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FOREWORD

Just as in 1963 the World Food Congress brought the problem of hunger and malnutrition to the center of the world stage, this year attention has been focused by the United Nations Conference on Trade and Development on the problems of international trade as a key factor in economic development.

The proximity of these two great conferences has brought out how closely linked are the problems with which they dealt. Freedom from hunger can come only from the economic development of the poorer countries, where at present the health and well-being of so many of the population are severely impaired by the inadequacy of their diets. Although foreign aid can help greatly in increasing the rate of development in these countries, this depends still more on the foreign exchange they are able to earn from their exports, which is needed to import essential capital goods for the execution of their development plans. In most of the developing countries foreign exchange earnings come predominantly from the export of agricultural products.

For many years now the agricultural export earnings of the developing countries have been increasing only very slowly, especially in terms of their purchasing power for industrial products, and have failed to provide them with their requirements for a satisfactory rate of economic development. The causes of this situation have been examined in detail in past issues of this report. This year's review chapter again gives particular attention to trade questions, and especially to an analysis of the trade policies of both the developing countries and the economically more developed countries over the last decade.

Recent movements in world prices for agricultural products are also discussed in some detail. In a sharp reversal of past trends, these prices have now been rising since the end of 1962. FAO's preliminary estimates indicate that for agricultural products as a whole world prices averaged 8 percent more in 1963 than the year before. How far this welcome upswing in agricultural prices in fact reflects lasting changes in the world market in favor of agricultural exports, and how far it is a temporary break in the long-term downward trend, cannot yet be seen with any certainty. For most commodities, however, there is little to suggest that there has been any change in the basic long-term factors that largely determine the growth of demand in the main importing countries.

One of these factors, and one which has had a major influence in limiting the growth of agricultural trade, is the development of synthetic substitutes for agricultural products, especially for those used as industrial raw materials. This is studied in a special chapter in the present report, which was originally prepared as part of the documentation provided by FAO for the United Nations Conference on Trade and Development. The question of synthetic substitutes gave rise to some important recommendations of that conference, and a summary of these and other recommendations affecting agricultural trade will be found in Chapter II of the present report.

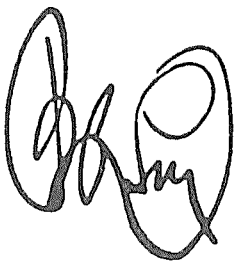
Another special chapter, entitled "Protein nutrition: needs and prospects," deals with one of the most crucial aspects of freedom from hunger. It is an aspect that probably concerns the health and efficiency of future generations even more than an overall shortage of food, for it particularly affects young children and expectant and nursing mothers. The chapter's conclusion, in line with what was said above about hunger and malnutrition in

general, is that economic development and higher incomes are the ultimate answer to protein malnutrition.

The achievement of the objectives of the current United Nations Development Decade, which calls for an annual rate of economic growth of 5 percent, would take us a long stride toward this goal. However, progress so far is generally less than was hoped. A 5 percent rate of overall growth entails an only slightly less rapid expansion in the agricultural sector. FAO's latest indices of agricultural production confirm that, in contrast to earlier increases in per caput production, for five years now world agricultural production has done no more than keep up with the annual population growth of about 2 percent. There has been little or no margin for the improvements in nutrition and general levels of living that are so badly needed. What causes special concern is that in many of the developing countries where the need is greatest the expansion of food and agricultural production has been even slower than the disappointing world average.

How to step up agricultural expansion in these countries and apply to their generally primitive agricultures the fruits of modern science and technology has been studied in its various aspects in many previous issues of The state of food and agriculture. *This year, as usual, there is a review of the new development plans and other policy measures that have been introduced to this end. This reveals the wide range of problems that have to be tackled, and the efforts of many of the developing countries to replace as quickly as possible outmoded land tenure systems and other institutions ill adapted to the needs of twentieth century agriculture.*

In this task, the assistance, both technical and financial, of the more advanced countries is urgently required. Agriculture has often in the past received less than its due share of financial resources, and one of the most encouraging developments in the recent food and agricultural situation has therefore been the decision of the International Bank for Reconstruction and Development to devote a greater share of its resources to projects in the agricultural sector. This has already given rise to the establishment, earlier this year, of a new co-operative program between FAO and the International Bank designed to identify and help to elaborate a much larger number of agricultural projects for Bank financing.



