	38.0	37.4	37.0
Coniferous logs	"	190.0	185.8	169.6	166.0	193.8	188.5	176.6	193.5	197.2	205.3	214.0	209.4	210.0
Broadleaved logs	"	42.4	40.7	38.7	37.9	36.7	34.8	33.4	35.7	36.8	39.3	41.6	40.5	40.0
Other industrial roundwood	"	119.8	132.8	123.9	111.9	123.6	132.7	125.0	124.3	122.5	134.4	143.1	150.7	152.0
Sawn softwood	"	90.3	90.4	80.4	80.8	89.1	80.9	79.7	82.5	87.8	91.0	93.1	90.6	87.0
Sawn hardwood	"	18.8	19.9	14.8	15.1	16.7	15.8	15.1	15.8	17.0	18.4	18.9	19.0	18.2
Plywood	"	6.5	6.7	6.7	7.6	8.8	8.9	9.7	10.7	11.9	13.1	14.5	15.7	15.0
Fibreboard	t	1.67	1.72	1.63	1.71	1.97	1.81	1.87	1.97	2.16	2.25	2.39	2.25	2.14
Mechanical wood pulp	"	8.87	9.20	8.98	8.70	9.36	9.58	9.50	9.87	10.12	10.78	11.27	11.90	12.20
Chemical wood pulp	"	19.16	20.62	20.25	20.27	22.53	23.79	25.13	26.46	28.53	31.11	32.15	34.94	35.30
Newsprint	"	6.92	7.32	7.41	7.04	7.51	7.89	7.96	7.96	8.05	8.71	8.91	9.63	9.50
Printing and writing paper	"	5.16	5.64	5.35	5.38	6.03	6.24	6.39	6.74	7.09	7.50	8.11	8.81	8.70
Other paper and paperboard	"	20.88	21.55	21.00	21.15	23.14	23.44	24.34	25.65	26.77	28.58	30.36	32.41	32.30

ANNEX TABLE 5. – WORLD [1] AND REGIONAL PRODUCTION OF MAJOR FOREST PRODUCTS (*concluded*)

	Unit	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
		Million units												
OCEANIA														
Fuelwood	m³	8.8	8.9	9.0	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.3	9.3	10.0
Coniferous logs	"	4.3	4.1	4.2	4.7	5.0	5.6	5.4	5.2	5.4	6.0	6.2	6.3	6.5
Broadleaved logs	"	7.6	7.5	7.3	7.1	7.3	7.6	7.7	7.1	7.5	8.0	8.0	7.8	8.0
Other industrial roundwood	"	2.2	2.7	2.4	2.7	2.5	2.7	2.9	2.9	3.3	3.5	3.7	3.8	2.4
Sawn softwood	"	2.0	2.1	2.1	2.1	2.3	2.3	2.2	2.1	2.2	2.5	2.5	2.4	2.5
Sawn hardwood	"	2.8	2.5	2.4	2.6	2.7	2.7	2.6	2.4	2.5	2.6	2.8	2.7	2.7
Mechanical wood pulp	t	0.19	0.24	0.26	0.28	0.30	0.29	0.30	0.31	0.38	0.28	0.30	0.28	0.30
Chemical wood pulp	"	0.17	0.26	0.26	0.26	0.30	0.30	0.31	0.33	0.38	0.42	0.44	0.49	0.53
Newsprint	"	0.09	0.13	0.15	0.16	0.17	0.18	0.18	0.21	0.26	0.28	0.29	0.29	0.30
Other paper and paperboard	"	0.29	0.35	0.37	0.41	0.44	0.52	0.54	0.55	0.64	0.69	0.81	0.84	0.85
LATIN AMERICA														
Sawn softwood	m³	5.3	5.1	4.6	5.3	5.2	4.9	5.1	5.3	5.0	5.6	5.8	6.2	6.3
Sawn hardwood	"	7.2	7.5	6.7	6.6	6.2	6.3	6.3	6.6	6.4	6.9	6.9	7.0	7.1
Plywood	"	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5
Mechanical wood pulp	t	0.15	0.16	0.16	0.20	0.22	0.24	0.28	0.27	0.33	0.37	0.48	0.48	0.49
Chemical wood pulp	"	0.13	0.19	0.22	0.23	0.28	0.35	0.48	0.50	0.60	0.73	0.77	0.86	0.88
All paper and paperboard	"	1.04	1.18	1.23	1.39	1.49	1.57	1.80	1.88	1.97	2.24	2.32	2.36	2.38
FAR EAST [1]														
Industrial roundwood	m³	63.1	67.6	69.5	68.6	72.8	77.2	83.6	79.2	86.0	90.0	91.2	94.2	95.6
Sawn softwood	"	16.4	19.3	21.6	20.4	21.6	23.4	23.6	23.3	25.4	26.7	28.4	29.7	31.8
Sawn hardwood	"	8.7	9.9	10.0	9.8	9.8	11.6	12.6	13.0	14.3	16.0	15.8	16.5	17.5
Plywood	"	0.8	1.0	1.2	1.3	1.6	1.7	1.9	2.4	2.7	3.3	3.7	4.5	5.3
Mechanical wood pulp	t	0.68	0.74	0.80	0.75	0.90	0.97	1.00	0.99	0.98	1.03	1.07	1.11	1.15
Chemical wood pulp	"	1.25	1.49	1.70	1.65	2.15	2.63	3.20	3.29	3.69	4.10	4.20	4.70	5.22
Newsprint	"	0.48	0.55	0.59	0.61	0.75	0.82	0.90	1.05	1.14	1.31	1.31	1.31	1.53
Other paper and paperboard	"	2.08	2.43	2.84	2.90	3.70	4.46	5.39	5.61	6.35	7.31	7.21	8.15	9.20
NEAR EAST														
Industrial roundwood	m³	7.4	7.6	8.0	7.9	7.8	8.1	7.9	8.3	9.1	9.7	9.6	9.7	9.9
Sawn softwood	"	0.8	0.6	0.7	0.6	0.7	0.8	0.8	1.1	1.2	1.4	1.5	2.0	2.2
Sawn hardwood	"	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.7
AFRICA														
Fuelwood	m³	153.1	158.0	159.0	159.4	163.4	168.5	173.9	177.3	197.0	199.6	195.2	194.6	193.0
Industrial roundwood	"	17.0	17.5	18.6	19.5	20.7	21.6	22.4	23.5	24.8	26.1	28.1	28.1	28.3
Sawn softwood	"	0.5	0.6	0.5	0.5	0.6	0.6	0.9	0.8	0.9	1.0	1.1	1.1	1.1
Sawn hardwood	"	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.7	1.8	1.8	2.0	2.0	2.0
Plywood	"	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
All paper and paperboard	t	0.20	0.24	0.25	0.27	0.29	0.32	0.35	0.40	0.48	0.50	0.55	0.56	0.57

[1] Excluding China (Mainland).

ANNEX TABLE 6. – STOCKS OF MAJOR AGRICULTURAL AND FOREST PRODUCTS

	Date	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968 (Forecast)
		Million metric tons																
WHEAT																		
United States	1 July	7.0	16.5	25.4	28.2	28.1	24.7	24.0	35.2	35.8	38.4	36.0	32.5	24.5	22.3	14.6	11.6	14.8
Canada	1 Aug.	5.9	10.4	16.8	14.6	15.8	19.9	17.6	16.0	16.3	16.5	10.6	13.3	12.5	14.0	11.4	15.6	19.5
Argentina	1 Dec.	0.1	2.0	1.6	2.4	1.2	1.6	1.3	1.4	1.2	0.8	0.2	0.5	2.2	3.3	0.2	0.4	0.9
Australia	1 Dec.	0.5	1.0	2.6	2.6	2.4	1.1	0.5	1.8	1.6	0.7	0.5	0.6	0.6	0.7	0.5	2.0	0.3
France	1 July	1.2	0.8	1.0	2.0	1.6	1.6	1.8	1.6	1.9	2.3	1.7	3.2	2.3	2.0	2.7	1.7	2.2
TOTAL 5 MAJOR EXPORTERS		14.7	30.7	47.4	49.8	49.1	48.9	45.2	56.0	56.8	58.7	49.0	50.1	42.1	42.3	29.4	31.3	37.7
RICE (milled equivalent)																		
Asian exporters [1]	31 Dec.	0.7	1.4	1.6	0.8	0.7	0.6	0.5	0.5	0.3	0.2	0.4	0.5	0.5	0.5	0.2	0.1	...
United States	31 July	0.1	—	0.2	0.8	1.1	0.6	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	...
TOTAL OF ABOVE		0.8	1.4	1.8	1.6	1.8	1.2	1.1	1.0	0.7	0.5	0.6	0.7	0.7	0.7	0.5	0.4	...
COARSE GRAINS [2]																		
United States	1 July[3]	18.5	24.7	29.4	37.3	39.3	44.4	53.8	61.6	68.0	77.2	65.4	58.2	62.9	50.1	38.6	34.2	38.3
Canada	1 Aug.	3.6	5.1	5.6	3.7	4.3	6.6	5.2	5.1	4.7	4.5	2.8	4.5	5.7	4.2	4.5	5.7	4.0
Argentina	1 Dec.	0.4	0.8	0.2	0.5	0.5	0.7	0.5	0.7	0.3	0.5	0.4	0.2	0.4	0.4	0.3	0.6	0.3
Australia	1 Dec.	—	—	—	—	—	0.1	—	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.4	0.7	0.6
France	1 July	0.2	0.2	0.2	0.6	0.6	1.5	0.7	1.0	1.6	2.2	1.1	1.2	1.8	1.0	1.3	1.1	1.2
TOTAL 5 MAJOR EXPORTERS		22.7	30.8	35.4	42.1	44.7	53.3	60.2	68.5	74.7	84.5	69.9	64.3	71.2	56.1	45.1	42.3	44.4
BUTTER																		
United States		0.03	0.13	0.17	0.07	0.01	0.04	0.03	0.01	0.03	0.10	0.14	0.09	0.03	0.02	0.01	0.08	...
Canada		0.02	0.03	0.04	0.05	0.04	0.03	0.04	0.05	0.05	0.06	0.06	0.06	0.04	0.03	0.03	0.03	...
European countries [4]		0.04	0.06	0.05	0.04	0.10	0.12	0.08	0.06	0.12	0.14	0.13	0.12	0.15	0.21	0.23	0.28	...
Australia and New Zealand		0.05	0.05	0.06	0.06	0.05	0.06	0.06	0.05	0.07	0.07	0.06	0.06	0.07	0.07	0.07	0.06	...
TOTAL OF ABOVE	31 Dec.	0.14	0.27	0.32	0.22	0.20	0.25	0.21	0.17	0.27	0.37	0.39	0.33	0.29	0.33	0.34	0.45	...
CHEESE																		
United States	31 Dec.	0.11	0.20	0.25	0.24	0.20	0.19	0.13	0.14	0.15	0.21	0.19	0.15	0.15	0.14	0.17	0.18	...
CONDENSED AND EVAPORATED MILK																		
United States [5]	31 Dec.	0.18	0.12	0.10	0.10	0.11	0.10	0.09	0.10	0.10	0.10	0.07	0.06	0.09	0.06	0.09	0.09	...
DRIED SKIM MILK																		
United States [6]	31 Dec.	0.08	0.23	0.06	0.04	0.04	0.05	0.06	0.04	0.17	0.22	0.31	0.22	0.08	0.07	0.05	0.12	...
LINSEED AND OIL (oil equivalent)																		
United States	1 July	0.41	0.38	0.29	0.17	0.10	0.22	0.13	0.18	0.07	0.09	0.08	0.14	0.18	0.19	0.25	0.17	...
Argentina	1 Dec.	0.30	0.23	0.08	0.03	0.06	0.06	0.06	0.05	0.10	0.03	0.01	...	...	...	...	...	...
TOTAL OF ABOVE		0.71	0.61	0.37	0.20	0.16	0.28	0.19	0.23	0.17	0.12	0.09	...	...	...	...	...	...

ANNEX TABLE 6. – STOCKS OF MAJOR AGRICULTURAL AND FOREST PRODUCTS (*concluded*)

	Date	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968 (Forecast)
		Million metric tons																
LIQUID EDIBLE VEGETABLE OILS AND OILSEEDS (oil equivalent)																		
United States																		
Soybeans and oil	1 Oct.[6]	0.11	0.13	0.06	0.13	0.12	0.18	0.23	0.44	0.26	0.34	0.57	0.49	0.42	0.28	0.39	0.72	1.03
Cottonseed and oil	1 Aug.	0.20	0.46	0.49	0.21	0.16	0.12	0.10	0.11	0.15	0.14	0.19	0.27	0.31	0.22	0.17	0.17	...
Other oils	1 Oct.	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.03	0.02	0.04	0.03	...
SUGAR (raw value)																		
Cuba	31 Dec.	2.2	1.5	1.9	1.6	0.6	0.7	0.5	1.2	1.1	1.0	0.3	0.2	0.2	0.5	0.4	0.3	...
WORLD TOTAL	1 Sept.	10.9	10.2	11.9	11.4	10.1	10.2	10.0	13.8	14.8	17.1	13.5	10.1	11.3	18.2	18.8	18.5	...
COFFEE																		
United States	30 June	0.22	0.21	0.21	0.08	0.17	0.16	0.14	0.14	0.18	0.19	0.18	0.20	0.29	0.16	0.21	0.15	...
Brazil	30 June	0.18	0.20	0.20	0.39	0.62	0.44	0.87	1.44	2.64	3.10	3.42	3.71	3.41	3.32	3.95	2.96	...
TOBACCO (farm weight)																		
United States[7]	1 Oct.	1.56	1.66	1.69	1.60	1.65	1.74	1.88	1.79	1.73	1.70	1.70	1.85	1.99	2.07	2.00	1.90	...
COTTON (lint)																		
United States		0.61	1.22	2.11	2.43	3.15	2.47	1.89	1.93	1.64	1.57	1.60	2.43	2.68	3.10	3.66	2.72	...
WORLD TOTAL[8]	31 July	3.41	4.05	4.59	4.84	5.33	5.12	4.81	4.61	4.42	4.40	4.31	5.06	5.62	6.05	6.60	5.74	...
NATURAL RUBBER																		
WORLD TOTAL[9]	31 Dec.	0.73	0.72	0.73	0.76	0.74	0.76	0.75	0.70	0.76	0.76	0.77	0.71	0.82	0.83	0.87	0.89	...
NEWSPRINT																		
North America[10]	31 Dec.	0.89	0.80	0.77	0.69	0.92	0.92	0.99	0.98	0.93	0.93	0.95	0.89	0.91	0.88	1.05	1.07	...
SAWN SOFTWOOD																		
European importers[11]	31 Dec.	5.74	6.19	5.10	6.09	5.32	5.62	5.42	5.12	6.22	6.14	6.06	6.34	6.97	7.44	7.14	6.72	...
European exporters[12]	31 Dec.	...	1.55	1.42	1.53	1.50	1.71	1.78	1.57	1.48	1.75	2.13	1.90	1.83	1.65	1.73	1.76	...
North America	31 Dec.	14.01	15.68	14.23	14.18	16.23	15.88	14.96	15.18	17.47	15.03	14.48	13.14	14.67	14.09	14.44	13.69	...
SAWN HARDWOOD																		
European importers[13]	31 Dec.	1.29	1.13	1.06	1.22	1.31	1.25	1.26	1.19	1.25	1.33	1.24	1.16	1.22	1.26	1.30	1.22	...
European exporters[14]	31 Dec.	...	0.42	0.41	0.50	0.59	0.62	0.57	0.55	0.54	0.73	0.68	0.62	0.52	0.56	0.70	0.81	...
North America	31 Dec.	5.11	5.41	4.62	4.17	4.77	4.73	4.77	4.79	5.06	4.11	4.36	4.85	3.80	2.94	2.76	3.44	...

NOTE: Quantities shown include normal carryover stocks.

[1] Burma. Thailand. Republic of Viet-Nam. – [2] Barley. oats, maize. sorghum and rye. – [3] Maize and sorghum. 1 October. – [4] Austria. Belgium. Finland. Federal Republic of Germany. Ireland. Netherlands. Norway. Sweden. Switzerland. United Kingdom and (from 1957) France. – [5] Manufacturers' stocks and CCC uncommitted supplies. – [6] Soybeans 1 October (1 September from 1965). – [7] Flue-cured types. 1 July. – [8] Including estimates of cotton afloat. – [9] Including estimates of rubber afloat, but excluding strategic stockpiles. – [10] United States and Canadian mills and United States consumers. – [11] Belgium-Luxembourg. Denmark. Federal Republic of Germany. Netherlands. Switzerland. United Kingdom. – [12] Austria. Poland. Yugoslavia. – [13] Belgium-Luxembourg. Federal Republic of Germany. United Kingdom. – [14] Austria. Bulgaria. Yugoslavia.

ANNEX TABLE 7. – INVESTMENT[1] OF UNITED STATES COMMODITY CREDIT CORPORATION AS OF 30 APRIL 1968

	1954	1955	1956	1957	1958	1959	1960	1961[2]	1962	1963	1964	1965	1966	1967	1968
	Quantity														
	Thousand metric tons														
Wheat	24 208	28 156	29 073	24 453	24 174	33 937	35 512	37 888	34 209	34 057	26 815	21 991	14 776	6 814	9 189
Rice	58	763	1 322	804	732	535	455	240	34	73	96	165	151	146	135
Barley	622	2 044	1 987	1 774	2 698	3 242	3 383	2 184	1 344	1 468	1 235	900	526	437	1 030
Oats	589	1 052	1 222	650	732	1 376	646	598	557	688	1 026	1 378	1 571	1 327	1 440
Maize	20 568	22 255	29 192	34 801	37 211	39 206	45 291	54 012	43 587	40 036	39 167	31 860	23 796	12 784	19 257
Grain sorghum	1 029	2 927	2 887	2 040	8 295	13 498	14 964	18 784	19 070	18 618	17 667	16 381	13 268	7 219	6 723
Butter	165	149	34	16	45	20	27	40	144	176	80	35	—	24	71
Cheese	164	176	130	87	74	5	4	—	38	30	10	3	—	2	29
Dried milk	298	101	81	65	70	59	108	117	217	311	147	127	20	5	105
Soybeans	101	876	270	1 228	1 746	3 255	1 598	89	2 565	1 567	1 588	368	830	2 928	5 131
Linseed	382	201	41	351	59	279	18	6	5	141	346	184	358	208	102
Linseed oil	31	37	26	—	—	—	14	—	—	—	—	36	36	36	36
Cottonseed oil	469	170	5	—	—	27	—	—	—	4	5	15	—	—	—
Cotton linters	279	318	141	20	—	—	—	—	—	—	—	—	—	—	—
Cotton, upland	1 674	1 817	2 839	2 056	973	1 628	1 179	565	1 203	2 214	2 579	2 903	3 435	2 010	330
Wool	55	70	54	24	—	—	—	—	—	—	—	—	—	—	—
Tobacco	281	366	402	451	427	414	317	280	211	285	432	535	479	439	485
	Value														
	Million dollars														
Wheat	2 155	2 633	2 795	2 411	2 402	3 105	3 253	2 772	2 459	2 499	1 987	1 575	1 041	371	439
Rice	6	98	232	107	104	81	65	26	5	9	11	19	17	16	15
Barley	34	107	92	87	114	155	113	85	52	56	48	34	19	15	40
Oats	32	58	60	32	32	57	27	21	21	26	40	55	61	52	57
Maize	1 296	1 437	1 926	2 289	2 414	2 486	2 786	2 688	1 952	1 818	1 766	1 438	1 059	528	785
Grain sorghum	60	167	128	105	393	706	833	797	810	800	765	729	579	294	268
Butter	245	212	44	21	60	26	35	53	191	227	103	45	—	35	105
Cheese	146	156	111	73	62	4	3	—	32	25	8	3	—	2	30
Dried milk	109	38	30	24	26	20	34	35	80	102	48	41	6	2	46
Soybeans	10	70	20	95	131	247	114	6	214	129	130	30	68	266	469
Linseed	56	25	5	42	7	31	2	1	1	16	39	21	40	24	11
Linseed oil	13	14	9	—	—	—	4	—	—	—	—	9	9	9	9
Cottonseed oil	185	64	2	—	—	7	—	—	—	1	1	5	—	—	—
Cotton linters	58	67	31	5	—	—	—	—	—	—	—	—	—	—	—
Cotton, upland	1 268	1 439	2 268	1 580	642	1 260	947	410	894	1 600	1 842	1 995	2 268	1 221	164
Wool	81	103	82	35	—	—	—	—	—	—	—	—	—	—	—
Tobacco	270	406	535	609	590	594	441	393	321	461	679	843	786	721	779
Other commodities	165	167	263	301	274	154	176	141	152	191	160	110	156	188	145
TOTAL	6 189	7 261	8 633	7 816	7 251	8 933	8 833	7 428	7 184	7 960	7 627	6 952	6 109	3 744	3 362
	Percent														
Change from previous year	+ 97	+ 17	+ 19	— 9	— 7	+ 23	— 1	— 1	— 3	+ 11	— 4	— 9	— 12	— 39	— 10

SOURCE: United States Department of Agriculture, Commodity Credit Corporation, *Report of financial conditions and operations, 30 April 1954–30 April 1968.*

[1] Stocks pledged for outstanding loans and stocks in price support inventory. – [2] As from 1961 the values are in accordance with the new accounting policy adopted by CCC as of 30 June 1961. The 1961 total comparable with the previous years is $8,748 million and the percentage change for 1960-61 refers to this amount.

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
WESTERN EUROPE												
Austria	1934–38	360	264	67	10	158	124	134	18	4	580	47
	1948/–50/	355	295	64	7	166	134	83	10	6	474	42
	1951/–53/	318	276	71	5	168	142	113	16	6	554	44
	1954/–56/	322	262	86	7	173	181	129	23	8	590	48
	1957/–59/	312	250	95	9	178	231	143	29	9	592	50
	1960/–62/	285	230	102	10	170	312	164	32	10	564	49
	1963/–65/	271	217	100	11	188	297	173	38	10	553	53
	1966/67	267	210	102	11	194	277	176	40	10	566	54
Belgium-Luxembourg	1936–38	313	428	72	16	135	92	129	32	16	340	52
	1948/–50/	290	405	79	12	166	172	129	33	16	418	57
	1951/–53/	286	402	79	10	180	214	134	35	19	476	60
	1954/–56/	274	409	79	11	178	229	145	40	19	499	60
	1957/–59/	251	354	90	12	193	174	154	42	21	486	75
	1960/–62/	246	345	87	17	208	148	166	37	21	530	78
	1963/–65/	233	360	95	17	217	150	171	38	22	552	80
	1965/66	237	329	85	16	204	156	175	40	22	588	80
Denmark	1934–38	257	330	138	13	159	105	204	20	28	602	73
	1948/–50/	286	387	101	19	198	135	168	24	49	781	50
	1951/–53/	261	377	114	14	175	164	155	21	34	735	69
	1954/–56/	240	336	134	13	170	175	161	20	38	651	72
	1957/–59/	220	329	126	11	182	166	178	26	38	656	77
	1960/–62/	216	324	137	17	182	184	175	31	54	694	75
	1963/–65/	205	292	131	17	170	208	173	34	51	718	78
	1966/67	199	281	139	7	156	228	176	33	59	728	77
Finland	1934–38	351	495	77	9	82	58	89	8	16	773	36
	1949/–50/	336	325	85	5	49	45	79	14	34	890	42
	1951/–53/	330	316	94	5	51	57	80	20	28	978	46
	1954/–56/	324	298	104	6	52	87	89	20	31	987	50
	1957/–59/	313	270	111	6	56	90	87	17	30	945	51
	1960/–62/	293	304	110	4	42	119	94	22	29	956	53
	1963/–65/	255	303	110	5	40	115	104	25	31	966	53
	1966/67	237	301	113	7	40	119	105	25	31	937	52
France	1934–38	339	392	66	18	392	81	151	25	16	391	43
	1948/–50/	333	363	63	14	384	110	152	29	16	392	40
	1951/–53/	319	334	72	13	380	139	166	30	16	407	43
	1954/–56/	305	356	71	15	362	136	188	28	16	439	47
	1957/–59/	278	335	84	17	334	126	194	30	18	512	54
	1960–62	269	313	86	19	386	165	229	31	20	520	61
	1963–65	250	288	89	14	368	205	249	30	21	558	65
	1965	247	276	88	15	368	213	257	30	22	564	67
Germany, Fed. Rep. of [12]	1935–38	310	508	72	9	142	129	145	20	18	526	58
	1948/–50/	314	574	67	11	140	115	80	14	22	460	43
	1951/–53/	271	472	70	8	125	192	113	22	19	533	62
	1954/–56/	260	432	82	9	124	208	138	29	19	553	70
	1957/–59/	238	391	86	9	128	225	154	34	19	562	72
	1960/–62/	217	359	89	10	135	284	171	36	18	564	73
	1963/–65/	203	322	94	10	141	277	179	37	18	547	72
	1966/67	194	298	91	10	154	287	185	39	18	557	70
Greece	1935–38	446	57	30	40	74	169	53	11	15	268	40
	1948/–50/	422	93	26	38	182	224	31	9	16	190	41
	1952/53	408	116	30	39	274	254	48	9	18	213	46
	1954–56	454	112	31	43	285	264	48	12	19	294	48
	1957–59	468	120	36	40	327	303	60	16	22	314	51
	1960–62	430	108	44	39	369	300	72	19	25	344	50
	1963–65	386	137	48	39	362	352	92	29	29	375	50
	1966	348	127	51	41	368	420	103	26	31	443	53

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Hungary	1960–62	372	262	75	8	220	167	133	24	2	295	58
	1963–65	374	241	84	8	222	172	140	27	2	268	58
	1966	371	233	86	8	228	170	137	29	2	276	61
Ireland	1934–38	360	535	104	4	146	53	150	43	8	673	37
	1948–50	366	521	97	6	161	72	146	34	7	690	50
	1951–53	362	478	110	4	160	50	145	40	8	685	54
	1954–56	350	425	116	5	167	60	151	48	11	673	54
	1957–59	320	390	123	7	172	60	159	48	11	689	53
	1960–62	300	387	131	7	179	88	176	45	11	715	54
	1963–65	279	372	134	9	178	109	190	43	10	730	53
	1966	268	360	135	12	173	120	199	43	12	742	50
Italy	1934–38	440	100	22	52	153	87	55	20	12	216	32
	1948/–50/	410	105	32	27	223	152	42	16	11	258	27
	1951/–53/	401	111	39	31	253	190	48	19	12	272	33
	1954/–56/	375	132	46	25	263	190	58	21	12	294	34
	1957/–59/	368	135	53	29	350	207	69	23	13	321	38
	1960/–62/	368	143	63	24	380	249	84	26	14	339	45
	1963/–65/	356	127	69	26	403	272	98	26	15	369	49
	1966/67	360	120	72	23	430	311	106	26	16	484	48
Netherlands	1936–38	293	317	88	14	183	138	103	25	15	625	56
	1948/–50/	269	434	106	10	186	129	76	13	17	717	63
	1951/–53/	259	317	106	10	174	145	95	18	14	708	68
	1954/–56/	246	264	116	10	181	165	118	29	13	704	65
	1957/–59/	233	250	119	10	181	170	121	32	12	698	68
	1960/–62/	220	270	127	12	192	198	128	33	15	665	79
	1963/–65/	200	257	130	13	195	218	143	34	16	667	67
	1966/67	195	244	133	14	197	222	157	32	18	682	63
Norway	1934–38	326	356	95	8	53	102	104	19	58	653	68
	1948/–50/	319	350	69	9	78	80	92	19	67	843	63
	1951/–53/	284	294	92	7	86	117	93	18	55	758	70
	1954/–56/	259	287	112	11	94	147	102	21	54	712	73
	1957/–59/	229	286	109	10	98	168	104	22	49	702	69
	1960/–62/	214	272	113	10	92	171	108	24	55	660	63
	1963/–65/	204	278	116	11	100	215	111	24	55	682	66
	1966/67	205	274	121	12	106	182	109	26	54	677	63
Poland	1960-62	409	548	81	5	254	60	126	21	10	517	37
Portugal	1937–38	287	209	28	22	300	118	41	9	44	42	40
	1948–50	330	296	34	34	294	155	44	7	44	60	37
	1951–53	338	325	38	21	295	152	46	8	47	91	41
	1954–56	342	316	43	26	300	168	50	9	50	107	42
	1957–59	334	286	47	24	306	192	49	10	54	116	41
	1960–62	345	272	52	25	321	230	54	10	57	123	42
	1963–65	344	274	54	27	399	259	59	10	60	145	45
	1966	309	239	57	28	479	230	72	10	54	141	34
Romania	1960–62	545	194	35	20	172	125	98	14	5	393	24
	1963	520	178	38	37	184	144	85	13	7	352	25
Spain	1952/–53/	336	286	29	40	279	183	39	13	27	180	42
	1954/–56/	320	309	43	37	280	182	39	14	29	209	44
	1957/–59/	310	318	43	44	314	213	42	14	31	202	49
	1960/–62/	317	316	50	40	356	239	57	20	39	213	56
	1963/–65/	284	309	57	33	364	249	73	29	40	237	64
	1966/67	276	300	63	33	369	268	86	29	40	257	65

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Sweden	1934–38	261	335	124	8	58	101	134	23	48	683	49
	1948/–50/	242	328	128	9	68	153	133	29	43	747	56
	1951/–53/	227	304	119	7	68	167	135	31	48	762	55
	1954/–56/	209	281	122	8	69	189	137	31	50	729	58
	1957/–59/	202	256	119	8	70	214	137	35	49	706	59
	1960/–62/	196	249	119	9	82	221	140	33	54	730	63
	1963/–65/	190	264	115	9	91	243	141	32	56	749	61
	1966/67	176	256	120	9	111	239	142	32	56	745	61
Switzerland	1934–38	300	248	105	12	170	235	146	24	4	887	42
	1948/–50/	319	243	105	16	200	270	121	24	5	876	40
	1951/–53/	298	214	108	19	199	265	131	27	6	832	42
	1954/–56/	277	204	112	19	206	299	141	27	8	757	47
	1957/–59/	267	200	111	21	208	261	149	27	8	765	51
	1960/–62/	263	188	120	21	206	324	164	27	10	706	54
	1963/–65/	244	173	115	22	214	394	176	28	11	684	56
	1965/66	244	165	118	24	211	381	178	28	11	683	55
United Kingdom	1934–38	261	226	122	14	149	144	184	35	33	402	58
	1948/–50/	291	314	111	14	167	135	136	36	32	559	59
	1951/–53/	265	286	117	14	154	156	151	34	27	555	58
	1954/–56/	243	270	135	17	161	150	187	37	27	558	60
	1957/–59/	232	260	142	16	164	154	194	40	28	568	61
	1960/–62/	224	270	143	16	160	152	203	42	26	592	63
	1963/–65/	215	280	137	16	166	154	203	43	27	595	63
	1966/67	206	274	136	18	169	151	201	44	26	593	62
Yugoslavia	1952–53	522	175	22	19	86	131	55	6	2	276	21
	1954–56	509	165	29	26	107	116	64	7	2	325	25
	1957–59	444	183	37	25	136	157	67	9	2	393	27
	1960–62	519	184	45	27	151	128	78	9	2	358	32
	1963–65	532	177	56	26	166	158	75	10	2	316	36
	1965	526	173	65	26	154	135	81	11	2	293	36
NORTH AMERICA												
Canada	1935–39	254	165	127	16	154	119	170	38	15	533	51
	1948/–50/	205	206	135	18	192	143	193	42	16	692	55
	1951/–53/	204	184	126	13	194	208	190	40	16	658	52
	1954/–56/	197	186	130	14	196	228	205	44	16	696	52
	1957/–59/	186	173	130	14	203	230	212	45	16	682	52
	1960/–62/	182	176	131	15	204	211	213	42	15	663	53
	1963/–65/	184	195	133	14	203	217	229	40	18	643	53
	1966/67	184	222	137	15	212	256	244	38	17	646	57
United States	1935–39	253	182	135	26	290	271	197	44	13	565	56
	1948–50	210	143	128	24	281	281	224	59	14	645	54
	1951–53	201	137	127	23	267	264	231	60	14	652	52
	1954–56	189	134	126	22	260	254	252	62	13	678	56
	1957–59	184	131	125	22	257	245	252	56	13	689	56
	1960–62	181	130	128	22	270	248	262	52	13	674	56
	1963–65	183	132	131	21	274	218	276	50	13	673	58
	1966	168	139	134	20	278	238	282	49	13	673	60
LATIN AMERICA												
Argentina	1935–39	291	180	74	7	67	129	293	19	6	419	26
	1948	345	241	96	6	108	160	319	20	5	399	43
	1951–53	287	216	87	8	122	162	282	24	6	394	50
	1954–56	287	229	93	9	135	184	296	18	5	361	49
	1957–59	316	192	92	6	121	210	299	20	5	305	45
	1960–62	250	241	96	7	131	219	273	22	6	285	43
	1963–65	344	232	92	9	119	224	256	18	7	326	44
	1966	268	202	90	6	124	229	309	21	8	338	41

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Bolivia [2]	1961–63	267	350	50	8	154	143	57	3	—	94	12
	1963	265	363	50	7	176	144	57	3	—	145	14
Brazil	1935–39	215	312	68	60	55	186	136	7	4	205	14
	1948–50	233	405	85	68	43	205	78	6	5	94	11
	1951–53	245	381	92	69	44	262	78	7	5	121	12
	1954–56	271	410	102	72	46	272	78	8	6	112	15
	1957–59	298	389	105	71	49	284	78	9	6	119	12
	1960–62	299	409	110	81	48	239	75	9	7	144	14
	1963–65	301	406	100	86	43	266	72	13	7	199	15
	1965	304	380	111	93	48	267	73	14	6	209	16
Chile	1935–39	339	201	70	28	137	114	105	5	9	116	13
	1948	367	218	68	16	148	112	104	5	...	236	15
	1951–52	352	168	74	25	154	113	82	13	15	277	22
	1954–56	375	207	74	21	183	82	86	11	23	306	19
	1957–59	334	207	62	19	189	86	88	7	21	324	26
	1960–62	326	192	86	25	228	154	106	7	17	273	21
	1963–65	390	185	86	23	224	273	88	7	26	262	16
Colombia [2]	1957–59	182	312	132	16	40	107	93	7	2	170	14
	1961–63	206	339	125	17	135	123	96	6	4	290	14
	1963–65	197	465	125	18	43	147	90	7	5	277	12
	1965	196	456	124	18	45	151	95	8	5	283	11
Costa Rica [2]	1960–62	229	120	158	28	30	480	57	17	5	284	19
	1963	239	116	164	27	24	474	54	17	4	283	19
Dominican Republic [2]	1959	146	655	59	61	35	488	54	11	11	108	11
	1964	154	553	81	61	42	396	51	11	17	238	26
Ecuador [2]	1954–56	226	282	62	26	53	257	30	10	6	203	13
	1957–59	190	331	54	25	70	221	37	12	8	218	15
	1961–63	178	318	98	29	128	260	59	5	8	106	12
	1963	179	317	97	24	123	252	59	5	8	100	13
El Salvador [2]	1960–62	354	8	63	32	13	62	35	13	3	234	15
	1962	365	8	67	34	13	61	34	13	3	234	18
Guatemala [2]	1960–62	398	21	71	24	106	78	34	5	1	90	8
	1962	465	22	70	24	106	80	30	5	1	107	8
Honduras [2]	1960–62	294	122	60	31	14	670	30	11	1	189	10
	1962	293	122	59	29	13	577	26	11	1	187	10
Jamaica [2]	1958	224	311	99	36	48	502	47	11	30	170	22
Mexico [2]	1954–56	346	45	88	53	...	135	54	12	6	190	26
	1957–59	335	39	88	58	...	147	61	18	6	236	25
	1960–62	349	47	91	62	34	172	62	15	7	326	30
	1963–65	352	56	104	68	34	162	63	12	8	342	28
	1965	353	54	104	69	35	157	65	12	8	339	28
Nicaragua	1960–62	206	12	125	38	31	365	45	7	2	614	15
	1962	218	16	146	47	31	352	40	7	2	620	16
Panama [2,16]	1960–62	335	188	71	36	60	154	83	11	20	164	23
	1963–65	333	190	70	32	60	158	85	12	23	185	26
	1965	317	192	63	34	57	158	88	11	23	180	25

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Paraguay	1957–59	205	726	42	42	44	383	130	2	—	196	11
	1960–62	202	702	53	39	43	383	120	2	1	177	13
Peru [2]	1957–59	246	400	68	26	...	...	49	2	15	95	21
	1960–62	263	482	72	27	89	125	61	4	19	127	21
	1963–65	239	497	76	25	90	128	66	4	21	184	23
	1965	254	507	80	27	82	114	60	4	20	206	21
Surinam [2]	1958–59	338	74	72	23	30	88	21	6	23	97	24
	1960–62	282	72	72	22	30	78	24	7	26	118	27
	1963–65	318	72	75	24	36	85	26	8	25	112	30
	1966	407	60	77	32	49	39	40	8	21	104	34
Uruguay	1948–50	272	140	91	8	61	165	315	20	3	427	39
	1952–53	261	161	89	6	73	144	336	18	3	460	44
	1954–56	271	168	90	5	100	164	298	18	3	476	45
	1957–59	251	177	88	6	130	132	305	19	3	476	58
	1960–62	275	193	109	9	104	145	319	18	4	608	44
Venezuela [2]	1952–53	223	238	88	39	27	180	51	12	17	200	18
	1954–56	215	204	82	34	27	174	51	12	14	209	19
	1957–59	215	225	85	33	33	174	62	11	21	233	23
	1960–62	239	275	93	43	37	207	69	9	18	232	26
	1963	218	313	85	38	35	258	74	6	30	252	26
NEAR EAST												
Afghanistan	1961–62	476	1	9	2	64	69	37	2	...	223	2
	1963–65	469	1	16	1	81	36	30	1	—	88	6
	1966	441	1	39	1	78	36	30	1	—	88	9
Iran	1960	394	10	52	11	22	101	44	5	2	176	18
	1963–65	312	9	61	13	96	167	40	3	—	131	17
	1966	323	9	71	12	95	169	41	3	—	142	16
Iraq	1960–62	355	15	81	15	156	196	55	3	2	207	10
Israel	1950/51	365	124	65	26	282	298	42	52	44	426	42
	1951/–53/	411	108	70	20	317	337	32	36	32	400	41
	1954/–56/	384	128	81	28	318	310	57	42	22	426	44
	1957/–59/	337	113	91	23	321	359	81	52	20	406	45
	1960/–62/	318	103	94	26	307	386	109	55	19	374	48
	1963/–65/	285	99	105	28	310	411	133	61	18	391	48
	1965/66	275	99	108	29	320	416	141	63	18	371	48
Jordan	1957–59	348	34	59	40	243	257	21	3	2	135	20
	1960–62	368	28	63	27	319	315	33	5	2	99	26
	1963–65	386	35	74	28	626	268	28	7	2	44	36
	1966	290	43	113	25	309	236	28	8	2	61	26
Lebanon	1960–62	303	40	66	25	267	435	71	8	7	188	28
	1963–65	340	54	72	74	284	486	87	10	6	268	31
	1966	365	64	111	12	312	379	84	23	6	353	26
Libya	1959	282	42	70	16	116	164	26	4	2	152	18
	1960–62	324	27	49	9	84	110	34	3	5	111	20
	1963–65	330	18	46	12	92	112	41	3	4	125	23
	1966	361	24	90	24	138	164	56	3	5	130	26
Saudi Arabia	1963–65	320	6	35	17	131	366	41	3	3	80	4
	1966	337	6	29	19	94	405	48	2	4	101	4
Sudan [17]	1961–63	342	54	36	25	95	112	56	2	6	365	21
	1964–65	350	62	34	24	95	79	73	3	4	290	22
	1966	310	69	33	15	95	99	76	3	4	352	24

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Syria	1960–62	432	24	46	32	153	435	38	4	—	146	30
	1963–65	438	25	44	39	169	396	30	4	—	108	26
	1966	575	21	39	23	146	257	32	4	—	121	26
Turkey	1934–38	520	16	20	27	87	156	41	6	1	212	20
	1948/–50/	511	50	27	26	152	191	39	3	2	201	19
	1951/–53/	545	78	30	30	186	195	40	4	4	216	22
	1954/–56/	550	80	32	34	209	222	37	5	4	187	21
	1957/–59/	547	108	31	38	215	279	36	4	4	204	21
	1960/61	611	105	28	36	288	340	37	5	6	193	22
United Arab Republic [10,11]	1948/–50/	474	29	39	32	125	138	28	2	9	163	10
	1951/–53/	470	24	44	28	137	184	30	2	7	124	10
	1954/–56/	493	25	43	28	173	210	34	3	13	128	10
	1957/–59/	504	26	44	29	214	190	35	3	12	116	13
	1960/–62/	545	32	44	29	242	227	32	3	14	125	16
	1963/–65/	578	41	48	32	282	250	35	3	13	124	17
	1965/66	551	38	49	35	292	232	36	4	9	122	19
FAR EAST												
Ceylon	1952–53	323	93	44	89	114	10	8	4	15	41	11
	1954–56	342	93	45	93	114	10	8	3	14	38	10
	1957–59	344	60	50	82	119	19	8	3	17	38	10
	1960–62	368	95	54	81	115	24	6	3	16	39	10
	1963–65	358	85	50	79	107	26	5	5	19	56	10
	1966	370	80	50	84	115	26	6	5	23	52	10
China (Taiwan) [4]	1935–39	270	331	30	15	170	54	51	6	35	12	8
	1948–50	377	209	26	15	170	61	30	4	16	2	6
	1951–53	398	180	26	22	169	49	46	4	23	4	10
	1954–56	406	193	26	25	160	42	46	5	26	15	10
	1957–59	426	198	26	28	164	54	50	5	28	14	11
	1960–62	440	175	26	28	159	58	44	4	33	21	13
	1963–65	424	152	26	33	159	54	51	6	36	14	15
	1966	428	140	32	37	144	72	63	7	39	11	14
India [10,11,12]	1934–38	377	21	36	60	68	72	8	1	4	177	7
	1949/–50/	324	24	32	56	...	36	4	—	2	122	8
	1951/–53/	333	30	31	60	...	34	4	—	2	128	8
	1954/–56/	346	29	36	66	...	34	4	1	3	133	10
	1957/–59/	359	29	38	64	...	31	4	1	3	129	11
	1960/–62/	383	29	49	63	...	48	4	1	3	127	11
	1963/–65/	380	35	49	54	...	45	4	1	3	117	10
	1965/66	346	39	50	41	...	44	4	1	3	110	9
Indonesia	1961–63	350	329	19	22	...	41	14	3	13	2	13
Japan [4,14]	1934–38	432	127	39	46	193	42	8	6	26	9	2
	1948–50	431	171	11	19	168	37	5	2	36	11	2
	1951–53	402	155	27	37	190	34	8	7	53	21	5
	1954–56	413	171	33	43	185	43	11	9	61	32	7
	1957–59	420	182	39	45	205	58	15	11	68	46	10
	1960–62	409	189	43	45	246	72	21	16	73	65	13
	1963–65	401	179	48	42	284	86	28	23	76	94	18
	1965	394	173	50	43	293	98	28	24	76	100	19
Korea, Rep. of	1962	551	122	5	19	138	20	16	4	26	—	1
	1963–65	569	198	3	17	134	22	14	5	33	6	1
	1966	556	212	4	16	142	28	10	6	36	5	1
Malaysia:												
West Malaysia-Singapore [2]	1961–63	392	113	80	23	97	71	39	10	28	112	26

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
Pakistan [10,11,12]	1934–38	377	21	36	60	68	72	8	1	4	177	7
	1949/–50/	438	...	33	22	50	39	12	1	2	152	8
	1951/–53/	419	...	36	19	49	91	12	1	3	156	10
	1954/–56/	410	...	39	22	49	91	12	1	4	156	10
	1957/–59/	420	10	41	19	51	56	11	1	4	129	9
	1960/–62/	424	13	39	14	51	71	10	1	4	151	15
	1963/–65/	454	26	56	18	37	79	10	1	4	200	16
	1965/66	453	30	60	17	40	76	10	1	4	195	19
Philippines	1953	308	120	38	11	88	86	40	8	24	20	5
	1954–56	313	120	35	10	87	87	43	9	27	26	5
	1957–59	314	118	34	12	85	86	45	9	29	36	7
	1960–62	324	117	35	19	81	97	41	9	30	34	7
	1963–65	350	122	50	17	74	126	36	7	43	40	7
	1966	322	108	52	16	75	127	47	8	42	44	8
AFRICA												
Cameroon [2]	1961–63	243	775	5	48	49	54	38	1	17	17	14
Ethiopia	1961	407	51	5	57	34	4	48	8	1	225	15
	1961–63	394	47	6	58	40	5	57	5	—	241	14
Gabon [2]	1961–63	47	1 769	11	14	104	13	74	2	12	20	10
	1963–65	49	1 791	13	13	104	13	72	2	12	18	10
Gambia	1961–63	482	48	32	26	45	21	18	1	40	35	21
Ghana [2]	1961–63	158	1 147	23	38	84	26	26	1	26	8	11
Ivory Coast [2]	1961–63	276	799	21	23	44	45	31	1	23	14	11
Kenya [2]	1961–63	350	334	29	68	64	13	49	2	3	98	4
Madagascar [2]	1961–63	449	378	20	20	74	42	44	1	10	24	4
Mali	1961–63	468	71	15	32	51	19	32	1	15	88	8
Mauritius	1955–56	359	46	108	32	78	30	15	—	17	124	26
	1957–59	359	45	102	29	78	29	14	4	15	133	28
	1960–62	357	36	106	31	87	14	16	4	15	165	34
	1963–65	356	33	103	29	98	33	18	5	16	206	36
	1966	346	36	103	30	101	41	18	6	14	202	43
Moroeco	1961–63	322	27	97	4	68	106	38	5	2	104	24
Mozambique	1961–63	258	976	20	56	53	56	15	1	5	5	4
Nigeria	1961–63	317	655	4	44	37	28	20	2	9	18	19
Rwanda	1961–63	146	608	—	136	9	230	20	—	—	13	6
Somalia	1961–63	320	128	33	13	36	41	55	2	—	210	6
South Africa [13]	1935–39	426	43	63	6	70	48	104	5	9	491	9
	1948–50	427	44	115	9	94	74	115	7	15	217	13
	1951–53	442	35	106	9	95	82	108	8	21	213	15
	1954–56	409	38	108	11	104	86	119	9	23	225	15
	1957–59	424	43	116	12	99	108	122	9	22	229	16
	1960/61	456	39	112	11	99	108	122	9	24	226	51
Tanzania: Tanganyika [2]	1961–63	345	478	18	47	70	69	35	2	7	39	5
Uganda [2]	1961	159	1 152	27	90	60	20	44	2	11	56	6
	1961–63	155	1 114	30	63	59	20	32	1	14	63	6

ANNEX TABLE 8A. – PER CAPUT FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*concluded*)

	Period	Cereals [1]	Potatoes and other starchy foods [2]	Sugars and sweets [3]	Pulses, nuts and seeds [4]	Vegetables [5]	Fruit [6]	Meat [7]	Eggs [8]	Fish [9]	Milk [10]	Fats and oils [11]
		Grams per day										
OCEANIA												
Australia	1936/-38/	278	133	149	7	178	205	330	33	14	395	44
	1948/-50/	265	136	153	15	181	217	300	32	12	444	40
	1951/-53/	257	139	146	12	165	191	295	28	12	498	45
	1954/-56/	254	126	147	11	168	201	307	28	12	518	44
	1957/-59/	235	145	146	10	172	209	316	29	13	547	42
	1960/-62/	229	129	142	12	174	222	298	33	14	571	40
	1963/-65/	236	129	146	13	182	227	295	34	15	602	39
	1965/66	238	141	147	13	185	234	286	35	16	614	39
New Zealand	1935–39	238	136	136	8	178	215	299	37	18	653	47
	1948–50	246	141	144	9	217	170	281	35	20	696	45
	1951–53	236	119	125	10	236	166	290	33	18	722	54
	1954–56	237	141	131	9	199	174	288	37	19	742	53
	1957–59	236	157	128	9	188	171	289	41	19	772	56
	1960–62	237	162	126	10	218	179	302	44	17	818	55
	1963–65	236	171	115	11	254	188	311	46	18	784	55
	1966	235	182	134	12	241	189	300	50	20	771	54

NOTE: Split years are indicated by a stroke, e.g., 1951/-53/ indicates 1951/52-1953/54.

[1] In terms of flour and milled rice. – [2] Bolivia includes bananas and plantains under starchy foods. Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Panama, Surinam, Venezuela, Cameroon, Gabon, Ghana, Ivory Coast, Kenya, Madagascar, Tanzania: Tanganyika, Uganda include plantains under starchy foods. Peru includes plantains starting with 1960-62. West Malaysia-Singapore includes plantains under starchy foods. – [3] In terms of refined sugar including crude sugar, syrups, honey and other sugar products. – [4] Shelled equivalent for nuts, including cocoa beans. China (Taiwan) includes soybean curd in terms of soybean. Japan includes "miso" and "shoyu" (soybean preparations) in terms of soybean. – [5] In terms of fresh equivalent; including processed vegetables. – [6] In terms of fresh equivalent; including processed fruit. – [7] Including poultry and game; expressed in terms of dressed carcass weight; including edible offals. – [8] In terms of fresh equivalent. – [9] Estimated edible weight. – [10] Milk and milk products excluding butter, expressed in terms of fresh milk. However, United Arab Republic, India and Pakistan include milk for making butter. – [11] United Arab Republic, India and Pakistan exclude butter. – [12] Up to 1958/59 excluding the Saar. – [13] Prewar figures refer to India-Pakistan. – [14] Refers to fiscal year, April-March. – [15] Split years starting with 1959/60. – [16] Data on consumption of coconuts, bananas and plantains include Indian jungle population. – [17] Data relate to an area covering 87% of population.