B. R. SEN
Director-General

Chapter I. - SUMMARY

Chapter II. - World review and outlook

AGRICULTURAL PRODUCTION

The preliminary estimates made by FAO indicate that agricultural production rose by only 1 to 2 percent in 1963/64 in the world excluding Mainland China. In eastern Europe and the U.S.S.R. the weather was particularly adverse in 1963/64, and agricultural production is estimated to have fallen in comparison with the year before. Production is estimated to have increased in each of the other main regions of the world but, as in several past years, the biggest gains were not in the developing regions where they are most needed but in North America and Oceania. In Mainland China there are still no official statistics of agricultural production, but it appears that there was a further increase in 1963/64.

The 1963/64 season is the fifth in succession in which there has been no significant change in world agricultural production on a per caput basis. In the developed regions per caput agricultural production has changed little during the past five years, although there has been a fairly steady rise in western Europe. In the developing regions also there has been little change in per caput production except for a sharp decline in Latin America, where the growth of population is higher than in any other major region. Agricultural production per caput is now a good deal higher than before the war in each of the developed regions and also in the Near East and Africa. The necessity to continue to make comparisons with the prewar level arises because this level has still not been regained in either the Far East or Latin America, although if food products alone are considered the prewar per caput level was briefly touched in both regions in a single year of particularly favorable harvests.

Especially since problems of international trade have recently been even more than normally prominent, it is of interest to compare the relative progress of production for export and for domestic consumption in the developing countries. Although there are insufficient data for detailed comparisons, an approximate idea can be obtained from the trends for some of the main commodities. No very clear picture emerges except in Africa, where the most rapid increases appear to have been in the production of commodities that are mainly exported. At least in terms of broad regions it seems that, with the exception of Africa, the tendency of governments to devote a high proportion of resources to the encouragement and assistance of export production, has not resulted in any notable disparity in the growth of production for export and for domestic consumption. It is likely, therefore, that the disparity is more on the demand side, between the slow growth of demand in the industrialized countries, which are the main markets for exports of agricultural products, and the much more rapid growth of domestic demand in the developing countries.

Among the main agricultural commodities, the largest increases in world production (excluding Mainland China) in 1963/64 were for maize, rice, sugar, cocoa, jute and apples. The production of wheat, oats, wine and coffee declined, but for most other main commodities there was little change from the 1962/63 level.

The world fish catch is estimated to have increased by somewhat less in 1963 than the very large expansions of the past four years. Preliminary estimates place the world catch at about 46 million tons, which would be about 3 percent more than in 1962.

World roundwood removals are estimated to have risen by only about 1 percent in 1963. Fuelwood production was almost unchanged, but removals of industrial wood rose by about 2 percent. North America and the U.S.S.R. accounted for most of the increase in industrial wood removals. World production of all manufactured and semimanufactured forest products rose in 1963, the largest gains being in the output of sawn softwood, wood pulp, and paper and paperboard.

It is still too early to form any clear picture of the likely level of the 1964/65 harvests. In western Europe there are generally good prospects for grain production, with large increases in wheat production over the low 1963/64 level. In the U.S.S.R. also prospects for grain production in 1964/65 are reported as good, and there have been substantial increases in the sugar-beet acreage in the U.S.S.R. and both eastern and western Europe. The United States wheat crop is expected to be about 12 percent above the reduced 1963/64 level, but declines are forecast for most other grain crops. As a result of damage by frost, fire and drought, a substantial drop is expected in Brazil's 1964/65 coffee crop. In India the current food situation presents disturbing aspects; there have been heavy losses in the spring crops because of inadequate rains and an unprecedented cold wave in the north, and food shortages have been especially severe in Rajasthan, Maharashtra and West Bengal. In the Near East the winter and spring rains were very favorable, and large harvests are generally expected in 1964/65.