ANNEX TABLE 8B. – ESTIMATED CALORIE AND FAT CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES PER CAPUT

	Calories								Fats							
	Prewar	1948/-1950/	1951/-1953/	1954/-1956/	1957/-1959/	1960/-1962/	1963/-1965/	1966/67	Prewar	1948/-1950/	1951/-1953/	1954/-1956/	1957/-1959/	1960/-1962/	1963/-1965/	1966/67
	Number per day								*Grams per day*							
WESTERN EUROPE																
Austria	2 930	2 670	2 700	2 900	2 980	2 970	2 960	2 950	101.3	79.8	91.7	102.2	107.8	111.9	118.0	118.4
Belgium-Luxembourg	2 820	2 880	2 950	2 970	3 010	3 060	3 090	[1]3 070	95.7	107.8	113.6	117.1	132.3	137.1	140.6	[1]143.4
Denmark	3 450	3 240	3 300	3 340	3 360	3 370	3 320	3 290	150.7	125.2	141.0	145.6	158.7	156.5	157.7	156.6
Finland	3 000	[2]2 980	3 070	3 160	3 110	3 110	3 010	2 950	87.9	[2]98.6	105.7	112.6	109.6	114.4	114.9	114.8
France	2 880	2 800	2 840	2 890	2 950	3 190	3 230	[3]3 250	91.6	89.5	95.3	103.1	114.0	138.0	147.4	[3]151.5
Germany, Fed. Rep. of[4]	3 040	2 730	2 880	3 020	3 000	2 990	2 940	2 870	110.8	78.8	109.3	122.7	128.4	131.5	131.2	130.3
Greece[5]	2 600	2 500	2 600	2 850	3 010	2 940	2 910	2 910	68.8	65.3	73.3	81.2	86.2	88.1	92.9	99.7
Hungary[5]	...	...	...	...	...	3 030	3 050	3 100	...	...	...	...	...	99.3	100.0	103.6
Ireland[5]	3 400	3 430	3 460	3 460	3 420	3 490	3 470	3 440	106.6	116.7	120.9	125.1	126.6	131.5	135.6	134.8
Italy	2 510	2 350	2 480	2 440	2 570	2 720	2 790	2 860	58.9	51.6	60.1	61.9	69.6	78.7	85.1	87.2
Netherlands	2 960	2 950	2 900	2 940	2 950	3 030	2 970	2 900	112.3	103.2	113.2	120.6	125.1	132.8	128.0	125.3
Norway	3 210	3 110	3 100	3 160	3 010	2 930	2 960	2 970	120.3	122.3	129.8	135.8	132.3	128.0	133.1	130.6
Poland[5]	...	...	...	...	...	3 350	...	...	...	...	...	...	...	101.2	...	...
Portugal[5]	2 040	2 270	2 390	2 480	2 440	2 550	2 640	2 580	63.0	56.8	62.1	64.2	63.0	66.6	70.7	81.0
Romania[5]	...	...	...	...	...	3 160	[6]3 020	...	...	...	...	...	...	75.4	[6]71.7	...
Spain	...	...	[7]2 490	2 520	2 590	2 820	2 800	2 860	...	...	[7]72.2	74.0	79.2	89.8	98.0	102.7
Sweden	3 120	3 110	3 020	2 990	2 950	2 990	2 950	2 900	121.2	128.1	127.6	130.4	127.8	135.3	132.7	132.2
Switzerland	3 140	3 170	3 110	3 130	3 120	3 220	3 150	[1]3 150	112.3	108.7	112.4	118.2	124.5	130.7	135.0	[1]134.5
United Kingdom	3 110	3 130	3 110	3 260	3 280	3 280	3 260	3 220	129.8	124.1	127.3	139.0	141.0	143.4	143.7	142.9
Yugoslavia[5]	...	...	[7]2 690	2 770	2 910	3 030	3 100	3 140	...	...	[7]57.9	66.0	69.9	75.9	81.1	85.7
NORTH AMERICA																
Canada	3 020	3 110	3 040	3 080	3 040	3 020	3 080	3 180	119.2	130.2	134.1	135.9	137.0	136.6	138.7	145.2
United States[5]	3 280	3 200	3 160	3 170	3 120	3 110	3 150	3 160	130.2	141.4	138.9	146.0	144.4	145.9	146.8	148.0
FAR EAST																
Ceylon[5]	...	...	[7]1 990	2 070	2 030	2 080	2 100	2 180	...	...	[7]49.8	49.0	44.9	44.0	44.2	45.2
China (Taiwan)[5]	1 870	1 980	2 140	2 210	2 330	2 350	2 340	2 400	35.6	25.0	35.3	37.1	40.0	40.1	45.8	47.3
India	[8]1 950	[2]1 700	1 740	1 850	1 900	2 020	1 960	[1]1 810	[8]25.8	[2]23.2	24.0	26.2	26.8	27.1	24.7	[1]22.6
Indonesia	...	...	...	...	...	[9]1 980	...	...	...	...	...	...	...	[9]31.2	...	...
Japan[10]	2 020	1 900	1 930	2 080	2 200	2 260	2 340	2 350	18.8	10.6	21.3	25.9	30.8	36.9	43.7	45.1
Korea, Rep. of[5]	...	...	...	...	...	[11]2 240	2 390	2 390	...	...	...	...	...	[11]12.9	14.2	14.7
Malaysia: West Malaysia-Singapore	...	...	...	...	...	[9]2 400	...	...	...	...	...	...	...	[9]46.1	...	...
Pakistan	[8]1 950	[2]2 020	2 000	1 990	1 980	2 090	2 260	[12]2 290	[8]25.8	[2]22.1	24.3	24.1	22.0	31.5	32.3	[12]32.8
Philippines[5]	...	...	[12]1 690	1 730	1 760	1 840	2 020	2 070	...	...	[12]19.0	22.1	25.5	28.1	26.9	30.1
NEAR EAST																
Afghanistan	...	...	...	...	...	[13]2 050	1 950	1 950	...	...	...	...	...	[13]29.7	23.9	24.3
Iran	...	...	...	...	...	[14]2 050	1 840	1 890	...	...	...	...	...	[14]37.2	34.7	34.1
Iraq	...	...	...	...	...	2 100	...	...	...	...	...	...	...	32.7	...	...
Israel	...	[15]2 680	2 760	2 860	2 770	2 810	2 830	[12]2 850	...	[15]74.4	70.5	82.5	85.5	90.7	95.5	[12]97.6
Jordan[5]	...	...	...	...	2 180	2 230	2 500	2 140	...	...	...	...	39.9	45.0	50.8	40.4
Lebanon[6]	...	...	...	...	...	2 320	2 630	2 720	...	...	...	...	...	53.4	63.1	55.4
Libya[6]	...	...	...	...	[16]1 870	1 840	1 920	2 340	...	...	...	...	[16]35.3	34.8	39.8	50.4
Saudi Arabia[5]	...	...	...	...	...	...	1 760	1 830	...	...	...	...	...	...	22.5	23.8

Sudan[6]	...	...	...	...	...	[2]2 030	[17]2 040	1 940	...	...	...	...	...	[3]52.7	[17]54.0	52.9
Syria[8]	...	...	...	...	...	2 350	2 330	2 600	...	...	...	...	...	48.3	48.0	48.6
Turkey	2 490	2 510	2 730	2 780	2 820	[15]3 110	...	...	44.3	43.3	49.5	47.8	49.3	[15]53.9	...	...
United Arab Republic	...	2 360	2 340	2 470	2 530	2 690	2 880	2 810	...	38.7	35.9	37.1	39.3	42.1	46.1	47.7
AFRICA																
Cameroon	...	...	...	...	...	[2]2 130	...	...	...	...	...	...	...	[2]45.3	...	...
Ethiopia[5]	...	...	...	...	...	[16]2 130	[2]2 040	...	...	...	...	...	...	[16]44.5	[2]41.9	...
Gabon[6]	...	...	...	...	...	[2]1 880	1 880	...	...	...	...	...	...	[2]27.7	26.5	...
Gambia	...	...	...	...	...	[2]2 300	...	...	...	...	...	...	...	[2]43.3	...	...
Ghana	...	...	...	...	...	[2]2 160	...	...	...	...	...	...	...	[2]34.7	...	...
Ivory Coast	...	...	...	...	...	[2]2 290	...	...	...	...	...	...	...	[2]30.6	...	...
Kenya	...	...	...	...	...	[2]2 120	...	...	...	...	...	...	...	[2]30.8	...	...
Madagascar[5]	...	...	...	...	...	[2]2 330	...	...	...	...	...	...	...	[2]21.2	...	...
Mali	...	...	...	...	...	[2]2 120	...	...	...	...	...	...	...	[2]38.6	...	...
Mauritius[6]	...	...	...	[20]2 260	2 240	2 330	2 350	2 370	...	...	...	[20]38.9	41.2	49.7	51.2	57.4
Morocco	...	...	...	...	...	[2]1 980	...	...	...	...	...	...	...	[2]42.9	...	...
Mozambique	...	...	...	...	...	[2]2 420	...	...	...	...	...	...	...	[2]31.6	...	...
Nigeria	...	...	...	...	...	[2]2 180	...	...	...	...	...	...	...	[2]41.0	...	...
Rwanda	...	...	...	...	...	[2]1 830	...	...	...	...	...	...	...	[2]19.9	...	...
Somalia	...	...	...	...	...	[2]1 780	...	...	...	...	...	...	...	[2]32.7	...	...
South Africa[3]	2 340	2 640	2 680	2 620	2 730	[14]2 820	...	...	53.9	63.1	63.5	64.6	67.0	[14]68.0	...	...
Tanzania: Tanganyika	...	...	...	...	...	[2]2 080	...	...	...	...	...	...	...	[2]26.4	...	...
Uganda[3]	...	...	...	...	...	[16]2 310	[2]2 070	...	...	...	...	...	...	[16]29.9	[2]43.0	...
OCEANIA																
Australia	3 300	3 240	3 170	3 230	3 210	3 140	3 180	[13]3 190	128.7	121.1	124.8	133.0	135.3	132.6	130.7	[13]128.9
New Zealand[3]	3 260	3 360	3 350	3 400	3 430	3 490	3 470	3 470	135.3	140.9	149.2	149.9	152.8	157.2	157.6	150.7
LATIN AMERICA[3]																
Argentina	2 780	[23]3 240	2 970	3 070	3 090	2 810	3 130	2 920	100.8	[23]109.6	111.7	121.9	117.4	109.1	108.8	115.6
Bolivia	...	...	...	...	...	[2]1 830	[4]1 860	...	...	...	...	...	...	[2]34.6	[4]36.5	...
Brazil	2 190	2 240	2 340	2 560	2 510	2 720	2 780	2 850	54.9	41.0	44.8	48.2	46.3	52.3	55.4	57.9
Chile	2 250	[24]2 420	[22]2 450	2 550	2 380	2 430	2 660	...	41.0	[24]46.5	[22]53.3	52.6	60.1	54.1	49.4	...
Colombia	...	...	...	...	1 990	[2]2 200	2 220	...	...	...	...	...	45.3	[8]52.7	46.7	47.2
Costa Rica	...	...	...	...	...	2 430	[4]2 460	...	...	...	...	...	...	50.2	[4]49.7	...
Dominican Republic	...	...	...	...	[16]2 080	...	[22]2 230	...	...	...	...	...	[16]41.0	...	[22]52.0	...
Ecuador	...	...	...	2 050	1 780	[2]1 850	[4]1 830	...	...	...	...	35.9	39.3	[2]36.1	[4]40.0	...
El Salvador	...	...	...	...	...	3 030	[12]2 120	...	...	...	...	...	...	44.1	[12]48.0	...
Guatemala	...	...	...	...	...	2 080	[12]2 320	...	...	...	...	...	...	34.7	[12]37.2	...
Honduras	...	...	...	...	...	2 080	[12]2 070	...	...	...	...	...	...	31.7	[12]32.0	...
Jamaica	...	...	...	...	[24]2 240	...	...	...	...	...	...	...	[24]49.3	...	...	...
Mexico	...	...	...	2 370	2 410	2 610	2 670	2 680	...	...	...	60.3	62.0	71.7	71.0	71.2
Nicaragua	...	...	...	...	...	2 420	[12]2 550	...	...	...	...	...	...	55.5	[12]56.9	...
Panama	...	...	...	...	...	2 330	2 340	2 280	...	...	...	...	...	52.1	55.1	56.4
Paraguay	...	...	...	...	2 510	2 520	...	...	...	...	...	...	50.0	49.9	...	...
Peru	...	...	...	...	2 040	2 180	2 160	2 230	...	...	...	...	42.4	43.4	47.0	45.0
Surinam	...	...	...	...	[25]2 070	1 980	2 090	2 470	...	...	...	...	[25]40.4	44.3	49.5	58.2
Uruguay	...	2 900	[2]2 940	2 960	3 020	3 220	...	...	...	117.1	[7]119.8	119.8	135.7	130.8	...	...
Venezuela	...	...	[2]2 030	1 950	2 080	2 300	[6]2 240	...	...	...	[7]39.9	41.3	48.6	57.5	[6]57.4	...

NOTE: See explanatory note to Annex Table 3A.

[1] 1965/66. – [2] 1949/-50/. – [3] 1965. – [4] From 1959/60 onward including the Saar. – [5] Calendar years instead of split years. – [6] 1963. – [7] 1952-53. – [8] India and Pakistan. – [9] 1961-63. – [10] Fiscal year April-March. – [11] 1962. – [12] 1953. – [13] 1961-62. – [14] 1960. – [15] 1950/51. – [16] 1959. – [17] 1964-65. – [18] 1960/61. – [19] 1961. – [20] 1955-56. – [21] 1948. – [22] 1951-52. – [23] 1964. – [24] 1958. – [25] 1958-59.

ANNEX TABLE 8C. – ESTIMATED PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES PER CAPUT

	Total protein								Animal protein							
	Prewar	1948/-1950/	1951/-1953/	1954/-1956/	1957/-1959/	1960/-1962/	1963/-1965/	1966/67	Prewar	1948/-1950/	1951/-1953/	1954/-1956/	1957/-1959/	1960/-1962/	1963/-1965/	1966/67
	Grams per day															
WESTERN EUROPE																
Austria	88.3	77.2	80.2	85.2	87.2	86.8	86.5	86.4	40.9	30.2	37.7	42.2	44.8	47.5	48.8	49.4
Belgium-Luxembourg	83.7	83.1	86.4	87.8	86.2	88.9	89.0	[1]90.3	35.3	37.7	40.9	43.8	46.0	48.2	49.5	[1]51.5
Denmark	93.2	104.9	92.1	89.0	90.5	93.3	93.4	91.9	56.8	59.8	50.9	50.3	54.7	57.9	59.6	61.7
Finland	95.2	[2]96.2	96.4	97.6	94.0	94.2	91.1	...	43.8	[2]51.6	52.9	55.0	52.7	54.6	57.2	56.4
France	94.9	92.4	92.8	95.3	97.9	103.0	103.7	[3]103.3	40.9	40.3	43.0	47.2	51.0	57.2	61.3	[3]61.9
Germany, Fed. Rep. of[4]	84.8	79.5	77.6	80.9	80.2	81.1	80.0	79.9	42.5	32.1	39.2	45.2	47.2	49.8	50.6	51.5
Greece[5]	83.6	76.3	79.2	91.3	96.8	96.3	97.1	98.2	23.0	16.6	18.9	24.1	27.4	31.3	37.0	41.7
Hungary[5]	...	...	...	...	...	91.7	94.3	95.6	...	...	...	...	...	37.2	37.9	38.3
Ireland[5]	98.5	100.6	95.3	94.7	91.0	91.9	91.4	92.3	47.4	47.6	48.0	49.9	51.5	54.8	56.1	57.7
Italy	76.6	69.7	71.9	72.0	75.9	79.4	82.4	85.4	20.3	19.3	21.3	23.7	26.2	29.7	32.8	35.5
Netherlands	82.3	80.6	80.5	80.5	79.2	80.5	82.9	82.7	40.1	38.6	40.8	43.4	44.2	46.1	51.1	52.8
Norway	89.7	99.5	90.1	88.4	83.8	81.3	81.9	81.4	49.1	53.2	50.3	50.4	49.1	48.8	50.2	49.2
Poland[5]	...	...	...	...	...	92.9	...	...	...	...	...	...	...	37.6	...	...
Portugal[5]	59.4	67.8	68.9	70.0	69.7	72.6	77.0	75.0	20.4	22.1	23.1	24.4	25.4	27.2	29.6	29.8
Romania[5]	...	...	...	...	...	97.3	[6]90.3	...	...	...	...	...	...	27.9	[6]25.4	...
Spain	...	...	[7]69.8	70.1	71.3	77.4	76.9	85.1	...	...	[7]17.8	19.3	19.9	23.9	28.0	36.7
Sweden	91.9	86.9	86.7	84.0	82.1	83.1	81.8	79.8	55.4	52.5	54.3	53.4	52.8	54.5	54.1	53.6
Switzerland	95.7	95.9	93.5	93.0	90.4	90.3	88.7	[1]88.6	53.9	50.8	51.0	52.1	51.0	51.3	52.4	[1]52.5
United Kingdom	80.2	90.3	84.7	85.6	86.0	89.0	89.2	88.9	43.9	45.1	44.9	49.6	50.8	53.4	53.1	53.3
Yugoslavia[5]	...	...	[7]83.2	85.5	91.1	94.0	93.8	91.8	...	...	[7]16.8	18.9	23.1	23.0	31.7	21.1
NORTH AMERICA																
Canada	84.6	93.1	90.6	93.9	92.4	91.2	93.2	95.9	47.9	57.2	57.5	61.3	61.4	60.4	62.3	64.2
United States[5]	86.3	89.7	90.2	92.4	92.2	91.4	93.1	93.8	51.7	59.6	61.2	64.7	65.1	64.3	65.6	66.7
FAR EAST																
Ceylon[5]	...	...	[7]43.4	44.6	44.6	46.1	45.2	44.5	...	...	[7]8.3	7.8	8.7	7.9	8.4	10.3
China (Taiwan)[5]	45.1	43.3	49.9	53.0	56.8	58.5	59.5	62.2	15.5	8.3	11.6	13.2	14.4	15.3	17.1	19.3
India	[8]52.2	[2]44.9	46.5	49.1	50.1	49.6	49.1	[1]45.4	[8]8.2	[2]5.4	5.7	6.0	6.0	5.6	5.6	[1]5.4
Indonesia	...	...	...	...	...	[9]38.2	...	...	...	...	...	...	...	[9]4.5	...	...
Japan[10]	59.7	49.4	60.1	68.7	74.8	77.4	78.4	77.6	7.7	8.6	10.9	14.6	17.7	21.3	23.6	24.6
Korea, Rep. of[5]	...	...	...	...	...	[11]72.6	70.7	70.5	...	...	...	...	...	[11]11.4	11.5	11.5
Malaysia: West Malaysia-Singapore	...	...	...	...	...	[9]54.3	...	...	...	...	...	...	...	[9]16.3	...	...
Pakistan	[8]52.2	[2]48.2	46.4	46.6	45.8	47.7	51.0	[1]51.9	[8]8.2	[2]7.6	7.9	8.2	7.3	9.8	10.0	[1]10.7
Philippines[5]	...	...	[12]41.1	43.0	44.1	44.3	48.5	48.6	...	...	[12]13.3	14.5	15.4	14.4	15.7	18.2
NEAR EAST																
Afghanistan	...	...	...	...	...	[13]68.4	58.3	55.3	...	...	...	...	...	[13]15.8	6.4	6.4
Iran	...	...	...	...	...	[14]59.6	48.7	49.8	...	...	...	...	...	[14]13.4	11.1	11.5
Iraq	...	...	...	...	...	60.7	...	...	...	...	...	...	...	16.8	...	...
Israel	...	[15]87.6	84.9	88.0	83.2	84.5	86.6	[1]87.8	...	[15]33.7	26.5	30.7	32.4	36.0	39.7	[1]40.9
Jordan[5]	...	...	...	...	58.3	61.5	66.8	54.9	...	...	...	...	7.4	9.9	10.5	13.6
Lebanon[5]	...	...	...	...	...	65.8	77.6	78.5	...	...	...	...	...	19.7	25.3	28.3
Libya[5]	...	...	...	...	[16]47.3	48.6	51.3	61.9	...	...	...	...	[16]10.3	10.0	11.3	14.7
Saudi Arabia[5]	...	...	...	...	...	...	45.1	48.9	...	...	...	...	...	...	9.7	12.0

Sudan[5]	...	...	...	...	...	[9]64.6	[17]65.8	63.9	...	...	...	...	...	[9]22.1	[17]23.9	25.9
Syria[5]	...	...	...	...	...	68.7	69.3	77.9	...	...	...	...	...	12.2	9.3	10.3
Turkey	81.0	80.9	88.4	88.0	90.5	[18]97.5	...	...	15.9	15.3	16.8	14.5	15.3	[16]15.9	...	...
United Arab Republic	...	69.3	67.7	71.5	73.5	79.0	82.6	80.1	...	12.1	10.6	12.1	11.9	12.2	12.0	11.8
AFRICA																
Cameroon	...	...	...	...	...	[9]54.4	...	...	...	...	...	...	...	[9]10.0	...	...
Ethiopia[5]	...	...	...	...	...	[19]71.9	[9]68.8	...	...	...	...	...	...	[19]17.4	[9]14.8	...
Gabon[5]	...	...	...	...	...	[9]36.5	36.5	...	...	...	...	...	...	[9]16.3	16.4	...
Gambia	...	...	...	...	...	[6]60.4	...	...	...	...	...	...	...	[9]12.2	...	...
Ghana	...	...	...	...	...	[9]48.6	...	...	...	...	...	...	...	[9]10.5	...	...
Ivory Coast	...	...	...	...	...	[9]52.3	...	...	...	...	...	...	...	[9]10.3	...	...
Kenya	...	...	...	...	...	[9]64.4	...	...	...	...	...	...	...	[9]12.1	...	...
Madagascar[5]	...	...	...	...	...	[9]52.3	...	...	...	...	...	...	...	[9]9.4	...	...
Mali	...	...	...	...	...	[9]64.2	...	...	...	...	...	...	...	[9]10.9	...	...
Mauritius[5]	...	...	...	[20]46.3	46.0	47.2	49.5	48.2	...	...	...	[20]10.5	10.7	12.3	13.8	13.5
Morocco	...	...	...	...	...	[9]49.5	...	...	...	...	...	...	...	[9]10.5	...	...
Mozambique	...	...	...	...	...	[9]47.9	...	...	...	...	...	...	...	[9]3.8	...	...
Nigeria	...	...	...	...	...	[9]59.3	...	...	...	...	...	...	...	[9]5.3	...	...
Rwanda	...	...	...	...	...	[9]56.3	...	...	...	...	...	...	...	[9]3.1	...	...
Somalia	...	...	...	...	...	[9]51.6	...	...	...	...	...	...	...	[9]16.3	...	...
South Africa[5]	67.8	72.9	73.8	74.6	77.0	[18]80.2	...	...	23.4	27.2	27.3	30.8	31.2	[18]31.5	...	...
Tanzania: Tanganyika	...	...	...	...	...	[9]58.1	...	...	...	...	...	...	...	[9]9.1	...	...
Uganda[5]	...	...	...	...	...	[19]58.4	[9]50.1	...	...	...	...	...	...	[19]10.9	[9]10.2	...
OCEANIA																
Australia	103.3	97.5	92.3	91.1	91.2	89.8	91.8	[19]1.9	66.6	66.1	61.5	59.2	60.8	59.7	61.1	[1]60.8
New Zealand[5]	100.7	100.1	102.4	103.9	106.6	109.4	110.8	109.4	67.8	66.8	69.3	70.4	72.9	74.8	75.9	74.8
LATIN AMERICA[5]																
Argentina	96.5	[21]110.4	96.5	96.9	97.6	81.6	87.6	88.0	59.6	[21]66.1	59.5	58.4	56.9	52.4	50.7	58.7
Bolivia	...	...	...	...	...	[9]48.6	[6]49.3	...	...	...	...	...	...	[9]12.4	[6]12.8	...
Brazil	63.8	54.9	58.0	61.5	60.6	66.4	68.8	71.1	27.9	15.5	17.0	16.9	17.5	17.9	19.4	19.8
Chile	69.6	[21]74.8	[22]75.0	80.1	77.4	78.6	85.0	...	21.4	[21]25.5	[22]26.0	29.0	28.8	28.9	27.7	...
Colombia	...	...	...	...	45.7	[9]53.3	53.8	55.3	...	...	...	...	20.5	[9]25.5	25.0	25.6
Costa Rica	...	...	...	...	...	53.9	[6]53.8	...	...	...	...	...	...	20.8	[6]20.3	...
Dominican Republic	...	...	...	...	[16]47.0	...	[23]53.0	...	...	...	...	...	[16]17.0	...	[23]22.0	...
Ecuador	...	...	...	49.6	45.2	[9]43.7	43.7	...	...	...	...	13.0	15.0	[9]14.0	14.2	...
El Salvador	...	...	...	...	...	56.7	[11]57.9	...	...	...	...	...	...	15.1	[11]14.9	...
Guatemala	...	...	...	...	...	55.4	[11]62.0	...	...	...	...	...	...	8.7	[11]8.7	...
Honduras	...	...	...	...	...	53.6	[11]53.0	...	...	...	...	...	...	12.7	[11]12.3	...
Jamaica	...	...	...	...	[24]57.9	...	...	...	...	...	...	...	[24]22.7	...	...	...
Mexico	...	...	...	63.3	66.6	71.9	74.5	74.5	...	...	...	16.6	19.7	23.1	23.7	23.7
Nicaragua	...	...	...	...	...	62.1	[11]64.1	...	...	...	...	...	...	29.0	[11]28.7	...
Panama	...	...	...	...	...	60.5	61.4	60.7	...	...	...	...	...	22.9	24.5	24.7
Paraguay	...	...	...	...	65.3	63.3	...	...	...	...	...	...	26.0	23.7	...	...
Peru	...	...	...	...	50.5	55.1	56.4	56.0	...	...	...	...	13.3	17.0	20.0	19.6
Surinam	...	...	...	...	[25]44.9	43.0	46.5	54.3	...	...	...	...	[25]13.3	14.5	14.7	15.8
Uruguay	...	[21]94.5	99.1	95.8	94.6	104.3	...	...	...	[21]61.2	66.3	61.4	62.1	68.5	...	...
Venezuela	...	...	53.4	51.3	57.3	58.7	[6]60.1	...	...	...	19.2	19.1	22.8	23.0	[6]25.4	...

NOTE: See explanatory note to Annex Table 8A.

[1] 1965/66. – [2] 1949/-50/. – [3] 1965. – [4] From 1959/60 onward including the Saar. – [5] Calendar years instead of split years. – [6] 1963. – [7] 1952-53. – [8] India and Pakistan. – [9] 1961-63. – [10] Fiscal year April-March. – [11] 1962. – [12] 1953. – [13] 1961-62. – [14] 1960. – [15] 1950/51. – [16] 1959. – [17] 1964-65. – [18] 1960/61. – [19] 1961. – [20] 1955-56. – [21] 1948. – [22] 1951-52. – [23] 1964. – [24] 1958. – [25] 1958-59.