Changes in stocks

There appears to have been a further slight reduction during 1963/64 in the overall level of unsold stocks of agricultural products. Movements differed rather sharply, however, among the main commodities of which there are large stocks. There were substantial reductions in stocks of wheat and also of dairy products. On the other hand, the level of stocks of coarse grains turned upward again and cotton stocks increased further. Most other stocks on which data are available showed only small changes in 1963/64, but there is very little information on the stocks of some important commodities, in particular coffee.

Economic activity and the demand for agricultural products

In mid-1964 economic activity was at a high level in most industrialized countries. In the United States the steady increase in economic activity that has gone on for more than three years, the longest period of expansion in peace time, showed no sign of coming to an end, and in both Canada and the United States a continuing though probably slower expansion at relatively stable prices is expected for 1964/65. Expansion continued in western Europe in 1963 for the fifth year in succession, and in spite of the restrictive measures that have been necessary in a number of countries economic growth is likely to continue at about the same rate in 1964, though there may be a slight reduction in the rate of growth in 1965.

The developing countries have benefited from the larger demand and higher prices for food and agricultural products. Many of them, however, have in recent months been faced by mounting inflationary pressures, often with detrimental effects on the execution of their development plans, and have been forced to take various short-term measures, mainly fiscal and monetary, to remedy the situation.

Food supplies and consumption

Whereas in the developed regions the increase in per caput food production over the prewar level has been greater than that in apparent consumption (i.e., per caput food supplies), in the developing regions the contrary is the case and food supplies per caput have improved somewhat more than production. Thus in both Latin America and the Far East (excluding Mainland China), where per caput food production remains below the prewar level, per caput supplies in 1961-63 are estimated as slightly greater than before the war. The increase in per caput supplies appears to have been greater, however, in the developed regions considered as a group than in the developing group, which suggests a widening of the gap between their food consumption levels in comparison with the prewar period.

In the shorter run there are generally only small changes in per caput food supplies. While there have been only very small changes in the total calorie and protein content of diets, however, shifts in the relative contribution of the different food groups have been more marked. Particularly striking are the increases in meat consumption which have occurred in many European countries, especially those in the southern part of the region.

International trade in agricultural products

For the year 1963 as a whole, the average export unit value (price) of all agricultural products was no less than 8 percent higher than in 1962. This

was the first major upturn in the average price level since 1951. Since the prices of manufactured products in international trade remained stable, the purchasing power of agricultural products in terms of manufactures (the "terms of trade") rose in the same proportion, thus regaining more than one third of the 22 percent loss suffered over the previous decade. Present indications based on market price indices are that this rise in prices continued until the first months of 1964, after which a slight decline set in.

Although the steep rise in sugar prices was an important factor contributing to the higher average for 1963, a remarkable feature of the increase was its widespread incidence. The effect of the higher prices on the value of trade was reinforced by an increase of about 4 percent in 1963 in the volume of agricultural trade to the highest level yet recorded. Total earnings from agricultural exports (excluding those of the U.S.S.R., eastern Europe and Mainland China) thus rose by 10 percent over the 1962 level.

As in most recent years, the largest gains in exports were made by the economically advanced countries of western Europe and North America, as well as Oceania. The combined exports of these regions rose by 9 percent in volume and 14 percent in value. Export earnings increased by 6 percent in Latin America, 10 percent in the Near East and 12 percent in Africa, but in the Far East (excluding Mainland China) they showed no significant rise over the preceding year's level.

The increased value of trade was particularly influenced by the high prices for sugar and by an increase of more than a quarter in the volume of trade in wheat, mainly because of a sharp increase in exports from North America and Australia to the U.S.S.R., where there was a poor grain crop. Smaller but still substantial increases were also recorded in the value of world exports of dairy products and wool.