ANNEX TABLE 9A. – VOLUME OF WORLD [1] EXPORTS OF MAJOR AGRICULTURAL COMMODITIES

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
Wheat and wheat flour (wheat equivalent)	24.85	31.75	29.56	27.68	29.37	33.29	40.83	36.97	45.04	54.41	54.60	55.79	48.04
Barley	5.16	7.04	6.35	6.50	6.18	4.93	6.19	5.61	4.96	6.97	5.91	6.04	6.60
Maize	4.64	5.79	7.07	8.80	9.99	11.12	12.47	17.48	19.00	20.05	23.44	24.70	23.95
Oats	0.88	1.32	1.44	1.46	1.40	1.28	1.14	1.34	1.19	1.39	1.68	1.33	1.20
Rye	0.94	1.03	0.73	0.62	0.59	0.56	0.70	0.77	0.64	0.50	0.40	0.43	0.37
Millet and sorghums	1.87	1.82	0.98	2.51	3.28	3.10	2.37	3.86	3.97	3.80	6.21	11.14	9.16
Rice (milled equivalent) [2]	4.62	5.43	5.49	4.82	4.77	5.50	5.69	5.49	6.33	6.55	6.83	5.78	5.46
Sugar (raw equivalent) [3]	13.28	13.51	14.61	14.42	13.34	16.13	17.22	15.47	15.15	15.20	16.80	16.37	17.58
Potatoes	2.31	2.33	1.87	2.58	2.47	2.38	2.34	2.67	2.42	2.40	2.87	2.54	2.55
Pulses (dry)	0.96	1.04	0.84	0.84	1.06	1.04	0.93	1.19	1.34	1.19	1.44	1.29	1.19
Apples	0.98	0.87	1.14	0.84	1.28	1.24	1.38	1.51	1.22	1.39	1.68	1.56	1.50
Bananas	3.06	3.05	3.36	3.53	3.68	3.88	3.98	3.89	4.03	4.22	4.87	5.47	5.27
Citrus fruit [4]	2.83	2.37	2.67	2.77	3.09	3.34	3.23	3.57	3.25	4.09	4.13	4.19	4.33
Grapes (fresh)	0.31	0.36	0.31	0.39	0.38	0.43	0.44	0.50	0.45	0.55	0.60	0.60	0.63
Dates	0.32	0.32	0.29	0.30	0.34	0.32	0.24	0.30	0.40	0.34	0.32	0.34	0.35
Vegetable oils and oilseeds (oil equivalent) [5]	4.18	4.53	4.74	4.54	4.70	5.08	5.03	5.43	5.23	5.75	5.69	5.91	5.56
Oilseed cake and meal	3.22	3.53	3.23	3.88	4.64	4.45	4.96	6.09	6.60	7.12	8.08	8.45	8.42
Cattle [6]	2.14	2.12	2.97	3.15	2.63	2.82	3.68	3.66	3.79	3.50	3.77	3.37	3.80
Sheep, lambs and goats [6]	2.54	2.26	1.86	1.92	2.54	2.80	3.46	3.99	4.45	4.08	4.13	3.56	3.86
Pigs [6]	0.66	0.52	0.52	0.49	0.99	1.23	1.19	1.01	0.69	0.85	0.92	0.62	1.00
Meat [7]	1.24	1.38	1.50	1.58	1.71	1.74	1.85	2.26	2.55	2.55	2.50	2.55	2.66
Milk (condensed, evaporated and powdered)	0.72	0.82	0.81	0.80	0.91	0.90	0.97	1.04	1.21	1.39	1.37	1.40	1.56
Eggs (in the shell)	0.35	0.35	0.37	0.39	0.43	0.41	0.39	0.34	0.28	0.24	0.19	0.18	0.20
Coffee (green)	2.06	2.33	2.22	2.19	2.55	2.61	2.67	2.81	3.02	2.76	2.67	2.95	2.98
Cocoa beans	0.70	0.75	0.78	0.64	0.75	0.90	1.00	1.02	1.03	1.02	1.29	1.11	1.12
Tea	0.43	0.50	0.48	0.52	0.49	0.49	0.52	0.54	0.55	0.54	0.56	0.52	0.55
Wine	2.57	2.48	2.81	2.78	2.42	2.69	2.66	2.80	2.37	2.52	2.30	2.53	2.52
Pepper and pimento	0.09	0.12	0.10	0.10	0.12	0.10	0.12	0.13	0.14	0.12	0.12	0.10	0.12
Tobacco (unmanufactured)	0.64	0.64	0.67	0.66	0.64	0.68	0.77	0.78	0.78	0.87	0.84	0.76	0.78
Wool (actual weight)	1.14	1.18	1.20	1.15	1.37	1.31	1.42	1.42	1.40	1.31	1.40	1.50	1.35
Cotton (lint)	2.37	2.82	3.06	2.65	2.79	3.50	3.28	3.00	3.37	3.45	3.19	3.36	3.42
Jute and kenaf	0.99	0.88	0.81	0.95	0.89	0.83	0.76	0.99	0.90	1.00	1.13	1.20	1.08
Rubber (natural) [8]	2.02	1.94	1.96	1.97	2.28	2.01	2.22	2.31	2.28	2.23	2.33	2.24	2.43

[1] Including exports from the rest of the world to the U.S.S.R., eastern Europe and China (Mainland), but excluding exports from these countries. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Oranges, mandarines and lemons. – [5] Excluding re-exports of copra from Malaysia, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaysia. – [6] Million head. – [7] Beef and veal, mutton and lamb, pork, poultry meat. – [8] Excluding imports into Malaysia for re-export and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaysia.

ANNEX TABLE 9B. – VOLUME OF REGIONAL EXPORTS OF MAJOR AGRICULTURAL COMMODITIES

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
WESTERN EUROPE													
Wheat and wheat flour (wheat equivalent)	3.40	2.30	3.09	3.88	3.78	3.37	3.19	3.70	4.93	5.25	6.74	5.89	4.99
Barley	0.40	0.99	1.96	0.76	0.64	1.05	2.51	1.69	2.29	3.16	2.63	3.37	4.00
Maize	0.12	0.13	0.11	0.61	0.37	0.81	1.09	0.34	0.94	1.27	1.89	2.15	2.77
Rye	0.24	0.32	0.14	0.09	0.21	0.20	0.31	0.18	0.16	0.05	0.05	0.06	0.05
Sugar (raw equivalent) [1]	1.81	1.56	1.72	1.37	1.34	1.57	1.47	1.26	1.59	1.45	1.54	1.27	1.37
Potatoes	1.78	1.64	1.35	2.01	1.80	1.58	1.75	1.83	1.64	1.68	2.20	1.84	1.86
Pulses (dry)	0.16	0.18	0.17	0.21	0.19	0.17	0.19	0.22	0.17	0.15	0.17	0.20	0.18
Apples	0.66	0.53	0.73	0.38	0.79	0.71	0.84	0.88	0.54	0.71	0.87	0.76	0.78
Citrus fruit [2]	1.40	0.85	0.96	1.20	1.35	1.47	1.49	1.73	1.22	2.01	1.90	1.97	1.92
Grapes (fresh)	0.19	0.24	0.19	0.26	0.24	0.28	0.31	0.34	0.29	0.38	0.41	0.41	0.43
Vegetable oils and oilseeds (oil equivalent) [3]	0.31	0.34	0.31	0.28	0.31	0.44	0.38	0.40	0.37	0.40	0.31	0.32	0.42
Oilseed cake and meal	0.61	0.68	0.65	0.61	0.77	0.76	0.91	0.92	0.89	1.03	1.07	1.13	1.23
Cattle [4]	1.18	1.24	1.51	1.34	1.26	1.38	1.80	1.37	1.85	1.92	1.73	1.39	2.01
Sheep, lambs and goats [4]	0.39	0.38	0.67	0.47	0.57	0.86	1.17	0.87	1.35	0.87	0.85	0.57	0.73
Pigs [4]	0.53	0.37	0.25	0.32	0.58	0.80	0.58	0.49	0.39	0.66	0.82	0.49	0.86
Meat (fresh, chilled and frozen) [5]	0.03	0.23	0.30	0.32	0.40	0.51	0.58	0.74	0.81	0.78	0.90	0.91	1.05
Bacon, ham and salted pork	0.29	0.28	0.30	0.30	0.31	0.37	0.36	0.37	0.35	0.35	0.36	0.35	0.35
Milk (condensed, evaporated and powdered)	0.39	0.43	0.45	0.46	0.51	0.58	0.64	0.69	0.72	0.75	0.90	1.03	1.16
Butter	0.19	0.19	0.25	0.25	0.21	0.25	0.26	0.23	0.24	0.23	0.27	0.27	0.31
Cheese	0.23	0.25	0.26	0.29	0.32	0.33	0.34	0.36	0.38	0.40	0.42	0.47	0.48
Eggs (in the shell)	0.27	0.28	0.30	0.31	0.34	0.31	0.29	0.28	0.23	0.19	0.14	0.13	0.15
Wine	0.64	0.91	0.88	1.17	0.75	0.91	1.01	1.01	1.26	1.21	1.19	1.30	1.28
Wool (actual weight)	0.07	0.08	0.09	0.08	0.11	0.11	0.11	0.12	0.13	0.10	0.11	0.11	0.09
EASTERN EUROPE AND U.S.S.R.													
Wheat and wheat flour (wheat equivalent)	2.64	1.74	5.63	4.11	6.34	5.86	5.46	5.18	4.97	2.51	2.15	3.65	...
Barley	0.62	0.91	1.33	0.38	0.19	0.43	1.18	0.61	0.69	0.76	2.14	0.39	...
Maize	1.01	0.84	0.26	0.73	0.27	0.70	1.30	2.27	1.73	0.96	0.69	0.40	...
Rye [6]	0.77	0.67	0.45	0.47	0.55	0.76	1.15	1.35	0.89	0.17	0.06	0.30	...
Sugar (raw equivalent) [1]	1.13	0.54	0.62	1.10	1.36	1.33	3.21	3.17	2.19	1.70	2.01	2.17	...
Potatoes	0.08	0.09	0.12	0.17	0.31	0.25	0.40	0.66	0.46	1.18	0.68	0.62	...
Sunflowerseed [6]	0.08	0.08	0.06	0.06	0.12	0.18	0.17	0.22	0.15	0.24	0.19	0.32	...
Oilseed cake and meal	0.19	0.15	0.22	0.38	0.59	0.53	0.42	0.40	0.24	0.08	0.16	0.42	...
Meat (fresh, chilled and frozen) [5]	0.07	0.09	0.12	0.10	0.31	0.14	0.20	0.27	0.27	0.16	0.23	0.25	...
Butter	0.01	0.03	0.05	0.06	0.11	0.08	0.09	0.10	0.10	0.06	0.08	0.08	...
Eggs (in the shell)	0.04	0.05	0.04	0.06	0.07	0.10	0.13	0.10	0.08	0.08	0.11	0.13	...
Cotton	0.34	0.32	0.32	0.32	0.35	0.40	0.39	0.35	0.32	0.39	0.46	0.52	...
NORTH AMERICA													
Wheat and wheat flour (wheat equivalent)	13.64	21.98	20.27	19.18	19.64	23.30	29.84	24.98	31.11	37.45	31.63	39.44	28.70
Barley	2.96	3.56	2.55	4.25	3.83	3.01	2.40	2.58	1.62	2.48	2.11	2.04	2.02
Maize	2.78	3.02	4.52	4.57	5.59	5.61	7.35	10.81	11.12	12.14	15.21	15.60	12.97
Millet and sorghums	1.59	1.40	0.57	1.88	2.59	2.46	1.64	2.79	2.94	2.55	5.32	9.50	7.80
Rye	0.37	0.55	0.27	0.34	0.25	0.21	0.34	0.57	0.48	0.29	0.18	0.35	0.31
Rice (milled equivalent) [7]	0.52	0.82	0.74	0.57	0.69	0.89	0.80	1.05	1.20	1.33	1.47	1.28	1.72
Citrus fruit [2]	0.36	0.48	0.40	0.27	0.33	0.29	0.30	0.27	0.26	0.30	0.33	0.48	0.42
Pulses (dry)	0.10	0.16	0.17	0.18	0.31	0.24	0.16	0.26	0.34	0.28	0.30	0.32	0.26
Vegetable oils and oilseeds (oil equivalent) [3]	0.81	1.16	1.26	1.52	1.43	1.39	1.24	1.62	1.62	2.00	2.08	1.77	1.85
Oilseed cake and meal	0.76	0.83	0.61	0.44	0.93	0.83	0.79	1.37	1.69	1.95	2.47	2.60	2.75
Milk (condensed, evaporated and powdered)	0.21	0.27	0.24	0.22	0.25	0.21	0.23	0.22	0.35	0.47	0.31	0.19	0.15
Tobacco (unmanufactured)	0.27	0.25	0.24	0.23	0.23	0.24	0.24	0.23	0.25	0.26	0.23	0.27	0.28
Cotton (lint)	0.56	1.03	1.57	1.04	0.83	1.73	1.45	0.87	0.99	1.19	0.86	0.82	0.90

ANNEX TABLE 9B. – VOLUME OF REGIONAL EXPORTS OF MAJOR AGRICULTURAL COMMODITIES (*continued*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
OCEANIA													
Wheat and wheat flour (wheat equivalent)	2.55	3.57	2.56	1.42	2.68	3.60	6.41	4.79	6.44	6.82	7.25	4.79	8.69
Barley	0.36	0.63	0.64	0.32	0.88	0.38	0.95	0.40	0.28	0.36	0.38	0.25	0.44
Oats	0.08	0.20	0.09	0.07	0.38	0.22	0.39	0.27	0.31	0.37	0.31	0.25	0.42
Sugar (raw equivalent) [1]	0.80	0.82	0.98	0.89	0.84	1.04	0.99	1.40	1.45	1.60	1.47	1.64	2.02
Copra and cococut oil (oil equivalent)	0.17	0.17	0.18	0.16	0.17	0.17	0.18	0.17	0.18	0.18	0.17	0.17	0.17
Beef and veal	0.25	0.24	0.28	0.28	0.32	0.25	0.26	0.37	0.40	0.43	0.40	0.39	0.36
Mutton and lamb	0.33	0.31	0.30	0.34	0.39	0.42	0.41	0.41	0.43	0.48	0.43	0.47	0.50
Butter	0.24	0.25	0.21	0.24	0.28	0.22	0.25	0.24	0.27	0.28	0.27	0.28	0.32
Cheese	0.11	0.11	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.13	0.12	0.12	0.14
Wool (actual weight)	0.71	0.75	0.80	0.73	0.87	0.85	0.89	0.91	0.92	0.90	0.93	1.03	0.90
LATIN AMERICA													
Wheat and wheat flour (wheat equivalent)	4.23	3.03	2.83	2.45	2.48	2.50	1.10	2.87	1.97	4.31	7.44	5.26	5.33
Maize	0.53	1.11	0.84	1.74	2.74	3.11	1.79	3.00	3.18	3.75	4.79	5.29	6.00
Millet and sorghums	0.02	0.17	0.16	0.34	0.33	0.20	0.39	0.67	0.64	0.89	0.34	1.15	0.70
Rye	0.33	0.16	0.31	0.19	0.06	0.14	0.04	0.01	—	0.11	0.10	—	—
Rice (milled equivalent) [7]	0.13	0.24	0.12	0.16	0.12	0.13	0.34	0.31	0.18	0.15	0.43	0.55	0.20
Sugar (raw equivalent) [1,8]	17.76	7.90	8.64	8.83	8.17	10.01	10.92	8.91	7.66	7.70	9.36	8.94	10.12
Bananas	2.37	2.37	2.63	2.79	2.94	3.11	3.10	3.02	3.14	3.16	3.66	4.19	4.00
Vegetable oils and oilseeds (oil equivalent) [3]	0.31	0.15	0.31	0.39	0.34	0.36	0.41	0.64	0.49	0.41	0.53	0.56	0.56
Oilseed cake and meal	0.67	0.79	0.82	1.39	1.07	1.09	1.27	1.43	1.42	1.27	1.75	1.83	1.64
Cattle [4]	0.38	0.35	0.61	0.71	0.61	0.66	0.85	1.13	0.96	0.63	0.79	0.85	0.90
Beef and veal	0.21	0.40	0.42	0.46	0.42	0.37	0.37	0.49	0.65	0.60	0.49	0.52	0.50
Coffee (green)	1.57	1.70	1.57	1.56	1.87	1.85	1.83	1.92	2.06	1.82	1.69	1.90	1.90
Cocoa beans	0.22	0.21	0.20	0.19	0.17	0.23	0.19	0.15	0.18	0.16	0.19	0.21	0.23
Tobacco (unmanufactured)	0.07	0.08	0.08	0.08	0.08	0.09	0.12	0.13	0.14	0.17	0.14	0.13	0.13
Wool (actual weight)	0.17	0.19	0.13	0.18	0.20	0.19	0.23	0.21	0.19	0.14	0.20	0.21	0.20
Cotton (lint)	0.69	0.76	0.52	0.59	0.73	0.61	0.76	1.01	0.97	0.91	1.03	1.05	0.98
FAR EAST, excluding China (Mainland)													
Maize	0.18	0.20	0.19	0.31	0.45	0.71	0.71	0.64	0.89	1.28	0.93	1.38	1.10
Rice (milled equivalent) [7]	3.36	3.50	3.98	3.23	3.55	3.82	3.85	3.57	4.25	4.26	4.26	3.30	2.66
Sugar (raw equivalent) [1]	1.89	1.99	2.03	2.06	1.81	2.23	2.25	2.19	2.68	2.58	2.73	2.55	2.02
Pulses (dry)	0.22	0.14	0.12	0.12	0.17	0.17	0.18	0.16	0.20	0.17	0.22	0.21	0.22
Vegetable oils and oilseeds (oil equivalent) [3,9]	1.42	1.47	1.40	1.19	1.10	1.29	1.40	1.34	1.48	1.49	1.37	1.70	1.38
Oilseed cake and meal	0.59	0.51	0.46	0.60	1.00	0.90	1.01	1.32	1.55	1.64	1.48	1.44	1.38
Coffee (green)	0.04	0.10	0.11	0.08	0.08	0.09	0.16	0.13	0.18	0.11	0.15	0.14	0.13
Tea	0.40	0.47	0.44	0.49	0.45	0.45	0.46	0.48	0.48	0.47	0.48	0.43	0.47
Pepper and pimento	0.07	0.10	0.09	0.09	0.11	0.08	0.10	0.11	0.11	0.10	0.09	0.07	0.09
Cotton (lint)	0.28	0.23	0.17	0.18	0.12	0.14	0.10	0.15	2.23	2.23	0.18	0.12	0.19
Jute and kenaf	0.99	0.87	0.81	0.94	0.89	0.83	0.75	0.99	0.89	1.00	1.12	1.19	1.08
Rubber (natural) [10]	1.92	1.82	1.83	1.83	2.12	1.85	2.06	2.15	2.12	2.07	2.16	2.05	2.26
NEAR EAST													
Wheat and wheat flour (wheat equivalent)	0.33	0.42	0.44	0.27	0.44	0.08	0.06	0.30	0.23	0.26	0.08	0.10	0.08
Barley	0.46	0.78	0.53	0.58	0.26	0.02	0.16	0.76	0.54	0.29	0.47	0.19	0.04
Rice (milled equivalent) [7]	0.23	0.23	0.30	0.39	0.05	0.31	0.23	0.14	0.38	0.53	0.34	0.35	0.40
Potatoes	0.09	0.12	0.12	0.10	0.18	0.24	0.15	0.26	0.21	0.20	0.19	0.24	0.24
Pulses (dry)	0.14	0.21	0.14	0.09	0.10	0.08	0.09	0.18	0.18	0.20	0.31	0.14	0.14
Citrus fruit [2]	0.30	0.35	0.37	0.39	0.46	0.51	0.40	0.48	0.62	0.55	0.69	0.68	0.76
Dates	0.29	0.30	0.27	0.27	0.31	0.29	0.22	0.26	0.37	0.31	0.30	0.32	0.33
Oilseed cake and meal	0.22	0.29	0.24	0.31	0.31	0.29	0.35	0.42	0.49	0.54	0.65	0.68	0.65
Sheep, lambs and goats [4]	1.18	0.95	0.23	0.47	0.69	0.71	0.90	1.32	1.25	1.15	1.43	1.26	1.30
Cotton (lint)	0.57	0.51	0.55	0.54	0.76	0.72	0.66	0.70	0.84	0.80	0.82	0.99	0.95

ANNEX TABLE 9B. – VOLUME OF REGIONAL EXPORTS OF MAJOR AGRICULTURAL COMMODITIES (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
AFRICA													
Wheat and wheat flour (wheat equivalent) [11]	0.63	0.36	0.30	0.38	0.28	0.36	0.13	0.19	0.20	0.17	0.14	0.19	0.12
Barley	0.46	0.48	0.10	0.25	0.25	0.16	0.04	0.01	0.19	0.14	0.02	0.07	0.05
Maize	1.02	1.31	1.39	1.56	0.83	0.87	1.54	2.69	2.85	1.61	0.62	0.27	1.10
Sugar (raw equivalent) [1]	1.04	1.08	1.15	1.18	1.12	0.99	1.20	1.46	1.65	1.67	1.57	1.87	1.93
Bananas	0.37	0.35	0.40	0.39	0.37	0.38	0.43	0.43	0.46	0.45	0.46	0.43	0.40
Citrus fruit [2]	0.68	0.58	0.79	0.71	0.75	0.88	0.83	0.90	0.89	0.99	0.87	0.87	1.02
Pulses (dry)	0.25	0.24	0.15	0.17	0.21	0.29	0.23	0.27	0.31	0.29	0.31	0.22	0.22
Groundnuts and oil (oil equivalent)	0.37	0.46	0.43	0.52	0.50	0.44	0.54	0.55	0.57	0.59	0.59	0.65	0.60
Palm kernels and oil (oil equivalent)	0.36	0.38	0.35	0.39	0.38	0.36	0.35	0.32	0.32	0.33	0.31	0.33	0.24
Palm oil	0.37	0.38	0.36	0.37	0.40	0.39	0.36	0.31	0.31	0.30	0.26	0.26	0.15
Oilseed cake and meal	0.36	0.41	0.42	0.50	0.55	0.56	0.62	0.60	0.53	0.67	0.65	0.74	0.75
Cattle [4]	0.29	0.22	0.19	0.21	0.18	0.25	0.25	0.37	0.39	0.40	0.33	0.33	0.33
Sheep, lambs and goats [4]	0.66	0.67	0.73	0.79	1.02	0.86	1.11	1.42	1.30	1.62	1.47	1.30	1.30
Coffee (green)	0.44	0.52	0.53	0.54	0.59	0.66	0.67	0.74	0.77	0.82	0.82	0.89	0.93
Cocoa beans	0.48	0.52	0.57	0.44	0.56	0.65	0.80	0.85	0.82	0.84	1.07	0.88	0.87
Wine	1.90	1.53	1.90	1.52	1.63	1.76	1.62	1.76	1.06	1.27	1.07	1.18	1.20
Tobacco (unmanufactured)	0.08	0.09	0.08	0.08	0.09	0.11	0.11	0.12	0.12	0.13	0.17	0.08	0.08
Cotton (lint)	0.24	0.26	0.24	0.27	0.29	0.27	0.27	0.20	0.28	0.27	0.27	0.33	0.33
Sisal	0.29	0.30	0.32	0.34	0.36	0.37	0.36	0.40	0.40	0.39	0.38	0.37	0.34
Rubber (natural)	0.10	0.12	0.12	0.13	0.14	0.15	0.14	0.15	0.15	0.15	0.15	0.17	0.16

[1] Including refined sugar converted at 108.7 percent. – [2] Oranges, mandarines and lemons. – [3] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, castor beans, cottonseed, olive oil, groundnut oil, coconut oil, palm kernel oil, soybean oil, sunflowerseed oil, castor oil, cottonseed oil. – [4] Million head. – [5] Beef and veal, mutton and lamb, pork, and poultry meat. – [6] U.S.S.R. only. – [7] Including paddy converted at 65 percent. – [8] Excluding trade between the United States and its territories. – [9] Excluding re-export of copra from Malaysia, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaysia. – [10] Excluding imports into Malaysia for re-export and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaysia. – [11] Including coarse ground flour.