The volume of world trade in forest products rose by some 7 percent in 1963, compared with an increase of 3 percent in 1962. Prices for most forest products were either stable or somewhat higher than in 1962, so that the total volume of world trade in forest products rose in roughly the same proportion. Trade in fisheries products continued to expand in 1963, especially the exports of frozen fish and fishmeal.

The sharp upturn of agricultural prices in world markets has naturally led to widespread discussion as to whether 1963 marks a turning point in the long downward trend in the prices and terms of trade for agricultural products. While it is too soon to reach any final judgment, it seems important to bear in mind that for a good many commodities, including some of those whose prices have gone up most sharply, the rise is largely explicable by changes in supply and demand relationships which do not seem likely to be of a long-term nature. The prices of some of these products have, in fact, already declined from the high levels of 1963. For some commodities, on the other hand, including sisal, wool, and meat, firmer markets may persist longer. Some factors which may tend to maintain prices in the longer run include some recent developments in commodity policy, including the entry into force of the International Coffee Agreement. A major unknown element is the future imports of the centrally planned countries.

It appears that the marked growth in the volume of exports has in itself been an important contributing factor to the long-term fall in prices that was interrupted in 1963 for the first time in many years. The developing regions as a whole would in all probability have received higher earnings from a smaller volume of exports, even though individual countries (especially new exporters) may have increased their share of the market and total receipts of foreign exchange.

The chapter includes a review of agricultural trade policies over the past decade or so, which shows how the developing countries, in largely unilateral attempts to maximize their export earnings in the face of slowly growing demand in their main markets, have been frustrated by a steady weakening of prices, intensified by their own efforts to increase the volume of exports. Economically advanced countries, concerned principally with supporting the income levels of their own farmers, have shifted much of the burden of adjustment on to international markets by means of import controls and export assistance. International measures to deal with trade problems have developed only slowly and have been unable to deal with the pressing problems of falling terms of trade for primary products, and the insufficient growth of the export earnings of the developing countries.

It was against this background that the United Nations Conference on Trade and Development was convened in the spring of 1964. The chapter includes a summary of the most relevant parts of the Final Act of the Conference. While revealing the sharply divergent views of developed and developing coun-

tries on many questions of trade and aid, the Conference brought home forcefully the urgency and magnitude of the development problems of the economically less advanced countries and the key role of trade in providing the sinews for economic growth. The recommendations adopted by the Conference (although with reservations on the part of some governments) went in many respects well beyond the accepted " philosophy " of international relations in the field of trade, aid and development. Although individually the innovations may be small, it is by such small steps that progress in intergovernmental relations is usually achieved, and there can be little doubt that in years to come the Conference and the new machinery it established will be considered an important milestone in the development of international economic co-operation.

Farm prices and incomes

As in the previous year, prices received by farmers increased in 1963 in most of the countries for which data are available. There were especially sharp increases in some parts of western Europe, but Canada, Ireland, Portugal and the United States were exceptions to the general rising trend in farm prices.

While increases in prices received by farmers seem to have been particularly widespread in 1963 and 1963/64, it should not be concluded that there was necessarily a general improvement in the economic situation of farmers. The prices which they have to pay for production requisites, wages, interest, taxes and other farm expenses have continued to rise in all of the countries for which such data are available.

Recent data on farm incomes are available for very few countries, all of them developed countries. In almost all of those countries for which data are available, farm incomes increased in 1963 or 1963/64. In many countries, however, per caput incomes in agriculture appear to be losing ground in relation to those in the rest of the economy.

Consumer prices

Consumer prices in 1963 and the early months of 1964 appear generally to have reflected the increases in farm prices and export prices, and rapidly rising prices have caused difficulties in a number of countries. In no less than 74 of the 85 countries for which there are data for 1963 the cost of living averaged higher than in 1962. A significant feature is that in rather a large number of countries the increase in retail food prices was greater than in the general cost of living, suggesting that in many cases rising food prices were a main cause of the general increase in prices. Many government measures have recently been taken in an attempt to stem the rise in prices.