ANNEX TABLE 9C. – VOLUME OF REGIONAL IMPORTS OF MAJOR AGRICULTURAL COMMODITIES

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
WESTERN EUROPE													
Wheat and wheat flour (wheat equivalent)	13.33	15.89	14.16	12.35	12.89	11.17	15.13	13.32	12.05	10.56	12.69	12.42	10.50
Barley	3.57	5.06	4.61	4.69	4.77	4.27	4.19	4.72	3.63	4.51	4.84	5.02	5.00
Maize	4.51	5.02	4.78	6.32	7.66	8.93	9.43	12.91	13.87	14.48	16.95	18.69	17.90
Oats [1]	0.70	1.11	0.98	1.32	1.41	1.24	0.86	1.31	1.08	0.96	1.30	1.27	1.05
Rye	0.92	0.76	0.77	0.56	0.59	0.76	0.75	1.02	0.74	0.46	0.36	0.41	0.40
Millet and sorghums	1.32	1.65	0.68	1.88	2.72	2.51	1.77	2.88	2.03	2.18	2.74	3.14	2.22
Rice (milled equivalent) [1]	0.44	0.54	0.48	0.51	0.60	0.59	0.51	0.53	0.52	0.54	0.55	0.60	0.48
Sugar (raw equivalent) [2]	4.07	4.40	5.38	4.86	4.62	4.62	3.99	4.22	5.32	4.97	4.54	4.97	4.74
Potatoes	1.49	1.50	1.05	1.81	1.86	1.41	1.48	1.97	1.72	1.54	2.35	1.99	2.03
Pulses (dry)	0.48	0.56	0.47	0.50	0.62	0.61	0.45	0.61	0.68	0.66	1.03	1.00	0.83
Apples	0.71	0.66	0.94	0.68	0.99	0.95	1.11	1.23	0.96	1.13	1.36	1.28	1.25
Bananas	1.18	1.31	1.44	1.59	1.63	1.68	1.85	1.90	1.93	1.97	2.35	2.48	2.49
Citrus fruit [3]	2.30	1.96	2.22	2.36	2.55	2.76	2.71	2.98	2.71	3.31	3.22	3.32	3.16
Grapes (fresh)	0.21	0.28	0.24	0.33	0.30	0.32	0.37	0.43	0.37	0.44	0.50	0.48	0.49
Vegetable oils and oilseeds (oil equivalent) [4]	3.27	3.49	3.66	3.33	3.47	3.81	3.64	3.61	3.87	3.82	3.91	4.10	4.11
Oilseed cake and meal	2.86	3.14	2.95	3.69	4.42	4.44	4.60	5.57	5.90	6.16	7.00	7.99	7.48
Cattle [5]	1.17	1.33	1.60	1.41	1.32	1.49	1.83	1.49	2.02	1.94	2.03	2.03	2.54
Sheep, lambs and goats [5]	0.49	0.62	0.78	0.68	0.87	1.10	0.88	1.35	1.32	1.37	1.93	1.78	1.71
Pigs [5]	0.80	0.65	0.40	0.76	1.16	1.29	1.04	0.96	0.74	0.91	1.24	1.22	1.13
Meat (fresh, chilled and frozen) [6]	0.99	1.20	1.25	1.21	1.23	1.36	1.27	1.44	1.73	1.81	1.88	1.83	2.02
Butter	0.39	0.44	0.45	0.46	0.47	0.48	0.47	0.49	0.51	0.56	0.52	0.52	0.54
Cheese	0.28	0.30	0.31	0.33	0.34	0.34	0.36	0.39	0.42	0.43	0.46	0.47	0.50
Coffee (green)	0.67	0.74	0.75	0.79	0.87	0.93	0.99	1.04	1.12	1.19	1.18	1.24	1.29
Cocoa beans	0.40	0.39	0.45	0.39	0.43	0.47	0.52	0.54	0.53	0.51	0.56	0.57	0.57
Tea	0.26	0.27	0.31	0.30	0.27	0.28	0.29	0.29	0.30	0.29	0.30	0.28	0.32
Wine	2.40	2.13	2.53	2.64	2.18	2.45	2.39	2.55	1.95	2.10	1.90	2.16	1.61
Tobacco (unmanufactured)	0.41	0.40	0.41	0.41	0.40	0.47	0.48	0.52	0.52	0.54	0.53	0.52	0.57
Wool (actual weight)	0.80	0.85	0.89	0.77	0.89	0.83	0.86	0.88	0.86	0.81	0.80	0.79	0.73
Cotton (lint)	1.41	1.51	1.72	1.43	1.44	1.70	1.59	1.46	1.47	1.54	1.39	1.57	1.46
Sisal	0.25	0.28	0.30	0.32	0.34	0.36	0.36	0.39	0.39	0.37	0.37	0.39	0.33
Rubber (natural)	0.76	0.64	0.71	0.62	0.64	0.64	0.64	0.66	0.70	0.74	0.68	0.76	0.75
EASTERN EUROPE AND U.S.S.R.													
Wheat and wheat flour (wheat equivalent)	3.12	3.18	5.13	3.66	5.09	5.57	5.46	4.18	7.80	14.66	10.70	12.27	...
Barley	0.80	0.77	1.10	0.61	0.49	0.43	0.69	0.67	0.89	1.17	1.93	0.44	...
Maize	0.72	0.54	0.15	0.69	0.39	0.64	0.61	1.32	0.96	1.20	1.25	0.92	...
Rye	0.77	0.84	0.40	0.49	0.39	0.54	0.76	1.67	0.62	0.55	0.06	0.18	...
Rice (milled equivalent) [1]	0.66	0.81	0.62	0.76	1.10	0.93	0.24	0.55	0.50	0.63	0.49	0.59	...
Sugar (raw equivalent) [2]	1.23	0.42	0.76	0.49	0.46	2.03	4.22	3.41	1.91	2.34	2.97	2.39	...
Citrus fruit [3]	0.16	0.15	0.20	0.25	0.26	0.23	0.24	0.26	0.27	0.35	0.39	0.40	...
Vegetable oils and oilseeds (oil equivalent) [4]	0.31	0.30	0.34	0.29	0.35	0.36	0.36	0.34	0.36	0.42	0.37	0.40	...
Sheep, lambs and goats [5]	2.31	2.23	1.52	1.66	1.58	1.74	1.76	1.38	1.25	1.14	1.41	1.93	...
Meat (fresh, chilled and frozen) [6]	0.27	0.23	0.16	0.22	0.25	0.21	0.17	0.26	0.22	0.25	0.34	0.29	...
Coffee (green)	0.01	0.02	0.03	0.03	0.06	0.06	0.08	0.07	0.09	0.10	0.11	0.11	...
Cocoa beans	0.03	0.04	0.07	0.04	0.08	0.10	0.07	0.10	0.11	0.13	0.16	0.12	...
Wine	0.08	0.08	0.11	0.13	0.12	0.18	0.19	0.18	0.22	0.25	0.24	0.30	...
Tobacco (unmanufactured)	0.11	0.13	0.15	0.14	0.16	0.13	0.12	0.13	0.16	0.20	0.17	0.13	...
Cotton (lint)	0.37	0.40	0.50	0.54	0.62	0.67	0.66	0.66	0.71	0.68	0.71	0.74	...
Rubber (natural)	0.09	0.20	0.21	0.34	0.35	0.34	0.52	0.49	0.45	0.35	0.43	0.48	...
NORTH AMERICA													
Maize	0.13	0.24	0.28	0.38	0.34	0.41	0.61	0.92	0.61	0.55	0.49	0.54	0.76
Sugar (raw equivalent) [2,7]	4.22	4.46	4.43	5.01	4.86	4.93	4.55	4.98	4.84	4.06	4.34	4.64	5.16
Bananas	1.58	1.67	1.70	1.76	1.91	2.02	1.94	1.72	1.73	1.71	1.75	1.89	1.91
Citrus fruit [3]	0.21	0.21	0.21	0.20	0.24	0.22	0.20	0.20	0.22	0.25	0.23	0.23	0.24
Vegetable oils and oilseeds (oil equivalent) [4]	0.54	0.52	0.52	0.53	0.57	0.58	0.59	0.62	0.58	0.62	0.64	0.71	0.72
Cattle [5]	0.32	0.16	0.73	1.16	0.74	0.67	1.05	1.25	0.86	0.58	1.13	1.11	0.78
Meat (fresh, chilled and frozen) [6]	0.05	0.05	0.09	0.22	0.31	0.27	0.35	0.49	0.58	0.41	0.35	0.44	0.48
Coffee (green)	1.23	1.33	1.30	1.26	1.45	1.38	1.41	1.54	1.51	1.44	1.35	1.39	1.36

ANNEX TABLE 9C. – VOLUME OF REGIONAL IMPORTS OF MAJOR AGRICULTURAL COMMODITIES (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Million metric tons												
Cocoa beans	0.24	0.27	0.25	0.21	0.23	0.27	0.37	0.31	0.30	0.29	0.38	0.34	0.30
Wool (actual weight)	0.17	0.17	0.13	0.12	0.19	0.15	0.16	0.17	0.17	0.11	0.13	0.13	0.09
Rubber (natural)	0.70	0.64	0.61	0.52	0.63	0.45	0.43	0.47	0.42	0.50	0.50	0.49	0.51
OCEANIA													
Wheat and wheat flour (wheat equivalent)	0.28	0.32	0.34	0.32	0.27	0.22	0.23	0.26	0.26	0.27	0.24	0.21	0.16
Sugar (raw equivalent) [2]	0.13	0.11	0.11	0.15	0.12	0.13	0.16	0.14	0.15	0.13	0.16	0.16	0.17
Rubber (natural)	0.06	0.05	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.06	0.05	0.05
LATIN AMERICA													
Wheat and wheat flour (wheat equivalent)	3.79	3.31	3.25	3.40	3.95	4.20	4.24	4.89	5.12	5.84	5.53	6.61	6.89
Maize	0.08	0.20	0.86	0.96	0.16	0.21	0.22	0.38	0.65	0.66	0.36	0.35	0.40
Rice (milled equivalent) [1]	0.22	0.22	0.32	0.40	0.34	0.35	0.35	0.32	0.34	0.49	0.55	0.40	0.40
Sugar (raw equivalent) [2]	0.47	0.28	0.49	0.37	0.39	0.24	0.50	0.24	0.28	0.22	0.31	0.31	0.35
Bananas	0.20	0.14	0.21	0.27	0.25	0.27	0.27	0.24	0.24	0.24	0.24	0.26	0.20
Pulses (dry)	0.11	0.13	0.13	0.17	0.17	0.14	0.17	0.13	0.11	0.14	0.14	0.18	0.15
Cattle [5]	0.17	0.20	0.26	0.24	0.21	0.30	0.35	0.40	0.43	0.29	0.26	0.30	0.35
Sheep, lambs and goats [5]	0.13	0.14	0.04	0.05	0.05	0.08	0.09	0.11	0.29	0.14	0.07	0.09	0.09
Milk (condensed, evaporated and powdered)	0.15	0.14	0.15	0.15	0.17	0.14	0.18	0.20	0.22	0.22	0.22	0.21	0.22
Rubber (natural)	0.10	0.07	0.09	0.10	0.08	0.09	0.09	0.07	0.07	0.07	0.08	0.08	0.08
FAR EAST, EXCLUDING CHINA (MAINLAND)													
Wheat and wheat flour (wheat equivalent)	4.41	5.49	7.55	7.85	8.45	10.31	8.86	8.53	11.48	13.32	14.48	14.89	14.86
Barley	0.60	1.20	1.12	1.07	0.50	0.02	0.18	0.11	0.39	0.68	0.75	0.46	0.62
Maize	0.44	0.49	0.68	0.82	1.15	1.65	2.20	2.78	3.10	3.55	3.82	3.95	4.40
Millet and sorghums	0.11	0.05	0.01	0.09	0.07	0.07	0.17	0.43	0.79	1.06	1.59	3.87	4.50
Rice (milled equivalent) [1]	3.10	4.03	4.05	3.85	3.17	3.90	3.75	3.51	4.15	4.43	4.87	4.15	3.77
Sugar (raw equivalent) [2]	2.24	2.07	1.91	2.08	1.91	2.08	2.31	2.48	2.35	2.43	2.77	2.91	3.02
Dates	0.10	0.11	0.12	0.07	0.07	0.08	0.08	0.04	0.08	0.04	0.09	0.08	0.07
Vegetable oils and oilseeds (oil equivalent) [4]	0.55	0.52	0.60	0.54	0.61	0.66	0.67	0.76	0.82	0.91	0.81	0.84	0.92
Milk (condensed, evaporated and powdered)	0.33	0.38	0.42	0.36	0.36	0.38	0.42	0.45	0.51	0.49	0.47	0.43	0.50
Wool (actual weight)	0.09	0.13	0.13	0.13	0.18	0.19	0.26	0.22	0.25	0.24	0.26	0.30	0.27
Cotton (lint)	0.66	0.86	0.89	0.75	0.90	1.15	1.26	1.05	1.14	1.15	1.18	1.17	1.30
Jute and kenaf	0.29	0.23	0.17	0.14	0.12	0.21	0.16	0.18	0.15	0.16	0.23	0.19	0.20
Rubber (natural) [8]	0.12	0.15	0.19	0.18	0.22	0.24	0.25	0.27	0.26	0.29	0.28	0.30	0.29
NEAR EAST													
Wheat and wheat flour (wheat equivalent)	1.25	2.19	2.51	2.29	2.90	3.99	4.24	3.76	4.43	3.54	4.09	4.55	3.75
Maize	—	0.13	0.16	0.12	0.23	0.21	0.31	0.48	0.44	0.68	0.38	0.47	0.40
Rice (milled equivalent) [1]	0.17	0.23	0.26	0.19	0.35	0.35	0.41	0.33	0.27	0.34	0.28	0.29	0.29
Sugar (raw equivalent) [2]	0.86	0.94	0.93	1.05	1.13	1.16	1.51	1.12	0.92	1.31	1.67	1.33	1.23
Dates	0.11	0.10	0.08	0.11	0.06	0.05	0.05	0.05	0.06	0.06	0.04	0.02	0.03
Vegetable oils and oilseeds (oil equivalent) [4]	0.07	0.08	0.11	0.13	0.17	0.17	0.14	0.29	0.31	0.31	0.25	0.23	0.23
Sheep, lambs and goats [5]	1.63	1.63	0.94	1.13	1.62	1.23	1.53	2.47	2.17	2.40	2.20	2.55	2.50
AFRICA													
Wheat and wheat flour (wheat equivalent)	0.78	0.99	0.94	0.79	1.66	1.75	2.02	1.96	1.69	1.62	1.79	2.81	3.01
Barley	0.04	0.07	0.02	0.01	0.01	0.01	0.38	0.23	0.10	0.11	0.13	0.09	0.15
Rice (milled equivalent) [1]	0.36	0.35	0.46	0.38	0.53	0.50	0.52	0.61	0.55	0.68	0.75	0.75	0.75
Sugar (raw equivalent) [2]	0.94	0.95	1.00	1.01	1.08	1.12	1.11	1.22	1.02	1.05	1.23	1.20	1.21
Potatoes	0.23	0.26	0.27	0.29	0.26	0.32	0.35	0.24	0.18	0.19	0.16	0.15	0.16
Cattle [5]	0.22	0.21	0.21	0.22	0.23	0.27	0.29	0.27	0.29	0.24	0.11	0.11	0.11
Sheep, lambs and goats [5]	0.27	0.32	0.28	0.25	0.33	0.38	0.25	0.26	0.22	0.19	0.20	0.21	0.20
Wine	0.28	0.33	0.25	0.20	0.22	0.26	0.30	0.24	0.22	0.24	0.26	0.26	0.26

[1] Including paddy converted at 65 percent. – [2] Including refined sugar converted at 108.7 percent. – [3] Oranges, mandarines and lemons. – [4] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, castor beans, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm kernel oil, soybean oil, sunflowerseed oil, castor oil, cottonseed oil. – [5] Million head. – [6] Beef and veal, mutton and lamb, pork, poultry meat. – [7] Excluding trade between the United States and its territories. – [8] Excluding imports into Malaysia for re-export.

ANNEX TABLE 10. – VOLUME OF WORLD [1] AND REGIONAL EXPORTS OF FISHERY PRODUCTS [2]

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
	Thousand metric tons											
WORLD												
Fresh, chilled or frozen fish	813.0	823.0	867.0	955.0	1 065.0	1 137.3	1 143.0	1 332.0	1 475.0	1 606.8	1 721.0	1 795.8
Dried, salted or smoked fish	653.0	673.1	631.0	608.0	578.0	559.4	547.3	547.0	535.0	503.0	506.0	502.0
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	175.0	180.7	168.0	182.2	208.8	215.0	233.9	249.3	250.0	294.0	293.0	297.0
Fish products and preparations, whether or not in airtight containers	386.2	427.4	425.2	473.2	512.2	504.1	523.2	541.1	505.1	583.1	525.1	569.2
Crustacean and mollusk products and preparations, whether or not in airtight containers	34.7	39.9	37.4	38.5	46.5	44.1	44.2	48.6	51.9	57.5	60.5	64.1
Oils and fats, crude or refined, of aquatic animal origin	315.2	334.1	442.4	476.0	544.0	593.3	619.8	668.0	742.8	633.3	717.0	691.4
Meals, solubles and similar animal feedstuffs of aquatic animal origin	460.1	528.6	571.2	673.2	829.0	1 027.0	1 358.0	1 721.0	1 783.4	2 434.0	2 443.2	2 458.0
WESTERN EUROPE												
Fresh, chilled or frozen fish	509.2	507.0	528.8	591.5	645.5	691.4	681.1	767.3	847.1	877.0	904.7	880.5
Dried, salted or smoked fish	431.0	466.0	417.0	391.0	345.2	328.8	331.3	350.5	330.6	314.7	324.3	318.4
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	83.9	85.6	73.9	83.6	101.8	95.7	98.8	104.7	95.4	118.9	107.9	112.8
Fish products and preparations, whether or not in airtight containers	164.5	166.5	166.7	177.6	197.0	191.0	207.7	211.7	196.7	209.1	221.4	213.3
Crustacean and mollusk products and preparations, whether or not in airtight containers	3.9	5.0	5.0	6.0	7.0	6.0	8.0	9.0	9.0	13.0	13.0	12.0
Oils and fats, crude or refined, of aquatic animal origin	109.8	104.8	216.8	213.7	228.4	213.7	208.8	243.8	199.8	190.0	265.9	347.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	231.0	284.0	253.0	266.0	252.8	235.0	286.0	240.3	306.7	434.8	555.0	583.8
EASTERN EUROPE AND U.S.S.R.												
Fresh, chilled or frozen fish	0.8	1.0	1.2	2.5	5.5	9.9	17.9	33.7	80.9	89.0	177.7	229.3
Dried, salted or smoked fish	—	1.2	1.0	13.0	34.8	45.3	31.7	40.5	44.4	35.3	31.7	26.6
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	0.1	0.1	0.1	0.4	0.2	0.3	0.2	0.3	0.6	1.1	1.1	1.2
Fish products and preparations, whether or not in airtight containers	6.5	7.5	9.3	9.4	18.0	22.0	25.3	24.3	19.3	18.9	19.6	22.7
Crustacean and mollusk products and preparations, whether or not in airtight containers	4.6	5.7	3.8	4.1	4.1	3.7	3.7	3.0	5.0	5.3	4.9	4.8
Oils and fats, crude or refined, of aquatic animal origin	5.4	6.3	4.6	5.3	8.6	35.3	18.2	15.2	32.2	40.0	57.1	71.9
Meals, solubles and similar animal feedstuffs of aquatic animal origin	3.1	3.6	3.2	3.8	7.2	4.0	4.9	3.7	3.8	4.2	7.2	14.2
NORTH AMERICA												
Fresh, chilled or frozen fish	128.5	142.0	148.7	147.6	139.6	147.3	142.5	157.3	159.1	197.2	216.4	240.0
Dried, salted or smoked fish	77.7	67.0	81.0	74.3	70.7	68.3	65.3	59.9	70.0	61.4	54.3	53.6
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	15.6	14.5	15.0	13.9	14.4	16.4	19.0	18.9	22.8	24.5	25.6	23.7
Fish products and preparations, whether or not in airtight containers	58.0	48.9	40.4	49.4	46.0	30.0	24.2	26.4	31.2	42.8	36.0	37.0
Crustacean and mollusk products and preparations, whether or not in airtight containers	8.9	9.5	8.4	4.6	6.5	6.3	4.5	6.6	7.2	7.7	10.4	10.6
Oils and fats, crude or refined, of aquatic animal origin	77.0	76.0	57.3	52.0	82.7	80.9	61.2	61.7	129.8	87.6	58.7	41.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	42.0	54.0	48.6	29.7	46.3	34.0	38.8	46.2	54.3	60.9	57.5	52.7

ANNEX TABLE 10. – VOLUME OF WORLD [1] AND REGIONAL EXPORTS OF FISHERY PRODUCTS [2] (*continued*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
	Thousand metric tons											
OCEANIA												
Fresh, chilled or frozen fish	3.0	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	4.0	8.0	11.0
Dried, salted or smoked fish	—	—	—	—	—	—	—	—	—	—	—	—
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	4.0	4.0	4.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	8.0	8.0
Fish products and preparations, whether or not in airtight containers	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Crustacean and mollusk products and preparations, whether or not in airtight containers	—	—	0.1	—	—	—	—	—	—	—	0.4	1.3
Oils and fats, crude or refined, of aquatic animal origin	17.0	14.0	16.0	19.0	15.0	17.0	11.0	8.0	4.0	5.3	9.0	5.4
Meals, solubles and similar animal feedstuffs of aquatic animal origin	—	—	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	—	—
LATIN AMERICA												
Fresh, chilled or frozen fish	16.5	18.0	15.3	23.4	41.4	28.7	30.5	33.7	35.9	23.3	30.6	32.0
Dried, salted or smoked fish	0.3	0.1	—	—	0.3	—	—	1.1	—	1.6	1.6	0.4
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	28.4	34.5	33.0	39.1	43.6	51.6	59.0	62.1	62.2	64.5	64.4	65.3
Fish products and preparations, whether or not in airtight containers	17.0	19.1	20.6	14.6	18.0	17.0	22.8	20.6	17.8	18.2	14.0	14.0
Crustacean and mollusk products and preparations, whether or not in airtight containers	3.2	2.6	2.7	2.6	3.6	4.1	3.9	4.0	4.7	3.5	5.0	4.6
Oils and fats, crude or refined, of aquatic animal origin	27.0	42.0	33.7	45.0	49.3	79.1	140.8	161.3	154.2	137.4	170.3	123.9
Meals, solubles and similar animal feedstuffs of aquatic animal origin	60.0	53.0	94.4	158.7	323.7	554.0	774.3	1 142.8	1 138.7	1 590.1	1 500.5	1 513.3
FAR EAST [1]												
Fresh, chilled or frozen fish	119.6	108.7	121.7	155.0	195.8	212.4	223.7	277.4	292.2	375.1	333.1	351.2
Dried, salted or smoked fish	87.0	78.3	70.3	70.2	68.9	57.7	55.4	46.3	42.6	39.4	35.8	43.0
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	37.9	36.6	35.7	36.0	37.1	38.0	41.5	44.6	50.5	66.0	72.4	74.9
Fish products and preparations, whether or not in airtight containers	65.4	108.8	106.6	133.7	138.7	125.9	110.9	138.7	139.6	156.7	146.7	174.6
Crustacean and mollusk products and preparations, whether or not in airtight containers	11.0	15.0	16.0	20.0	24.0	22.0	23.0	25.0	25.0	27.0	26.0	29.4
Oils and fats, crude or refined, of aquatic animal origin	55.5	78.9	75.3	110.0	106.0	107.9	114.9	113.9	172.9	107.8	97.7	55.9
Meals, solubles and similar animal feedstuffs of aquatic animal origin	7.0	19.0	7.0	26.0	31.0	12.0	13.0	30.0	16.0	21.0	33.0	36.0
NEAR EAST												
Fresh, chilled or frozen fish	15.9	25.8	25.6	10.4	7.6	13.1	10.7	8.9	9.5	10.9	14.8	13.5
Dried, salted or smoked fish	13.0	11.7	7.9	5.5	5.3	8.2	7.7	4.7	6.2	7.4	8.4	9.1
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	0.2	0.6	0.5	0.4	0.9	1.3	2.8	5.1	4.0	3.5	3.5	2.8
Fish products and preparations, whether or not in airtight containers	1.3	0.9	1.2	2.3	1.1	0.6	0.6	0.6	0.6	0.3	0.4	0.4
Crustacean and mollusk products and preparations, whether or not in airtight containers	0.5	0.5	0.3	0.5	0.8	1.1	0.9	—	—	—	—	0.4
Oils and fats, crude or refined, of aquatic animal origin	0.5	0.1	0.7	—	—	0.1	0.1	0.1	0.1	0.3	0.3	0.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	—	—	—	—	—	—	—	—	—	—	—	—

ANNEX TABLE 10. – VOLUME OF WORLD [1] AND REGIONAL EXPORTS OF FISHERY PRODUCTS [2] (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
	Thousand metric tons											
AFRICA												
Fresh, chilled or frozen fish	19.5	17.5	21.7	21.6	25.6	30.5	33.6	50.7	47.3	30.4	35.4	38.4
Dried, salted or smoked fish	44.0	49.0	53.8	54.0	52.8	51.1	55.9	44.0	41.2	43.2	49.8	50.9
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	4.9	4.8	5.8	4.8	6.8	6.7	7.6	7.6	8.5	8.5	10.1	8.3
Fish products and preparations, whether or not in airtight containers	73.3	75.5	80.2	86.0	93.2	117.5	131.6	118.7	99.8	137.0	86.9	107.0
Crustacean and mollusk products and preparations, whether or not in airtight containers	2.5	1.5	1.1	0.7	0.5	0.9	0.2	1.0	1.0	1.0	1.0	1.0
Oils and fats, crude or refined, of aquatic animal origin	23.0	12.0	38.0	31.0	54.4	59.3	64.8	64.0	49.8	65.1	58.0	46.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	117.0	115.0	164.0	188.0	167.0	187.0	240.0	257.0	263.0	322.0	290.0	258.0

[1] Excluding China (Mainland). – [2] Data for 1967 not yet available.

ANNEX TABLE 11. – VOLUME OF WORLD [1] AND REGIONAL TRADE IN FOREST PRODUCTS

	Unit	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
		Million units												
Exports														
WORLD														
Pulpwood	m^3	10.9	10.6	10.3	8.5	9.0	10.8	13.1	12.4	11.7	13.2	13.8	14.1	14.9
Coniferous logs	"	1.8	1.8	2.1	2.8	3.3	4.2	5.9	6.4	8.7	9.9	11.6	13.5	16.9
Broadleaved logs	"	7.0	7.7	8.4	9.4	11.9	13.3	14.0	14.2	17.4	19.3	20.7	24.1	25.0
Sawn softwood	"	32.0	28.1	30.4	29.7	32.3	36.3	36.3	38.2	41.4	44.6	44.0	42.5	44.0
Sawn hardwood	"	3.7	3.4	3.5	3.5	3.9	4.5	4.2	4.3	4.4	5.4	5.7	6.0	5.9
Plywood and veneers	"	1.2	1.1	1.3	1.4	1.9	1.8	1.9	2.1	2.4	3.0	3.3	3.6	3.8
Fibreboard	t	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.1	1.2
Mechanical wood pulp	"	1.2	1.3	1.3	1.1	1.2	1.3	1.3	1.2	1.3	1.4	1.4	1.4	1.2
Chemical wood pulp	"	6.3	6.5	6.6	6.6	7.3	8.4	8.5	9.0	10.1	11.0	11.1	12.1	12.2
Newsprint	"	6.6	7.0	6.9	6.8	7.0	7.5	7.7	7.5	7.8	8.5	9.0	9.7	9.4
Other paper and paperboard	"	3.1	3.2	3.5	3.5	4.0	4.5	5.0	5.2	5.9	6.8	7.4	8.2	8.4
EUROPE														
Pulpwood	m^3	5.74	5.20	5.12	4.20	4.68	5.92	7.31	5.56	5.10	5.58	5.81	4.74	5.74
Coniferous logs	"	0.96	0.75	0.79	1.04	1.11	1.44	1.47	1.31	1.31	1.27	1.17	1.60	1.75
Broadleaved logs	"	0.77	0.68	0.68	0.60	0.79	1.04	0.98	0.93	0.92	0.98	1.02	1.11	1.19
Pitprops	"	2.99	3.01	3.11	2.60	2.09	1.84	2.05	1.53	1.25	0.89	0.65	0.61	0.41
Sawn softwood	"	15.28	13.90	14.77	13.60	15.07	17.19	16.27	16.33	16.83	17.90	16.74	16.17	16.20
Sawn hardwood	"	1.30	1.08	1.19	1.11	1.25	1.66	1.58	1.63	1.69	1.83	1.93	2.04	2.02
Plywood and veneers	"	0.60	0.49	0.56	0.51	0.65	0.76	0.73	0.76	0.85	0.97	1.03	1.05	1.10
Fibreboard	t	0.46	0.48	0.54	0.57	0.67	0.75	0.77	0.81	0.88	0.94	0.89	0.84	0.91
Particle board	"	...	...	...	0.06	0.11	0.15	0.19	0.24	0.28	0.37	0.54	0.60	0.70
Mechanical wood pulp	"	0.99	1.06	1.02	0.88	0.93	1.10	1.06	0.97	1.05	1.15	1.12	1.13	1.01
Chemical wood pulp	"	3.69	3.89	3.87	3.93	4.40	4.78	4.56	4.88	5.44	5.96	5.91	6.34	6.29
Newsprint	"	1.12	1.30	1.29	1.34	1.36	1.56	1.66	1.67	1.76	1.94	2.04	2.14	2.16
Other paper and paperboard	"	2.41	2.44	2.68	2.60	2.95	3.37	3.69	3.87	4.35	4.87	5.17	5.62	5.67
U.S.S.R.														
Pulpwood	m^3	0.55	0.53	0.59	0.82	1.18	1.59	2.33	3.26	3.49	4.05	4.18	5.47	5.55
Coniferous logs	"	0.12	0.24	0.65	0.99	1.14	1.50	1.83	2.45	2.63	3.22	4.57	4.83	5.10
Pitprops	"	0.84	0.64	0.82	0.99	0.89	1.11	1.00	1.20	1.40	1.39	1.50	1.24	1.10
Sawn softwood	"	2.33	2.21	3.46	3.63	4.38	4.98	5.20	6.00	6.53	7.68	8.00	7.99	8.10
Plywood	"	0.09	0.05	0.10	0.11	0.12	0.13	0.13	0.14	0.15	0.19	0.21	0.22	0.23
Chemical wood pulp	t	0.14	0.15	0.15	0.22	0.20	0.24	0.27	0.27	0.25	0.26	0.26	0.30	0.30
NORTH AMERICA														
Pulpwood	m^3	4.58	4.89	4.51	3.29	2.91	3.12	3.17	3.20	2.88	3.14	3.44	3.52	3.20
Coniferous logs	"	0.71	0.70	0.54	0.60	0.79	1.00	2.28	2.24	4.33	4.85	5.25	6.42	9.30
Broadleaved logs	"	0.22	0.26	0.25	0.27	0.24	0.34	0.31	0.40	0.41	0.38	0.45	0.43	0.55
Sawn softwood	"	12.60	10.81	10.22	10.76	11.38	12.55	13.28	14.50	16.68	17.36	17.43	16.51	17.80
Sawn hardwood	"	0.63	0.61	0.57	0.53	0.64	0.62	0.55	0.60	0.59	0.69	0.74	0.91	0.84
Plywood and veneers	"	0.17	0.16	0.13	0.13	0.22	0.19	0.21	0.29	0.31	0.45	0.47	0.52	0.60
Mechanical wood pulp	t	0.24	0.26	0.23	0.21	0.22	0.22	0.22	0.24	0.23	0.26	0.29	0.24	0.22
Chemical wood pulp	"	2.48	2.37	2.41	2.27	2.59	3.18	3.45	3.60	4.09	4.47	4.47	4.87	5.05
Newsprint	"	5.42	5.55	5.51	5.27	5.47	5.74	5.84	5.68	5.74	6.29	6.60	7.19	6.85
Other paper and paperboard	"	0.58	0.59	0.68	0.70	0.78	0.89	0.99	1.05	1.22	1.57	1.76	2.01	2.03
OCEANIA														
Coniferous logs	m^3	—	—	—	0.04	0.15	0.14	0.27	0.29	0.29	0.36	0.45	0.55	0.65
LATIN AMERICA														
Pulpwood	m^3	—	—	0.05	0.18	0.24	0.18	0.24	0.34	0.24	0.41	0.34	0.36	0.35
Broadleaved logs	"	0.40	0.48	0.37	0.39	0.28	0.31	0.35	0.31	0.28	0.42	0.55	0.58	0.59
Sawn softwood	"	1.60	0.99	1.75	1.44	1.22	1.26	1.37	1.06	1.05	1.39	1.49	1.51	1.53

ANNEX TABLE 11. – VOLUME OF WORLD [1] AND REGIONAL TRADE IN FOREST PRODUCTS (*continued*)

	Unit	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
		Million units												
FAR EAST [1]														
Broadleaved logs	m^3	2.95	3.57	3.99	4.66	6.54	6.92	7.81	8.31	10.83	11.69	13.21	16.62	17.37
Sawn hardwood	"	1.05	1.08	1.04	1.05	1.13	1.40	1.24	1.20	1.29	1.84	1.99	1.98	2.00
Plywood	"	0.25	0.30	0.37	0.49	0.69	0.53	0.59	0.67	0.83	1.08	1.24	1.47	1.56
All other paper and paperboard	t	0.12	0.15	0.14	0.13	0.14	0.20	0.28	0.24	0.25	0.26	0.29	0.43	0.45
AFRICA														
Broadleaved logs	m^3	2.54	2.64	3.00	3.38	3.92	4.60	4.44	4.13	4.79	5.64	5.24	5.08	5.00
Sawn hardwood	"	0.38	0.42	0.47	0.57	0.58	0.61	0.58	0.60	0.57	0.70	0.73	0.74	0.74
Imports														
EUROPE														
Pulpwood	m^3	6.21	6.03	5.59	5.10	5.59	7.50	9.61	8.82	8.07	10.00	11.02	9.89	10.60
Coniferous logs	"	1.36	1.23	1.39	1.55	1.78	2.39	2.62	2.68	2.79	2.71	2.76	3.09	3.25
Broadleaved logs	"	3.27	3.26	3.67	3.91	4.66	5.93	5.95	5.70	6.26	6.96	6.41	6.58	6.57
Pitprops	"	3.88	3.57	3.66	3.23	2.53	2.47	2.39	2.15	1.83	1.88	1.74	1.44	1.01
Sawn softwood	"	17.42	15.23	17.56	16.48	18.39	21.79	21.46	22.38	23.89	26.65	26.23	24.41	24.75
Sawn hardwood	"	1.75	1.58	1.72	1.69	1.77	2.17	2.14	2.04	2.31	2.60	2.76	2.84	2.80
Plywood and veneers	"	0.69	0.54	0.68	0.68	0.78	1.01	0.97	1.04	1.15	1.39	1.46	1.47	1.75
Fibreboard	t	0.33	0.35	0.42	0.42	0.48	0.55	0.57	0.63	0.69	0.77	0.73	0.73	0.85
Mechanical wood pulp	"	1.03	1.06	1.02	0.92	0.95	1.12	1.06	0.97	1.04	1.16	1.21	1.16	1.01
Chemical wood pulp	"	3.66	3.71	3.92	3.93	4.29	5.21	5.18	5.28	6.14	6.65	6.45	6.96	7.15
Newsprint	"	0.92	1.01	1.13	1.18	1.15	1.37	1.48	1.55	1.61	1.75	1.77	1.90	1.84
Other paper and paperboard	"	1.62	1.58	1.85	1.92	2.22	2.75	3.12	3.39	3.87	4.49	4.93	5.40	5.38
U.S.S.R.														
Sawn softwood	m^3	0.61	0.49	0.42	0.34	0.27	0.21	0.21	0.16	0.11	0.02	—	—	—
Sawn hardwood	"	0.08	0.15	0.17	0.18	0.22	0.24	0.27	0.27	0.24	0.31	0.27	0.27	0.28
NORTH AMERICA														
Pulpwood	m^3	4.08	4.42	4.18	3.31	3.05	3.42	3.43	3.39	3.08	1.85	1.83	1.98	1.85
Coniferous logs	"	0.91	0.90	0.74	0.64	0.75	0.90	0.97	1.21	1.23	1.20	1.56	1.24	1.30
Broadleaved logs	"	0.54	0.55	0.41	0.33	0.33	0.36	0.22	0.28	0.24	0.51	0.50	0.53	0.60
Sawn softwood	"	8.20	7.84	6.79	7.87	9.32	8.97	9.86	11.15	12.11	11.73	11.73	11.39	11.65
Sawn hardwood	"	0.87	0.92	0.81	0.83	1.09	0.94	0.83	0.97	0.97	1.00	1.08	1.26	1.25
Plywood	"	0.44	0.46	0.46	0.55	0.90	0.66	0.73	0.96	1.07	1.31	1.42	1.64	1.66
Mechanical wood pulp	t	0.23	0.25	0.21	0.18	0.21	0.24	0.28	0.30	0.31	0.32	0.31	0.28	0.25
Chemical wood pulp	"	1.83	1.93	1.76	1.78	2.06	1.98	2.01	2.34	2.28	2.42	2.60	2.80	2.64
Newsprint	"	4.68	5.05	4.74	4.43	4.77	4.91	4.96	4.97	4.91	5.40	5.74	6.34	5.90
Other paper and paperboard	"	0.30	0.28	0.24	0.26	0.29	0.26	0.29	0.30	0.28	0.31	0.33	0.42	0.42
OCEANIA														
Sawn softwood	m^3	0.77	0.66	0.65	0.60	0.56	0.70	0.71	0.60	0.58	0.73	0.69	0.71	0.75
Newsprint	t	0.26	0.23	0.21	0.31	0.22	0.25	0.30	0.20	0.22	0.26	0.29	0.28	0.29
Other paper and paperboard	"	0.14	0.14	0.11	0.12	0.12	0.14	0.20	0.15	0.17	0.17	0.19	0.17	0.18
LATIN AMERICA														
Broadleaved logs	m^3	0.37	0.41	0.32	0.34	0.24	0.27	0.28	0.23	0.22	0.25	0.36	0.35	0.37
Sawn softwood	"	1.48	1.10	1.62	1.42	1.08	1.05	1.32	1.09	1.03	1.23	1.38	1.39	1.41
Chemical wood pulp	t	0.51	0.43	0.45	0.40	0.44	0.40	0.49	0.38	0.41	0.50	0.54	0.57	0.60
Newsprint	"	0.42	0.48	0.55	0.54	0.52	0.60	0.64	0.58	0.54	0.57	0.61	0.67	0.70
Other paper and paperboard	"	0.27	0.35	0.36	0.36	0.33	0.30	0.31	0.28	0.29	0.41	0.42	0.46	0.46

ANNEX TABLE 11. – VOLUME OF WORLD[1] AND REGIONAL TRADE IN FOREST PRODUCTS (*concluded*)

	Unit	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
		Million units												
FAR EAST[1]														
Pulpwood	m^3	—	—	—	0.10	0.13	0.19	0.42	0.47	0.49	0.64	0.55	0.96	1.26
Coniferous logs	"	0.11	0.21	0.27	0.60	1.01	1.25	2.68	3.25	4.45	5.51	6.15	7.81	10.54
Broadleaved logs	"	2.41	2.97	2.84	4.02	5.09	5.65	6.78	8.00	9.61	10.64	12.19	15.83	16.77
Sawn softwood	"	0.24	0.22	0.31	0.37	0.56	0.37	0.75	0.81	1.07	1.15	0.97	1.27	1.90
Sawn hardwood	"	0.17	0.13	0.12	0.09	0.12	0.09	0.10	0.13	0.17	0.37	0.44	0.34	0.39
Chemical wood pulp	t	0.12	0.18	0.25	0.13	0.22	0.30	0.38	0.49	0.74	0.78	0.73	0.96	0.86
Newsprint	"	0.23	0.21	0.21	0.19	0.23	0.23	0.29	0.24	0.26	0.34	0.28	0.33	0.36
Other paper and paperboard	"	0.33	0.31	0.35	0.30	0.33	0.37	0.39	0.38	0.42	0.48	0.46	0.53	0.55
NEAR EAST														
Sawn softwood	m^3	0.65	0.52	0.60	0.53	0.65	0.69	0.63	0.72	0.62	0.68	0.71	0.70	0.70
All paper and paperboard	t	0.11	0.11	0.12	0.14	0.15	0.16	0.18	0.20	0.23	0.24	0.28	0.30	0.30
AFRICA														
Sawn softwood	m^3	1.38	1.13	1.23	1.27	1.13	1.28	1.12	1.01	1.09	1.29	1.26	1.26	1.31
Sawn hardwood	"	0.61	0.50	0.53	0.55	0.45	0.55	0.40	0.30	0.37	0.41	0.38	0.32	0.34
Newsprint	t	0.11	0.13	0.13	0.14	0.14	0.16	0.16	0.13	0.14	0.14	0.14	0.13	0.13
Other paper and paperboard	"	0.31	0.25	0.30	0.31	0.28	0.36	0.36	0.36	0.37	0.39	0.45	0.47	0.49

[1] Excluding China (Mainland).

ANNEX TABLE 12A. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
Export volume													
WESTERN EUROPE													
Agricultural, fishery and forest products	91	92	98	99	103	115	121	121	129	135	143	145	156
Agricultural products	89	89	98	100	102	114	124	123	132	136	146	148	161
Food and feed	91	87	98	99	103	116	127	126	133	140	151	153	168
Beverages and tobacco	77	94	98	118	84	98	107	101	122	121	121	129	132
Raw materials	82	100	94	89	116	110	117	130	142	113	112	116	113
Fishery products	88	95	97	100	103	104	108	114	114	121	133	136	152
Forest products	97	97	99	95	106	120	119	119	125	137	139	143	145
NORTH AMERICA													
Agricultural, fishery and forest products	83	100	103	96	101	118	122	121	134	155	149	161	149
Agricultural products	73	100	105	95	101	121	124	120	135	158	149	162	143
Food and feed	74	102	96	96	108	117	128	134	152	180	175	191	164
Beverages and tobacco	113	104	104	99	98	103	104	100	106	109	99	114	118
Raw materials	52	90	137	90	74	143	121	74	83	102	76	76	79
Fishery products	106	101	97	104	99	93	91	132	115	125	122	120	120
Forest products	102	101	100	95	105	110	109	124	135	148	152	162	166
OCEANIA													
Agricultural, fishery and forest products	91	95	98	92	110	106	115	121	129	133	134	129	143
Agricultural products	92	96	98	92	110	106	120	121	129	133	133	127	142
Food and feed	96	102	97	93	111	106	128	128	142	153	149	137	171
Beverages and tobacco	71	82	92	94	113	131	158	194	231	270	303	311	326
Raw materials	89	90	100	92	109	106	112	114	116	113	117	117	114
Fishery products	96	92	101	100	98	117	103	113	108	128	171	196	187
Forest products	25	60	90	98	112	111	105	110	148	166	164	176	193
LATIN AMERICA													
Agricultural, fishery and forest products	90	96	95	99	106	110	114	120	121	118	130	133	136
Agricultural products	92	98	95	99	106	110	112	118	119	114	126	130	131
Food and feed	86	91	98	104	98	110	110	112	107	111	137	137	141
Beverages and tobacco	95	103	95	95	110	112	111	114	124	112	105	116	117
Raw materials	106	110	83	99	118	102	127	149	141	127	152	148	142
Fishery products	67	76	76	95	128	168	215	267	263	318	314	310	397
Forest products	19	36	108	100	91	90	102	88	87	114	124	131	133
FAR EAST [1]													
Agricultural, fishery and forest products	96	98	98	98	104	103	109	114	121	123	125	122	121
Agricultural products	100	101	100	98	102	101	108	111	118	117	117	111	107
Food and feed	101	103	106	95	98	111	117	113	131	134	131	129	107
Beverages and tobacco	83	102	98	104	98	96	109	112	118	110	112	99	105
Raw materials	106	99	96	96	108	96	101	110	109	108	110	104	115
Fishery products	68	85	82	104	114	103	100	122	121	133	129	131	117
Forest products	67	80	85	95	119	122	132	137	166	197	220	258	270
NEAR EAST													
Agricultural, fishery and forest products	91	91	99	90	112	110	107	120	126	124	131	141	140
Agricultural products	91	90	99	90	112	110	107	120	126	124	131	141	139
Food and feed	90	106	106	97	97	110	106	137	138	135	149	126	129
Beverages and tobacco	84	86	126	82	92	81	117	103	68	80	94	112	117
Raw materials	93	83	89	87	124	117	105	112	133	128	130	155	149
Fishery products	112	130	125	100	75	95	98	94	89	86	102	98	98
Forest products	65	68	76	85	138	147	138	169	230	262	297	305	305

ANNEX TABLE 12A. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS (*continued*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
AFRICA													
Agricultural, fishery and forest products	91	95	98	98	105	109	117	124	123	127	129	128	128
Agricultural products	93	96	98	98	104	108	116	123	122	124	127	125	124
Food and feed	93	96	94	105	101	97	106	117	120	117	106	112	110
Beverages and tobacco	92	97	103	92	105	119	127	138	128	137	152	139	140
Raw materials	93	98	94	97	109	103	107	98	107	104	108	117	112
Fishery products	82	81	95	97	108	124	142	144	134	131	134	151	160
Forest products	66	76	88	101	111	124	124	125	146	173	178	184	181
WORLD [2]													
Agricultural products	89	97	99	97	104	110	117	119	125	130	133	136	135
Food and feed	87	96	98	99	104	111	120	124	132	143	148	151	148
Beverages and tobacco	92	99	100	97	103	109	115	120	122	120	121	121	124
Raw materials	91	96	101	94	105	110	112	105	114	112	113	116	115
EASTERN EUROPE AND U.S.S.R.													
Agricultural, fishery and forest products	72	69	90	92	118	121	145	154	150	139	163	176	...
Agricultural products	71	68	90	90	120	118	146	152	139	118	143	155	...
Food and feed	64	59	88	88	124	115	155	166	146	111	138	149	...
Beverages and tobacco	61	85	90	93	117	133	120	110	148	157	150	161	...
Raw materials	102	95	97	96	107	120	124	115	109	127	158	174	...
Fishery products	64	79	71	85	144	192	194	211	290	299	433	529	...
Forest products	74	67	89	93	102	120	129	149	165	187	197	209	211
WORLD [1]													
Agricultural, fishery and forest products	89	94	98	97	105	112	119	122	128	134	138	143	...
Agricultural products	88	95	98	97	105	111	119	121	126	129	134	137	...
Food and feed	85	93	97	98	105	112	123	127	133	140	147	150	...
Beverages and tobacco	91	99	99	97	104	110	115	119	123	121	122	122	...
Raw materials	92	96	101	94	105	110	112	110	113	113	115	119	. .
Fishery products	83	90	91	100	109	112	118	132	135	150	153	157	174
Forest products	95	94	97	96	106	118	122	126	137	153	158	168	172
Export value													
WESTERN EUROPE													
Agricultural, fishery and forest products	93	95	102	97	100	112	116	118	132	146	158	161	169
Agricultural products	89	91	101	98	100	111	116	120	139	151	162	166	179
Food and feed	90	91	101	98	102	113	118	121	138	153	167	170	183
Beverages and tobacco	79	86	101	110	89	100	109	116	145	149	150	162	191
Raw materials	92	110	113	84	103	104	108	117	134	117	102	108	99
Fishery products	84	94	98	99	103	104	111	123	126	142	171	180	174
Forest products	103	103	106	95	99	115	118	114	120	138	145	146	147
NORTH AMERICA													
Agricultural, fishery and forest products	84	101	105	96	99	113	118	116	130	151	148	164	152
Agricultural products	76	102	107	96	97	115	123	119	135	159	153	171	151
Food and feed	76	103	98	97	105	111	126	133	152	182	180	203	174
Beverages and tobacco	102	94	102	99	99	108	111	108	115	120	110	137	144
Raw materials	66	101	145	90	65	131	117	73	78	94	69	65	66
Fishery products	91	94	93	102	105	99	93	97	114	135	142	151	159
Forest products	106	102	100	97	104	114	120	111	119	133	138	148	153

ANNEX TABLE 12A. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS (*continued*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
OCEANIA													
Agricultural, fishery and forest products	95	99	110	85	105	103	112	113	135	148	136	133	142
Agricultural products	96	99	110	85	105	102	112	113	135	148	135	132	140
Food and feed	96	101	94	89	117	108	126	126	152	170	164	154	184
Beverages and tobacco	82	73	80	103	117	120	128	158	187	217	231	213	282
Raw materials	96	98	126	81	93	97	99	101	119	127	107	111	99
Fishery products	79	89	103	96	100	110	106	141	134	149	203	258	266
Forest products	25	60	91	98	111	111	105	109	140	159	160	173	192
LATIN AMERICA													
Agricultural, fishery and forest products	101	104	105	99	96	100	102	105	114	123	129	130	131
Agricultural products	104	106	105	99	96	99	100	102	112	119	125	125	124
Food and feed	87	88	104	100	96	103	102	104	121	130	145	144	152
Beverages and tobacco	113	119	109	98	93	94	88	87	91	102	97	99	93
Raw materials	128	126	97	100	103	101	131	144	146	134	143	138	128
Fishery products	47	66	77	96	127	137	175	254	260	308	334	387	439
Forest products	22	37	114	99	87	85	94	84	84	107	123	133	135
FAR EAST [1]													
Agricultural, fishery and forest products	102	99	98	94	108	111	106	109	119	122	124	119	111
Agricultural products	108	101	101	93	107	109	104	103	113	114	114	104	95
Food and feed	96	96	103	95	102	106	111	110	141	154	144	137	121
Beverages and tobacco	97	105	100	104	96	99	102	102	108	105	105	89	95
Raw materials	121	103	99	86	115	116	100	99	95	90	97	87	77
Fishery products	59	82	82	107	110	108	105	144	134	147	155	169	152
Forest products	68	85	84	93	122	133	134	151	183	206	221	273	289
NEAR EAST													
Agricultural, fishery and forest products	94	100	109	91	99	103	97	103	116	114	123	126	138
Agricultural products	95	100	109	91	99	103	97	103	115	114	122	126	137
Food and feed	88	113	108	98	94	101	100	132	143	137	150	142	147
Beverages and tobacco	84	89	133	82	85	62	79	86	68	84	84	96	104
Raw materials	100	95	105	90	105	113	99	92	112	109	116	124	139
Fishery products	101	117	111	97	92	108	116	113	115	129	146	152	152
Forest products	68	71	77	84	139	144	133	168	233	248	274	289	289
AFRICA													
Agricultural, fishery and forest products	93	95	98	102	100	101	104	106	115	124	118	120	116
Agricultural products	95	96	99	103	99	99	102	104	112	118	113	114	110
Food and feed	92	101	99	103	97	94	104	113	113	119	113	119	114
Beverages and tobacco	94	89	95	106	99	100	98	99	99	119	116	111	111
Raw materials	102	107	105	92	102	107	106	96	119	115	103	111	101
Fishery products	82	85	99	97	105	114	128	125	120	143	125	132	137
Forest products	65	78	88	101	111	131	134	136	170	201	205	207	201
WORLD [2]													
Agricultural products	94	100	104	96	100	106	109	110	123	134	134	137	134
Food and feed	87	97	100	97	102	108	116	120	139	155	159	165	162
Beverages and tobacco	101	103	103	101	94	96	96	96	101	111	107	108	110
Raw materials	103	104	113	88	99	111	107	100	109	109	103	102	96

ANNEX TABLE 12A. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
EASTERN EUROPE AND U.S.S.R.													
Agricultural, fishery and forest products	77	72	94	91	115	117	137	145	153	143	163	178	...
Agricultural products	75	71	93	89	118	114	138	143	148	126	147	161	...
Food and feed	66	62	90	87	123	112	146	157	158	123	145	159	...
Beverages and tobacco	59	80	91	94	115	132	114	101	150	154	155	175	...
Raw materials	122	105	108	97	95	114	120	108	105	122	151	160	...
Fishery products	62	78	75	89	136	163	165	169	210	212	254	305	...
Forest products	77	70	93	92	99	116	125	142	155	182	197	210	210
WORLD [1]													
Agricultural, fishery and forest products	93	98	103	96	102	108	112	114	126	137	140	144	...
Agricultural products	93	98	103	96	101	107	111	112	125	134	135	138	...
Food and feed	85	94	99	97	104	108	118	123	141	152	158	164	...
Beverages and tobacco	100	102	103	101	95	98	96	96	102	112	109	110	...
Raw materials	104	104	113	89	99	111	108	101	109	109	105	104	...
Fishery products	76	88	92	101	108	109	115	135	138	157	175	190	189
Forest products	98	96	101	95	104	115	116	118	129	147	155	164	167

[1] Excluding China (Mainland). – [2] Excluding the U.S.S.R., eastern Europe and China (Mainland).

ANNEX TABLE 12B. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF IMPORTS OF AGRICULTURAL PRODUCTS, BY COMMODITY GROUPS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
Import volume													
WESTERN EUROPE													
Agricultural products	89	96	100	97	103	107	109	114	116	118	122	127	125
Food and feed	86	96	97	98	105	109	110	118	121	124	133	138	136
Beverages and tobacco	92	93	100	101	99	109	114	120	119	122	122	125	128
Raw materials	97	99	108	93	99	103	101	100	100	100	95	101	95
NORTH AMERICA													
Agricultural products	92	95	95	97	108	101	106	115	113	104	107	112	113
Food and feed	80	82	90	105	105	103	109	121	121	105	110	123	130
Beverages and tobacco	92	100	98	95	107	106	112	117	115	112	111	113	110
Raw materials	117	110	101	87	112	88	89	95	90	84	90	87	83
OCEANIA													
Agricultural products	101	93	98	102	100	102	104	95	105	110	119	117	109
Food and feed	87	91	96	107	97	95	105	105	114	118	127	132	124
Beverages and tobacco	100	91	100	98	102	104	107	94	99	105	109	112	104
Raw materials	124	101	98	101	102	105	98	82	100	106	127	102	97
LATIN AMERICA													
Agricultural products	92	89	99	102	99	103	108	116	122	134	132	136	138
Food and feed	90	88	98	101	101	104	108	118	125	138	132	137	141
Beverages and tobacco	96	96	106	110	84	95	109	108	105	112	116	135	130
Raw materials	103	94	104	102	94	106	104	108	117	121	143	129	124

ANNEX TABLE 12B. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF IMPORTS OF AGRICULTURAL PRODUCTS, BY COMMODITY GROUPS (*continued*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
FAR EAST [1]													
Agricultural products	79	93	101	97	103	120	126	123	142	154	164	172	175
Food and feed	79	90	101	100	99	116	113	117	141	159	171	178	183
Beverages and tobacco	102	113	104	92	104	102	137	153	156	145	138	178	148
Raw materials	75	97	101	90	110	133	153	133	143	143	150	159	162
NEAR EAST													
Agricultural products	73	86	94	96	110	121	133	137	142	146	152	163	143
Food and feed	67	87	95	94	111	126	140	140	146	150	158	164	146
Beverages and tobacco	93	85	96	99	105	101	111	117	121	121	118	148	123
Raw materials	72	74	86	100	115	133	134	166	158	178	197	212	179
AFRICA													
Agricultural products	87	97	99	94	107	119	128	127	117	122	128	140	146
Food and feed	82	91	97	92	111	122	132	132	120	121	131	146	152
Beverages and tobacco	100	116	104	99	97	107	117	106	106	116	113	121	123
Raw materials	97	93	104	100	96	116	126	137	129	152	143	131	153
WORLD [2]													
Agricultural products	88	95	99	97	104	109	112	116	119	122	126	131	130
Food and feed	83	93	97	99	104	100	112	119	125	128	137	142	143
Beverages and tobacco	93	96	99	98	102	107	114	119	118	118	117	122	121
Raw materials	96	100	105	92	103	107	109	107	108	107	107	111	108
EASTERN EUROPE AND U.S.S.R.													
Agricultural products	79	81	94	95	111	117	129	129	134	166	166	157	...
Food and feed	94	88	98	92	109	121	139	139	141	198	189	178	...
Beverages and tobacco	62	76	96	91	113	109	99	108	136	160	159	137	...
Raw materials	64	74	87	102	111	116	128	122	125	121	133	134	...
WORLD [1]													
Agricultural products	87	94	99	97	104	109	113	117	121	126	130	133	...
Food and feed	84	92	97	98	105	111	114	121	126	134	141	145	...
Beverages and tobacco	91	95	99	98	103	107	113	118	119	121	120	124	...
Raw materials	92	96	103	93	104	108	112	109	110	109	111	114	...
Import value													
WESTERN EUROPE													
Agricultural products	94	101	106	96	98	104	102	108	116	124	128	133	129
Food and feed	87	101	102	95	103	106	106	115	130	138	150	157	153
Beverages and tobacco	96	91	101	105	94	98	98	101	102	113	110	113	116
Raw materials	109	108	121	89	90	102	96	94	96	101	88	93	82
NORTH AMERICA													
Agricultural products	102	102	101	97	102	95	93	97	102	101	98	104	103
Food and feed	77	80	89	104	106	101	105	115	129	109	110	127	136
Beverages and tobacco	111	113	109	97	94	88	86	86	84	101	93	93	89
Raw materials	132	121	109	79	112	99	84	88	86	85	82	81	68

ANNEX TABLE 12B. – WORLD AND REGIONAL INDICES OF VOLUME AND VALUE OF IMPORTS OF AGRICULTURAL PRODUCTS, BY COMMODITY GROUPS (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
OCEANIA													
Agricultural products	114	97	101	99	100	100	97	88	101	110	113	111	102
Food and feed	87	93	99	105	96	91	101	101	124	133	136	144	133
Beverages and tobacco	120	91	100	98	103	96	93	83	87	94	94	97	92
Raw materials	141	111	105	95	101	118	100	78	95	103	114	87	76
LATIN AMERICA													
Agricultural products	101	91	103	102	96	101	101	112	121	136	128	135	138
Food and feed	98	90	101	101	97	100	103	115	125	142	131	138	143
Beverages and tobacco	101	91	107	112	81	79	83	84	89	105	100	115	116
Raw materials	118	102	109	96	95	119	102	106	115	121	131	126	121
FAR EAST [1]													
Agricultural products	86	98	109	95	96	113	119	115	139	160	161	172	173
Food and feed	82	91	107	99	94	106	106	109	141	170	172	183	189
Beverages and tobacco	110	107	100	95	105	103	128	134	145	148	145	194	171
Raw materials	92	111	113	89	98	129	146	125	136	140	139	145	140
NEAR EAST													
Agricultural products	78	88	103	93	104	112	123	123	137	155	146	157	139
Food and feed	69	88	103	92	105	115	128	128	147	168	156	165	149
Beverages and tobacco	114	91	104	97	99	95	100	94	95	102	99	118	96
Raw materials	79	81	100	97	103	132	151	172	161	180	193	191	159
AFRICA													
Agricultural products	90	98	102	96	101	112	118	114	110	123	129	134	137
Food and feed	85	96	101	94	105	116	123	118	113	126	136	141	146
Beverages and tobacco	98	105	102	107	91	96	97	94	97	107	106	113	110
Raw materials	119	105	117	93	92	129	135	137	127	145	129	120	132
WORLD [2]													
Agricultural products	94	100	105	96	99	104	104	107	117	126	127	134	131
Food and feed	85	95	101	97	102	106	107	115	131	140	147	156	155
Beverages and tobacco	103	100	104	102	94	94	94	95	96	108	104	108	106
Raw materials	110	110	117	88	95	108	105	100	103	107	99	102	92
EASTERN EUROPE AND U.S.S.R.													
Agricultural products	83	85	99	94	107	115	122	120	133	173	164	156	...
Food and feed	94	90	102	91	107	115	131	133	150	217	199	190	...
Beverages and tobacco	63	73	94	99	112	103	89	93	120	151	141	125	...
Raw materials	76	83	97	98	105	119	123	114	114	116	120	118	...
WORLD [3]													
Agricultural products	93	98	105	96	99	105	106	109	119	130	131	136	...
Food and feed	86	95	101	97	102	107	109	116	133	147	151	158	...
Beverages and tobacco	100	98	103	101	95	95	94	95	97	111	106	109	...
Raw materials	105	106	114	89	96	109	90	102	105	108	102	105	...

[1] Excluding China (Mainland). – [2] Excluding the U.S.S.R., eastern Europe and China (Mainland).

ANNEX TABLE 13. – WORLD[1] AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, 1957-59 average = 100												
AGRICULTURAL PRODUCTS[2]	108	105	106	100	94	98	95	93	100	104	102	101	100
Food and feed	101	101	102	99	99	97	96	97	106	109	108	109	109
Cereals	108	104	102	100	98	96	97	103	103	105	104	109	113
Edible oils and oilseeds	98	103	101	98	101	97	95	91	97	98	109	106	101
Meat	98	97	95	101	104	107	105	101	106	119	127	133	129
Dairy products	108	109	104	92	104	103	96	96	103	104	114	111	105
Beverages and tobacco	110	103	104	104	92	89	84	81	84	94	92	91	91
Agricultural raw materials	120	114	118	99	84	108	101	96	101	102	96	92	88
FISHERY PRODUCTS[1]	91	99	100	100	99	100	101	106	107	111	120	126	116
FOREST PRODUCTS[1]	102	103	104	99	98	97	96	94	94	96	98	97	97
	U.S. dollars per metric ton												
AGRICULTURAL PRODUCTS[2]													
Wheat	65.8	62.9	63.5	62.5	62.2	61.7	63.3	66.2	64.6	66.1	61.0	63.2	65.7
Wheat flour	95.4	89.7	88.7	84.8	79.0	76.9	78.5	82.2	81.3	84.3	85.2	87.2	84.2
Barley	55.5	55.1	51.1	51.3	52.7	52.8	47.2	57.6	55.6	56.3	62.5	69.5	67.1
Maize	62.0	60.0	55.1	50.6	50.2	50.1	49.2	47.8	53.1	54.7	57.2	57.4	56.3
Rice (milled)	119.1	117.4	117.2	122.4	112.9	103.3	109.5	122.0	121.3	124.8	127.7	140.4	162.0
Sugar (raw)	96.2	95.4	114.1	99.9	96.0	93.1	95.4	95.6	134.9	136.6	104.2	102.2	104.7
Apples	109.9	128.4	136.7	154.3	111.8	138.0	125.7	137.1	145.1	137.0	144.2	158.1	159.8
Bananas	104.1	105.7	105.6	98.1	92.3	86.4	90.4	92.2	88.2	90.4	92.7	88.9	91.9
Oranges and tangerines	102.2	124.1	133.7	127.0	105.6	110.5	121.1	121.6	136.7	120.2	119.2	132.2	125.5
Raisins	241.4	275.4	279.8	326.4	317.1	272.0	282.3	263.3	273.1	337.3	335.2	331.3	325.9
Dates	48.1	42.1	56.4	51.6	50.4	62.5	63.7	99.8	84.8	76.3	77.2	78.9	78.6
Cottonseed	84.3	84.0	80.8	68.4	67.5	77.8	77.5	68.6	62.2	63.1	69.7	79.7	78.2
Copra	151.6	143.5	139.3	163.7	201.9	174.7	141.9	141.9	164.5	176.5	200.0	167.0	162.4
Palm kernels	121.7	123.7	121.1	125.7	158.4	157.9	126.8	120.7	136.9	139.5	167.3	153.6	148.6
Soybeans	95.2	95.8	91.2	86.8	84.7	83.3	94.4	92.4	99.1	99.4	104.9	113.6	107.5
Groundnuts (shelled)	186.0	195.2	204.1	171.8	164.6	182.1	179.5	169.2	168.7	174.8	183.2	187.7	182.2
Olive oil	590.1	763.6	668.6	589.3	507.0	511.9	532.9	564.8	800.5	552.5	625.1	636.9	661.1
Cottonseed oil	299.4	333.8	337.9	358.0	292.5	244.5	304.6	303.9	266.8	251.9	292.9	295.3	273.1
Coconut oil	243.6	235.2	243.5	273.6	342.6	292.5	233.0	221.3	249.4	279.9	320.9	259.4	240.7
Palm oil	202.7	219.2	220.8	202.6	206.5	194.1	206.4	193.8	188.7	202.1	232.4	218.5	211.0
Palm-kernel oil	240.6	236.1	242.1	252.4	316.8	296.2	230.7	209.2	230.9	232.9	276.9	287.9	272.6
Soybean oil	321.7	343.4	338.6	303.6	254.1	233.0	284.5	244.9	239.4	239.1	293.8	299.1	258.9
Groundnut oil	319.6	399.5	397.2	361.2	325.8	343.1	344.3	300.1	307.2	322.6	336.7	310.7	296.0
Cattle[3]	128.2	125.2	126.7	135.9	145.2	138.2	130.7	120.6	132.5	151.8	153.7	131.4	133.7
Pigs[3]	60.1	56.8	43.3	51.2	49.1	47.7	47.1	45.9	53.8	56.7	56.0	70.2	59.0
Beef and veal	448.9	414.7	437.1	500.9	573.7	595.3	559.3	522.6	559.5	679.0	771.6	781.9	767.3
Mutton and lamb	428.9	453.5	460.3	429.1	377.9	401.2	378.7	372.2	414.2	464.1	517.5	493.9	462.4
Poultry meat	804.0	825.4	781.6	767.4	682.2	669.2	630.3	650.9	662.4	668.1	693.5	670.8	672.5
Bacon, ham, salted pork	664.7	726.3	684.1	712.5	675.0	686.0	661.6	664.9	716.8	780.4	756.9	864.8	828.6
Canned meat	877.0	873.6	820.8	848.1	883.5	901.8	937.1	911.7	978.7	924.6	951.4	1 019.2	1 006.2
Milk, condensed and evaporated	310.2	317.6	330.3	311.2	307.9	308.8	307.4	299.8	306.2	328.1	336.3	333.7	313.6
Milk, powdered	375.4	374.8	429.0	375.6	355.1	401.8	363.5	336.5	298.8	305.2	385.9	378.2	383.3
Butter	949.5	923.5	783.9	639.6	904.8	829.9	714.0	762.2	866.9	896.0	905.7	821.4	800.9
Cheese	678.7	736.9	708.5	639.0	739.3	721.8	719.5	701.7	709.6	763.9	842.0	867.3	877.7
Potatoes	48.4	58.8	51.8	59.4	57.3	56.1	52.3	72.6	62.1	57.3	67.6	77.1	70.7
Oilseed cake and meal	72.5	67.7	61.9	55.4	68.7	68.1	63.7	70.2	77.7	76.3	78.3	83.3	83.7
Coffee	1 077.1	1 051.0	1 025.2	922.8	749.1	723.4	684.2	656.2	647.4	844.3	810.3	776.7	727.9
Cocoa	818.5	580.8	562.9	844.0	738.8	593.4	474.3	453.9	486.2	502.8	396.2	401.4	425.3
Tea	383.4	1 215.5	1 191.0	1 170.6	1 144.5	1 168.0	1 144.6	1 103.0	1 113.4	1 108.4	1 086.2	1 029.4	1 051.3
Wine	141.7	155.1	170.3	207.2	176.2	177.6	182.2	174.3	202.6	204.6	227.9	225.9	258.3
Tobacco (unmanufactured)	1 267.6	1 227.6	1 334.5	1 280.8	1 290.2	1 280.1	1 211.7	1 182.2	1 298.8	1 234.3	1 252.9	1 360.7	1 388.7

ANNEX TABLE 13. – WORLD [1] AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS (*concluded*)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	U.S. dollars per metric ton												
Linseed	133.7	145.4	116.7	125.1	131.6	132.4	127.9	134.6	124.6	121.2	116.1	115.8	120.4
Linseed oil	205.3	313.6	245.6	250.0	212.5	246.8	254.1	230.1	200.7	208.5	188.7	189.1	169.8
Castor beans	96.9	134.7	182.0	117.4	110.4	134.1	123.9	106.9	110.8	114.2	103.9	107.0	116.6
Castor oil	206.2	288.8	279.5	273.0	238.2	282.2	280.1	263.4	249.4	240.9	205.1	238.5	311.5
Cotton	797.9	731.9	732.8	673.2	587.0	624.1	641.2	609.8	609.4	606.6	620.8	586.7	611.2
Jute and kenaf	189.1	183.8	208.5	193.0	174.8	220.2	291.0	194.7	199.6	161.2	215.6	223.7	213.9
Sisal	156.3	158.3	141.8	146.9	174.5	214.8	193.4	197.0	293.2	285.9	183.0	173.8	141.1
Wool (greasy)	1 358.7	1 378.0	1 598.4	1 132.8	1 083.6	1 162.4	1 143.8	1 136.3	1 322.9	1 443.1	1 176.3	1 118.4	1 098.5
Rubber (natural)	698.2	627.5	596.5	516.0	659.4	743.0	548.1	517.4	497.7	483.9	488.1	447.3	358.8
FISHERY PRODUCTS [1]													
Fresh, chilled or frozen fish	259.8	275.0	282.0	296.3	278.1	286.8	300.6	314.9	297.6	307.6	329.5	353.3	...
Dried, salted or smoked fish	272.9	291.2	296.4	296.5	307.8	328.3	331.2	345.8	362.0	387.4	423.1	448.6	...
Crustaceans and mollusks, fresh, frozen, dried, salted, etc.	471.8	540.6	649.8	674.3	669.1	672.4	722.4	808.5	900.9	800.4	944.1	972.9	...
Fish products and preparations, whether or not in airtight containers	549.8	621.5	606.5	645.9	631.8	624.3	600.5	694.9	648.4	639.8	702.8	686.9	...
Crustacean and mollusk products and preparations, whether or not in airtight containers	1 005.8	1 071.1	1 075.5	1 108.5	1 068.9	1 099.5	1 150.5	1 146.4	1 210.8	1 282.6	1 316.9	1 453.4	...
Oils and fats, crude or refined, of aquatic animal origin	213.6	238.3	241.6	207.3	191.9	180.1	172.6	133.3	137.5	182.6	192.9	184.7	...
Meals, solubles and similar animal feedstuffs of aquatic origin	144.0	145.7	137.0	133.4	134.3	92.6	86.9	103.8	108.0	110.0	125.1	146.3	...
FOREST PRODUCTS [1]													
Fuelwood [4]	8.8	8.8	8.8	9.2	8.0	8.1	9.4	9.7	9.9	9.7	10.0	10.2	9.7
Charcoal	23.5	21.6	22.7	23.1	21.8	22.8	23.3	22.1	22.0	30.1	31.6	30.7	30.7
Coniferous logs [4]	15.9	15.7	16.4	17.0	17.5	17.4	17.8	18.1	14.4	15.2	16.7	17.3	18.0
Broadleaved logs [4]	21.7	19.6	18.4	18.6	19.0	22.2	21.7	22.6	23.5	22.7	23.3	22.3	22.8
Pulpwood [4]	12.8	12.1	12.3	11.6	10.8	10.6	11.9	11.3	10.7	11.0	11.2	10.6	10.4
Pitprops [4]	13.9	14.3	14.7	14.0	12.5	11.9	13.0	13.0	13.0	15.1	16.4	17.3	17.0
Poles, piling, posts [4]	29.8	32.3	34.2	28.0	25.0	23.9	22.9	24.1	24.8	27.9	29.3	32.0	32.0
Sawn softwood [4]	40.0	39.4	39.0	36.8	36.6	36.7	35.9	35.0	35.0	36.6	38.1	38.4	37.6
Sawn hardwood [4]	60.9	62.2	60.2	58.7	58.6	59.4	59.0	59.2	63.8	61.3	58.8	59.5	59.5
Sleepers [4]	33.4	37.6	39.2	37.1	37.6	36.9	35.1	36.1	39.7	42.5	40.7	40.0	40.0
Veneer sheets [4]	271.6	260.6	271.8	263.5	262.4	259.0	253.3	262.2	254.9	241.6	260.1	255.5	255.5
Plywood [4]	160.5	160.5	155.6	152.0	156.1	149.5	145.1	150.1	152.3	142.6	139.4	143.4	143.4
Particle board	147.3	135.1	143.3	131.1	116.5	108.8	113.9	110.1	108.5	109.2	107.2	106.4	106.4
Fibreboard	101.7	101.1	100.3	93.6	91.3	91.1	87.7	88.7	91.8	97.0	104.0	106.1	106.1
Mechanical woodpulp	70.3	76.6	77.1	70.5	67.4	66.6	66.1	65.6	64.6	64.9	68.9	68.4	68.4
Chemical woodpulp	144.9	147.5	149.6	140.5	134.2	133.4	132.3	125.4	125.0	134.1	136.8	132.2	129.6
Newsprint	131.1	135.9	141.1	138.4	140.0	134.8	129.1	127.1	125.8	126.2	124.7	126.4	125.1
Printing and writing paper	266.2	261.3	267.2	251.4	236.0	235.1	229.8	228.3	222.0	225.2	225.1	231.3	231.3

[1] Excluding China (Mainland). – [2] Excluding the U.S.S.R., eastern Europe and China (Mainland). – [3] U.S. dollars per thousand head. – [4] U.S. dollars per cubic meter.

ANNEX TABLE 14. – REGIONAL INDICES OF AVERAGE EXPORT UNIT VALUES, BY COMMODITY GROUPS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967 (Preliminary)
	Indices, average 1957-59 = 100												
WESTERN EUROPE													
Agricultural products	101	103	103	98	99	98	94	98	106	110	111	111	109
Food and feed	101	104	103	99	99	98	93	97	105	109	110	110	107
Beverages and tobacco	102	91	102	93	106	101	101	113	121	123	123	124	142
Raw materials	110	109	119	93	88	94	92	90	94	103	90	91	84
Fishery products	97	100	101	99	100	100	104	108	110	118	129	135	...
Forest products	106	106	107	100	94	96	99	96	96	101	104	102	101
NORTH AMERICA													
Agricultural products	113	104	103	102	95	96	97	98	97	98	99	99	98
Food and feed	107	101	101	102	97	93	92	93	93	97	99	100	99
Beverages and tobacco	90	90	98	101	101	105	107	108	109	110	112	121	121
Raw materials	133	114	108	103	89	94	99	100	96	94	93	87	85
Fishery products	91	89	95	98	108	108	107	102	108	109	118	128	...
Forest products	97	99	101	98	101	96	91	89	88	90	91	92	92
OCEANIA													
Agricultural products	104	104	112	93	95	97	94	93	104	111	102	103	98
Food and feed	100	98	97	97	105	104	100	99	106	111	113	113	111
Beverages and tobacco	117	89	86	111	104	92	81	82	85	82	79	69	89
Raw materials	108	109	126	88	86	91	88	89	102	112	92	95	87
Fishery products	84	97	102	94	104	92	99	109	118	106	100	124	...
Forest products	99	99	101	100	99	101	100	99	95	96	98	98	99
LATIN AMERICA													
Agricultural products	112	107	110	99	90	91	89	86	96	106	99	96	94
Food and feed	104	98	106	97	97	95	95	93	116	119	107	107	109
Beverages and tobacco	118	116	114	102	84	83	79	75	73	91	92	84	79
Raw materials	119	113	115	99	86	97	100	95	104	107	94	92	89
Fishery products	75	90	99	101	100	85	87	102	110	103	113	127	...
Forest products	115	103	105	99	95	94	92	95	96	94	99	102	101
FAR EAST [1]													
Agricultural products	109	101	101	95	104	109	98	93	96	97	97	93	89
Food and feed	96	94	97	100	103	94	94	97	106	114	108	105	112
Beverages and tobacco	117	103	102	99	98	104	97	93	94	96	96	92	92
Raw materials	115	105	103	89	107	122	101	91	89	85	89	84	70
Fishery products	91	97	101	103	96	107	107	118	115	116	120	128	...
Forest products	101	106	99	98	103	109	102	110	111	104	101	106	107
NEAR EAST													
Agricultural products	103	109	110	101	89	93	92	85	91	91	93	90	98
Food and feed	98	104	101	101	97	96	100	100	103	100	105	114	115
Beverages and tobacco	101	104	106	101	93	79	70	74	100	106	90	87	90
Raw materials	106	113	116	101	83	95	92	81	83	84	88	79	91
Fishery products	87	90	87	97	116	136	155	161	147	259	210	218	...
Forest products	105	104	101	99	101	98	96	99	101	95	92	95	95
AFRICA													
Agricultural products	103	100	101	105	94	92	89	85	92	95	93	93	91
Food and feed	100	107	105	99	96	98	98	96	102	99	106	107	104
Beverages and tobacco	103	91	92	115	93	83	77	71	77	86	80	81	80
Raw materials	110	109	112	95	94	103	99	98	109	110	96	95	90
Fishery products	99	106	104	99	97	92	90	94	98	97	97	99	...
Forest products	97	102	99	100	101	106	108	109	116	116	115	113	111

[1] Excluding China (Mainland).

ANNEX TABLE 15. – UNITED STATES: EXPORTS[1] UNDER SPECIAL PROGRAMS IN RELATION TO TOTAL AGRICULTURAL EXPORTS

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
	Million U.S. dollars												
Exports under Public Law 480													
Sales for foreign currency[2]	263	638	760	752	731	1 014	878	1 007	1 162	1 239	926	820	716
Long-term dollar credit sales[3]	—	—	—	—	—	—	1	42	52	97	143	226	187
Donations for disaster relief and economic development[4]	56	65	39	43	32	49	93	81	99	62	73	79	108
Donations through voluntary relief agencies[5]	186	187	175	159	111	124	151	178	160	186	180	132	179
Barter[6]	262	372	244	65	175	117	181	137	74	123	188	260	314
Total	767	1 262	1 218	1 019	1 049	1 304	1 304	1 445	1 547	1 707	1 510	1 517	1 504
Agency for International Development (AID) programs[7]	351	449	318	214	158	157	179	35	11	23	26	47	33
Total exports under special programs	1 118	1 711	1 536	1 233	1 207	1 461	1 483	1 480	1 558	1 730	1 536	1 564	1 537
Commercial exports[8]	2 081	2 459	2 970	2 622	2 748	3 371	3 541	3 554	4 026	4 618	4 693	5 317	4 846
TOTAL AGRICULTURAL EXPORTS	3 199	4 170	4 506	3 855	3 955	4 832	5 024	5 034	5 584	6 348	6 229	6 881	6 383
	Percentage												
Exports under special programs as percentage of total agricultural exports	35	41	34	32	31	30	30	29	28	27	25	23	24
Exports under Public Law 480 as percentage of total agricultural exports	24	30	27	26	27	27	26	29	28	27	25	22	25

[1] Export market value. – [2] Authorized by Title I, P.L. 480. – [3] Shipments under agreements signed through 31 December 1966, authorized by Title IV, P.L. 480; shipments under agreements signed from 1 January 1967, authorized by Title I, P.L. 480 as amended by P.L. 89-808. – [4] Authorized by Title II, P.L. 480. – [5] Authorized by Section 416 of the Agricultural Act of 1949 and Section 302, Title III, P.L. 480 through 31 December 1966; authorized by Title II, P.L. 480 as amended by P.L. 89-808, effective 1 January 1967. – [6] Authorized by the Charter Act of the Commodity Credit Corporation; Section 303, Title III, P.L. 480 and other legislation. – [7] Formerly Mutual Security Act. – [8] Includes shipments of some commodities with governmental assistance in the form of extension of credit and credit guarantees for relatively short periods, sales of government-owned commodities at less than domestic market prices, and export payments in cash or in kind.

ANNEX TABLE 16. – YIELDS OF WHEAT AND RICE (PADDY) IN SELECTED COUNTRIES, 1909-13 TO 1963-67

	1909-13	1923-27	1928-32	1934-38	1948-52	1953-57	1958-62	1963-67
	Quintals per hectare							
Wheat								
WESTERN EUROPE								
Austria	13.7	13.6	15.5	16.7	17.1	21.6	24.1	27.6
Belgium	25.3	26.2	25.2	27.3	32.2	33.7	37.2	37.7
Denmark	30.2	26.7	29.5	30.4	36.3	38.6	40.3	41.3
Finland	11.2	15.1	16.1	18.1	15.4	15.8	17.6	18.1
France	13.1	14.0	14.8	15.5	18.3	22.6	25.4	31.0
Greece	8.1	6.1	6.0	9.0	10.2	13.1	14.7	17.2
Ireland	25.3	24.1	26.5	22.9	22.7	28.9	30.0	33.4
Italy	10.5	12.0	13.7	14.8	15.2	17.8	16.5	21.1
Luxembourg	15.2	12.7	12.6	18.4	19.6	20.6	21.3	22.6
Malta	14.0	20.9	21.3	19.0	12.4	15.7	14.5	14.0
Norway	16.6	16.1	16.8	20.1	20.6	21.9	23.4	27.7
Netherlands	23.4	27.2	29.1	30.3	36.6	37.8	41.8	44.4
Portugal	6.6	7.3	7.7	9.3	7.2	8.5	7.9	7.8
Spain	9.2	9.3	9.1	9.6	8.7	9.8	9.9	11.3
Sweden	21.3	19.8	21.2	24.0	20.9	23.1	26.9	37.0
Switzerland	21.3	21.7	20.5	23.0	26.5	29.2	32.7	32.4
United Kingdom	21.2	22.0	21.9	23.1	27.2	30.9	36.4	40.5
Yugoslavia	...	10.4	11.5	11.4	12.0	11.9	16.4	21.5
EASTERN EUROPE AND U.S.S.R.								
Bulgaria	6.2	9.2	11.5	12.7	12.4	14.3	16.9	23.3
Czecoslovakia	—	16.0	16.9	17.0	19.0	19.8	22.9	25.2
Hungary	13.2	12.8	13.4	14.0	13.8	[1]14.9	...	...
Poland	12.4	11.4	11.7	11.9	12.5	14.1	17.8	20.7
Romania	12.9	8.5	9.5	9.7	10.2	10.9	12.4	16.6
U.S.S.R.	6.9	7.5	6.7	9.3	8.5	8.9	10.8	10.6
NORTH AMERICA								
Canada	13.3	12.3	10.8	7.1	12.8	13.9	12.1	15.7
United States	9.9	9.7	9.7	8.7	11.2	12.9	16.7	17.4
LATIN AMERICA								
Argentina	6.6	8.6	8.8	8.7	11.5	13.2	13.2	14.6
Bolivia	—	—	8.1	9.5	7.2	5.9	6.8	8.0
Brazil	—	13.1	9.7	8.3	7.4	8.4	5.7	7.6
Chile	13.5	11.9	11.2	10.6	11.9	12.8	13.4	15.3
Colombia	—	—	6.7	—	7.2	8.3	9.2	9.8
Guatemala	—	5.7	6.5	7.1	5.8	5.3	7.1	9.6
Mexico	3.8	4.6	6.3	6.7	8.8	12.1	15.8	24.1
Peru	9.7	7.8	8.1	7.0	9.3	9.5	9.8	9.6
Uruguay	5.6	7.9	6.4	7.5	9.1	9.7	7.6	9.7
Venezuela	—	—	—	4.9	5.5	6.4	6.2	5.3
FAR EAST								
Burma	—	—	...	5.4	2.9	2.9	4.4	6.0
China (Taiwan)	7.2	6.1	8.7	8.8	19.6	15.4	19.0	18.7
India and Pakistan	8.1	7.5	7.0	7.1	6.6	7.4	8.0	8.3
Japan	13.5	16.0	17.7	18.8	8.5 18.5	7.5 21.4	8.0 24.7	8.1 22.4
NEAR EAST								
Cyprus	—	7.3	6.5	7.9	6.4	8.8	7.7	10.1
Iran	...	...	15.2	11.7	9.0	12.2	8.1	7.7
Iraq	—	—	6.4	7.2	4.8	6.3	5.3	4.6
Lebanon	...	...	...	5.2	7.3	8.6	8.7	9.3
Libya	—	...	3.1	4.7	...	[2]3.7	1.9	2.5
Syria	—	—	—	9.7	7.7	6.6	5.4	7.8
Sudan	13.5	13.4	6.8	7.6	11.8	14.3	16.0	11.6
Turkey	—	6.5	7.8	9.9	10.0	10.0	10.5	11.7
United Arab Republic	17.5	17.2	18.3	20.1	18.4	22.5	24.4	26.8

ANNEX TABLE 16. – YIELDS OF WHEAT AND RICE (PADDY) IN SELECTED COUNTRIES, 1909-13 TO 1963-67 (*continued*)

	1909-13	1923-27	1928-32	1934-38	1948-52	1953-57	1958-62	1963-67
	Quintals per hectare							
AFRICA								
Algeria	6.7	5.3	5.4	5.6	6.2	6.9	6.6	6.1
Angola	—	8.0	8.7	9.7	...	8.6	9.3	10.8
Kenya	—	5.6	6.7	8.1	10.9	10.2	10.4	11.4
Rhodesia	—	5.3	5.8	4.7	...	11.8	14.7	21.3
South Africa	5.7	5.8	5.4	5.9	...	7.1	7.3	7.0
Tunisia	3.2	4.2	4.6	5.1	4.9	4.5	3.7	5.4
OCEANIA								
Australia	8.1	8.4	7.8	8.0	11.2	11.1	12.4	12.0
New Zealand	19.6	21.9	21.2	21.1	27.3	26.7	31.8	33.5
Rice								
WESTERN EUROPE								
France	21.9	—	—	—	36.1	38.2	40.5	38.6
Greece	30.3	—	11.8	19.5	31.4	38.5	37.4	46.3
Italy	32.8	44.9	46.8	52.1	48.5	50.8	54.3	48.9
Portugal	22.6	17.1	17.6	31.1	41.6	43.8	44.5	44.6
Spain	49.9	61.4	61.9	52.4	48.6	59.6	61.8	61.9
Yugoslavia	—	12.2	14.5	15.3	22.6	35.1	38.0	40.9
EASTERN EUROPE AND U.S.S.R.								
Bulgaria	22.2	19.6	21.9	24.7	29.7	34.2	33.1	35.0
Hungary	—	—	—	—	25.1	17.5	18.8	19.1
Romania	—	—	—	25.6	21.2	24.4	23.6	28.2
U.S.S.R.	11.8	16.3	16.3	21.4	15.0	17.0	21.2	28.0
NORTH AMERICA								
United States	16.7	20.1	23.3	24.7	25.6	31.5	38.5	47.6
LATIN AMERICA								
Costa Rica	—	5.4	...	11.0	13.3	11.2	11.0	14.1
Cuba	...	...	13.5	10.9	17.4	19.4	17.1	15.3
El Salvador	5.7	19.2	6.4	10.4	16.9	18.1	20.1	25.3
Guatemala	—	6.4	9.7	14.3	12.0	12.2	13.9	16.7
Mexico	10.1	15.8	19.8	21.0	17.9	19.6	21.8	22.4
Nicaragua	—	—	10.0	7.4	13.9	13.9	15.7	14.2
Puerto Rico	4.8	14.0	4.7	4.7	6.0	6.7	5.5	6.8
Trinidad and Tobago	—	9.0	7.5	14.4	21.3	16.2	16.6	16.8
Argentina	16.8	20.8	18.9	28.5	29.9	32.2	33.8	36.0
Bolivia	—	11.0	30.2	14.0	15.7	14.9	13.3	14.8
Brazil	—	10.0	14.2	14.1	15.8	14.7	16.1	15.5
Colombia	21.0	8.9	13.2	11.4	19.3	17.6	20.2	20.0
Ecuador	—	...	13.0	17.8	16.9	20.9	16.8	16.8
Paraguay	20.0	18.4	20.2	20.4	18.5	21.4	23.2	24.6
Peru	17.6	15.5	21.4	20.0	37.2	39.2	40.5	40.8
Uruguay	—	...	15.4	35.7	31.3	33.7	33.4	32.4
FAR EAST								
Brunei	—	10.7	5.6	8.3	16.6	13.9	14.3	12.4
Burma, India and Pakistan	16.5	14.3	14.5	13.9	12.0	13.2	14.8	15.3
Cambodia	—	12.9	10.4	8.8	9.1	9.8	10.2	11.4
Ceylon	8.0	7.7	8.6	9.9	14.2	15.8	18.6	19.3
China, Taiwan	17.0	20.1	22.3	24.7	22.1	27.5	31.3	36.8
Hong Kong	16.0	21.8	27.5	...	22.9	30.6	27.2	18.3
Indonesia	...	...	...	...	16.1	17.1	17.8	18.5

ANNEX TABLE 16. – YIELDS OF WHEAT AND RICE (PADDY) IN SELECTED COUNTRIES, 1909-13 TO 1963-67 (*concluded*)

	1909-13	1923-27	1928-32	1934-38	1948-52	1953-57	1958-62	1963-67
	Quintals per hectare							
Japan	30.8	32.5	35.0	36.3	42.5	44.1	50.0	51.8
Laos	—	7.8	7.4	7.0	7.2	8.6	8.0	7.9
Malaysia	10.2	12.3	13.2	17.3	19.3	20.9	23.5	25.8
Philippines	7.4	11.7	12.0	10.9	11.8	11.6	11.7	13.2
Thailand	15.0	18.6	16.3	12.9	13.1	13.6	14.0	16.3
NEAR EAST								
Iran	—	—	25.0	19.3	19.3	17.9	19.9	23.1
Iraq	—	—	—	15.5	11.6	17.0	13.9	17.1
Syria	—	26.0	13.6	31.5	22.9	28.6	21.3	21.0
Turkey	24.6	9.9	24.0	28.3	35.1	34.1	36.4	41.9
United Arab Republic	36.0	30.0	29.9	35.0	37.9	47.7	51.8	46.4
AFRICA								
Angola	—	10.0	10.0	11.6	10.0	10.7	11.9	13.3
Madagascar	16.1	9.9	12.1	13.5	13.5	13.8	15.1	17.4
Morocco	...	...	...	...	37.8	43.4	40.9	51.9
OCEANIA								
Australia	7.9	50.6	38.6	46.9	46.6	51.1	63.1	65.1
Fiji	34.2	15.8	24.7	22.0	15.3	17.4	17.5	19.9

[1] 1955-57 average. – [2] 1957 only.

ANNEX TABLE 17. – AVERAGE MILK YIELD PER MILKING COW IN SELECTED COUNTRIES [1]

	Average 1948-52	Average 1957-59	1964	1965	1966	Average 1964-66
	..... *Kilograms per cow per year*					
WESTERN EUROPE						
Austria [2]	1 836	2 388	2 808	2 891	2 915	2 871
Belgium	3 423	3 778	3 815	3 866	3 866	3 849
Denmark	3 211	3 646	3 809	3 946	3 913	3 889
Finland	2 199	2 824	3 280	3 375	3 424	3 360
France [2]	1 817	2 209	2 622	2 756	2 912	2 763
Germany, Fed. Rep. of [3]	2 326	3 190	3 572	3 642	3 649	3 621
Greece [3]	864	791	957	1 039	1 100	1 032
Iceland	2 500	2 768	2 940	2 985	3 082	3 002
Ireland	1 930	2 236	2 355	2 308	2 308	2 324
Italy	2 568	2 666	2 700	2 790	2 100	2 530
Luxembourg	2 942	3 309	3 413	3 495	3 608	3 505
Malta	[4]1 772	2 800	3 100	3 200	3 300	3 200
Netherlands	3 914	4 123	4 177	4 207	4 180	4 188
Norway	2 044	2 610	3 021	3 240	3 300	3 187
Portugal	1 959	2 235	2 887	2 887	2 887	2 887
Spain [3]	1 371	1 591	1 470	1 500	1 700	1 557
Sweden	2 790	2 923	3 422	3 531	3 623	3 525
Switzerland	2 884	3 227	3 360	3 370	3 410	3 380
United Kingdom [5]	2 723	2 919	3 676	3 797	3 779	3 751
Yugoslavia [4]	[6]951	1 142	1 212	1 221	1 243	1 225
EASTERN EUROPE AND U.S.S.R.						
Albania	262	517	540	560	560	553
Bulgaria	[4]405	1 110	1 627	1 741	1 914	1 761
Czechoslovakia [2]	[4]1 542	1 808	1 975	2 015	2 146	2 045
Germany, Eastern [2]	2 098	2 637	2 719	2 982	3 090	2 930
Hungary	[6]1 534	2 132	2 359	2 214	2 410	2 328
Poland	[7]1 770	1 985	2 094	2 252	2 365	2 237
Romania	886	1 226	1 435	1 543	1 686	1 555
U.S.S.R.	1 367	1 764	1 618	1 853	1 880	1 784
NORTH AMERICA						
Canada	2 248	2 569	2 888	2 896	2 978	2 921
United States	2 389	2 979	3 674	3 767	3 861	3 767
LATIN AMERICA						
Costa Rica	1 020	1 103	1 600	1 650	1 700	1 650
Dominican Rep.	950	1 010	1 180	1 200	1 170	1 183
El Salvador	795	677	650	670	670	663
Guatemala	980	1 053	1 100	1 120	1 120	1 113
Honduras	380	377	430	450	450	443
Jamaica	886	934	781	781	785	782
Mexico	1 996	2 233	2 000	2 100	2 200	2 100
Cuba	535	610	750	770	770	763
Argentina	442	470	410	430	400	413
Bolivia	1 760	2 150	2 600	2 800	2 900	2 767
Brazil	366	410	410	430	440	427
Chile	1 183	805	1 700	1 700	1 700	1 700
Colombia	462	420	273	274	273	273
Ecuador	420	400	489	500	500	496
Paraguay	474	480	480	500	600	527
Peru	330	559	670	680	680	677
Uruguay	422	430	410	430	410	417
Venezuela	722	787	650	670	700	673
NEAR EAST						
Cyprus	3 047	3 167	3 281	3 515	3 515	3 437
Iran	530	603	640	650	680	657
Israel	3 300	4 350	4 810	4 902	4 933	4 882
Jordan	773	897	800	850	900	850
Lebanon	1 580	1 767	2 060	2 150	2 150	2 120
Turkey	524	540	600	585	605	597
United Arab Rep.	676	683	674	674	675	674
Sudan	328	504	560	454	560	525
Libya:						
Cyrenaica	252	248	270	280	280	277
Tripolitania	366	381	410	420	420	417
FAR EAST						
Burma	736	762	790	800	800	797
Cambodia	619	653	375	428	480	428
China: Taiwan	1 341	2 267	2 700	2 731	2 580	2 670
India	166	180	180	190	200	190
Indonesia	1 931	2 066	2 300	2 400	2 400	2 367
Japan	2 920	2 737	4 345	4 284	4 300	4 310
Korea, Rep. of	1 965	2 764	3 000	3 400	3 400	3 267
Malaysia:						
West Malaysia	356	469	525	550	550	542
AFRICA						
Botswana	304	359	370	400	400	390
Central African Rep.	326	367	309	320	365	331
Ethiopia	590	570	540	560	560	553
Guinea	164	205	240	250	260	250
Kenya	1 130	1 077	1 205	1 101	1 626	1 311
Mali	534	553	550	580	600	577
Mauritius	1 237	1 182	1 278	1 278	1 278	1 278
Morocco	309	343	350	370	370	363
Niger	220	207	220	240	250	237
Reunion	619	928	825	825	825	825
Senegal	316	309	310	320	320	317
Southern Rhodesia	849	1 402	1 828	1 900	2 000	1 909
South West Africa	628	547	520	530	540	530
Swaziland	379	489	400	420	420	413
Tanzania: Zanzibar	508	513	300	310	310	307
Togo	167	143	105	115	120	113
Tunisia	1 030	1 134	673	680	690	681
Uganda	230	281	281	281	281	281
Upper Volta	182	187	180	190	200	190
Zambia	1 160	1 635	1 550	1 580	1 600	1 577
OCEANIA						
Australia	1 662	1 812	2 137	2 189	2 250	2 192
Fiji Islands	883	797	703	703	705	704
New Caledonia	1 134	1 157	1 240	1 260	1 300	1 267
New Zealand	2 620	2 677	2 803	2 939	2 924	2 889

[1] Milk yield generally excludes milk sucked by young animals but includes milk fed to them. – [2] Including milk sucked by young animals. – [3] Excluding milk fed to young animals. – [4] Average of two years. – [5] Average yield for cows in milk and in calf. – [6] Average of four years. – [7] 1952.

THE STATE OF FOOD AND AGRICULTURE
SPECIAL CHAPTERS

In addition to the usual review of the recent world food and agriculture situation, each issue of this report from 1956 has included one or more special studies of problems of longer term interest. Special chapters in earlier issues have covered the following subjects:

1956	Some factors influencing the growth of international trade in agricultural products
	World fisheries: general trends and outlook with examples from selected countries
1957	Factors influencing the trend of food consumption
	Postwar changes in some institutional factors affecting agriculture
1958	Food and agricultural developments in Africa south of the Sahara
	The growth of forest industries and their impact on the world's forests
1959	Agricultural incomes and levels of living in countries at different stages of economic development
	Some general problems of agricultural development in less developed countries in the light of postwar experience
1960	Programing for agricultural development
1961	Land reform and institutional change
	Agricultural extension, education and research in Africa, Asia and Latin America
1962	The role of forest industries in the attack on economic underdevelopment
	The livestock industry in less developed countries
1963	Basic factors affecting the growth of productivity in agriculture
	Fertilizer use: spearhead of agricultural development
1964	Protein nutrition: needs and prospects
	Synthetics and their effects on international trade
1966	Agriculture and industrialization
	Rice in the world food economy
1967	Incentives and disincentives for farmers in developing countries
	The management of fishery resources

SALES AGENTS AND BOOKSELLERS FOR FAO PUBLICATIONS

Argentina	Editorial Sudamericana, S.A., Humberto I 545, Buenos Aires.
Australia	Hunter Publications, 23 McKillop Street, Melbourne C.1; Commonwealth Government Printing Office, P.O. Box 84, Canberra, A.C.T.
Austria	Wilhelm Frick Buchhandlung, Graben 27, Vienna 1.
Belgium	Agence et Messageries de la Presse, 14-22 rue du Persil, Brussels.
Bolivia	Librería y Editorial "Juventud," Plaza Murillo 519, La Paz; Libreria Alfonso Tejerina, Comercio 1073, La Paz.
Brazil	Livraria Mestre Jou, Rua Martins Fontes 99, São Paulo.
Bulgaria	Hèmus, 11 place Slaveikov, Sofia.
Cameroon	"Le monde noir," B.P. 736, Yaoundé.
Canada	Queen's Printer, Ottawa.
Ceylon	M.D. Gunasena and Co. Ltd., 217 Norris Road, Colombo 11.
Chile	Biblioteca, FAO Oficina Regional para América Latina. Av. Providencia 871, Casilla 10095, Santiago; Libreria Renacimiento, Amunategui 458, Santiago; Editorial y Distribuidora Orbe Ltd., Galeria Imperio 256, Santiago; Sergio Feliú Cia. Ltda. "Chile Libros," Av. Santa María 281, Santiago.
Colombia	"Agricultura Tropical," Avenida Jiménez Nº 7-25, Ofcs. 811/816, Bogotá; Libreria Central, Calle 14 Nº 6-88, Bogotá.
Costa Rica	Imprenta y Libreria Trejos, S.A., Apartado 1313, San José.
Cuba	Instituto del Libro, Calle 19 y 10 No. 1002, Vedado.
Cyprus	MAM, P.O. Box 1722, Nicosia.
Denmark	Ejnar Munksgaard, Norregade 6, Copenhagen S.
Ecuador	Libreria Universitaria, Garcia Moreno 739, Quito; Su Libreria, Plaza de Independencia, Quito.
El Salvador	Libreria Cultural Salvadoreña S.A., 6ª Calle Oriente 118, Edificio San Martin, San Salvador.
Ethiopia	International Press Agency, P.O. Box No. 120, Addis Ababa.
Finland	Akateeminen Kirjakauppa, 2 Keskuskatu, Helsinki.
France	Editions A. Pedone, 13 rue Soufflot, Paris 5e.
Germany	Paul Parey, Lindenstrasse 44-47, Berlin SW 61.
Greece	"Eleftheroudakis," Constitution Square, Athens; Institute of Scientific Publications, 9 Amerikis Street, Athens.
Guatemala	Sociedad Económico Financiera, Edificio "El Cielito," Despacho 222, Zona 1, Guatemala.
Haiti	Max Bouchereau, Librairie "A la Caravelle," B.P. 111B, Port-au-Prince.
Hong Kong	Swindon Book Co., 13-15 Lock Road, Kowloon.
Iceland	Snaebjörn Jónsson and Co. h.f., Hafnarstraeti 9, P.O. Box 1131, Reykiavik.
India	Oxford Book and Stationery Co., Scindia House, New Delhi; 17 Park Street, Calcutta.
Indonesia	Pembangunan Ltd., 84 Gunung Sahari, Jakarta.
Iran	Economist Tehran, 99 Sevom Esfand Avenue, Tehran.
Iraq	Mackenzie's Bookshop, Baghdad.
Ireland	The Controller, Stationery Office, Dublin.
Israel	Emanuel Brown, formerly Blumstein's Bookstores Ltd., P.O. Box 4101, Tel Aviv.
Italy	Libreria Internazionale Rizzoli, Largo Chigi, Rome; A.E.I.O.U., Via Meravigli 16, Milan; Libreria Commissionaria Sansoni, S.p.A., Via Lamarmora 45, Florence.
Jamaica	Bolivar, 1 Grove Road, Kingston 10.
Japan	Maruzen Company Ltd., Tori-Nichome 6, Nihonbashi, Tokyo.
Kenya	The E.S.A. Bookshop, P.O. Box 30167, Nairobi; University Bookshop, University College, P.O. Box 30197, Nairobi.
Korea	The Eul-Yoo Publishing Co. Ltd., 5 2-Ka, Chong-ro, Seoul.
Lebanon	Dar Al-Maaref Liban S.A.L., place Riad El-Solh, B.P. 2320, Beirut.
Malaysia	Caxton Stationers Ltd., 13 Market Street, Kuala Lumpur.
Mauritius	Nalanda Company Limited, 30 Bourbon Street, Port Louis.
Mexico	Manuel Gómez Pezuela e Hijo, Donceles 12, México, D.F.; Editorial Iztaccihuatl, S.A., Miguel Schultz, 21 México 4, D.F.; Av. Morelos Ote 437, Monterrey, N.L.; Colón 175, Guadalajara, Jal.

SALES AGENTS AND BOOKSELLERS FOR FAO PUBLICATIONS

Morocco	Librairie "Aux Belles Images," 281 avenue Mohammed V, Rabat.
Netherlands	N.V. Martinus Nijhoff, Lange Voorhout 9, The Hague.
New Zealand	Government Printing Office: Government Bookshops at State Advances Building, Rutland Street, P.O. Box 5344, Auckland; 20 Molesworth Street, Private Bag, Wellington; 112 Gloucester Street, P.O. Box 1721, Christchurch; Stock Exchange Building, corner Water and Bond Streets, P.O. Box 1104, Dunedin.
Nicaragua	Librería Universal, 15 de Septiembre 301, Managua.
Nigeria	University Bookshop Nigeria Ltd., University College, Ibadan.
Norway	Johan Grundt Tanum Forlag, Karl Johansgt. 43, Oslo.
Pakistan, East	Shilpa Niketan, 29, D.I.T. Super Market, Mymensingh Road, Dacca-2.
Pakistan, West	Mirza Book Agency, 65 The Mall, Lahore 3.
Panama	Agencia Internacional de Publicaciones J. Menández, Apartado 2052, Panama.
Paraguay	Agencia de Librerías de Salvador Nizza, Calle Pte. Franco No. 39-43, Asunción.
Peru	Librería Internacional del Perú, S.A., Casilla 1417, Lima; Librería La Universidad, Av. Nicolás de Piérola 639, Lima; Librería Studium, Amargura 939, Lima; Distribuidora Inca, Emilio Althaus 470, Lince, Lima.
Philippines	The Modern Book Company, 928 Rizal Avenue, Manila.
Poland	Ars Polona, Krakowskie Przedmiescie 7, Warsaw; Ruch Export-Import Enterprise, Ul. Wronia 23, Warsaw.
Portugal	Livraria Bertrand, S.A.R.L., Rua Garrett 73-75, Lisbon.
Romania	Cartimex, P.O. Box 134-135, Bucharest.
Saudi Arabia	Khazindar Establishment, King Faysal Street, Riyadh.
South Africa	Van Schaik's Book Store Ltd., P.O. Box 724, Pretoria.
Spain	Librería Mundi-Prensa, Castelló 37, Madrid; Librería Agrícola, Fernando VI, 2, Madrid 4; José Bosch, Librero, Ronda Universidad 11, Barcelona; Librería General, S. Miguel 4, Saragossa.
Sweden	C.E. Fritze, Fredsgatan 2, Stockholm 16; Gumperts A.B., Göteborg, Universitetsbokhandel, Sveavägen 166, Stockholm Va.
Switzerland	Librairie Payot S.A., Lausanne and Geneva; Hans Raunhardt, Kirchgasse 17, Zurich 1.
Syria	Librairie Internationale, B.P. 2456, Damascus.
Tanzania	Dar es Salaam Bookshop, P.O. Box 9030, Dar es Salaam.
Taiwan	The World Book Company Ltd., 99 Chungking South Road, Section 1, Taipeh.
Thailand	FAO Regional Office for Asia and the Far East, Maliwan Mansion, Bangkok; Suksapan Panit, Mansion 9, Rajadamnern Avenue, Bangkok.
Togo	Librairie du Bon Pasteur, B.P. 1164, Lomé.
Turkey	Librairie Hachette, 469 Istiklal Caddesi, Beyoglu, Istanbul.
Uganda	The E.S.A. Bookshop, P.O. Box 2615, Kampala; University Bookshop, Makerere University College, P.O. Box 16031, Kampala.
United Arab Republic	Librairie Hachette, 45 bis rue Champollion, Cairo.
United Kingdom and Crown Colonies	Her Majesty's Stationery Office, 49 High Holborn, London, W.C.1; 423 Oxford Street, London W.1; P.O. Box 569, London, S.E.1. (Trade and London area mail orders); 13a Castle Street, Edinburgh, 2; 109 St. Mary Street, Cardiff CF1 1JW; 7-11 Linenhall Street, Belfast BTZ 8AY; Brazennose Street, Manchester, 2; 258-259 Broad Street, Birmingham 1; 50 Fairfax Street, Bristol 1.
United States of America	Columbia University Press, International Documents Service, 136 South Broadway, Irvington on Hudson, N.Y. 10533.
Uruguay	Editorial Losada Uruguaya S.A., Colonia 1060, Montevideo; Barreiro y Ramos, 25 de Mayo esq. J.C. Gómez, Montevideo; Librería Albe, Soc. Com., Cerritos 566, Montevideo.
Venezuela	Suma S.A., Calle Real de Sabana Grande, Caracas; Librería Politécnica, Apartado del Este 4845, Caracas; Librería del Este, Pericás S.A., Av. Fco. de Miranda 52, Edificio Galipán, Caracas; Librería Técnica Vega, Plaza Las Tres Gracias, Edificio Odeón, Los Chaguaramos, Caracas.
Yugoslavia	Yugoslovenska Knjiga, Terazije 27/11, Belgrade; Prosveta Export-Import Agency, Terazije 16, Belgrade; Cankarjeva Zalozba, P.O. Box 201 - IV, Ljubljana.
Other countries	Requests from countries where sales agents have not yet been appointed may be sent to: Distribution and Sales Section, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

FAO publications are priced in U.S. dollars and pounds sterling. Payment to FAO sales agents may be made in local currencies.

Price: $5.75 or 46s. PP/74303/8.68/E/1/6600