Agricultural policies and development plans

In the EEC (European Economic Community) the gradual elaboration of the details of the common agricultural policy has continued during 1963/64. In December 1963 regulations were agreed for three further commodity groups (dairy products, beef and veal, and rice), as well as the general principles of the regulations for fats and oils. The main outstanding question remains the harmonization of grain prices within the Community, on which a decision has once again been deferred.

In the United States the search continues for long-term policies that will bring a better balance between supplies and requirements of surplus commodities and at the same time increase farm incomes and rural welfare. Meanwhile further temporary programs have been introduced for wheat and cotton for the 1964/65 and 1965/66 crop years.

Increases in prices have been particularly widespread in 1963/64 under the various systems of price support in both developed and developing countries. In the United Kingdom the new policy, announced in May 1963, of applying the concepts of " standard quantities " and " graduated deficiency payments " to support for domestic producers and arranging with exporters to regulate their shipments to the United Kingdom market, has begun to be implemented.

In the U.S.S.R. measures to re-establish the former more rapid momentum of agricultural expansion have been widely discussed in 1963/64, in particular measures for the intensification of agricultural production. Attention has centered especially on the special seven-year plan for the development of the chemical industry, under which greatly increased supplies of fertilizers, insecticides and other agricultural chemicals are expected to become available.

A large number of new economic development plans have been announced during 1963/64. Modifications in planning organizations and machinery have continued, especially in the Latin American countries. A number of countries are also engaged in the elaboration of long-term perspective plans. Although evaluation reports on the progress of plans are becoming more frequent, there is still far too little information on their implementation. During the period under review, however, there have been rather widespread reports of financial difficulties, caused in part by inflationary tendencies. Among measures for the implementation of agricultural plans, the improvement of land tenure conditions and of credit supplies continue to be prominent. In some Latin American countries a difficulty in the execution of land reform programs is proving to be the devising of a suitable system of compensation for expropriated land, since cash payments tend to accentuate inflation and payment in bonds is often unacceptable because of the inflation already under way.

Chapter III. - Protein nutrition: needs and prospects

Within the pattern of hunger and malnutrition in the developing countries the greatest problem is that which results from inadequate protein in the diets of a large proportion of the population. It concerns the health and efficiency of future generations more specifically than an overall shortage of food, for it particularly affects young children and expectant and nursing mothers.

While it is difficult to arrive at a precise estimate of the world's "protein gap," there is no doubt that it is so large that any interim targets established for the next few decades are in no danger of overfilling it. Economic development, bringing higher incomes, is the ultimate answer to protein malnutrition. At the same time, however, there is much that governments can do to improve the situation in the shorter run.

Present knowledge of protein nutrition

Proteins are essential to life, and every cell in animals and plants is composed in part of these large molecules compounded in differing proportions from more simple units called amino acids. Food proteins are used as a source of energy through conversion to carbohydrate and fat, but their main role is in the growth and maintenance of the human body, for which they are essential. They are the body's source of nitrogen.

Although proteins are one of the most important components of a diet, they cannot be considered in isolation. The nutritive value of the proteins in a mixed diet is affected by the amounts of other dietary constituents, such as the energy-yielding nutrients, minerals, and vitamins.

The most severe clinical forms of protein deficiency in young children are kwashiorkor and marasmus, which cause many deaths in developing countries. In general, marasmus results from the consumption of diets markedly deficient in both protein and calories, whereas kwashiorkor results when the deficiency of protein is severe in relation to that of calories. Reduced growth rates from around six months to adolescence, and poor general physical and possibly also mental development can also be attributed in large part to diets containing inadequate amounts of protein of good quality. Although the needs of adults for proteins of high nutritional value are less than those of children in relation to body weight, their health, ability to resist disease and working efficiency are seriously impaired if their diets do not provide enough of the proteins they need.

The determination of protein requirements is a complex question, though a good deal of progress has been made in recent years. The chapter includes a summary of the findings of the Joint FAO/WHO Expert Group on Protein Requirements, which met in October 1963. Requirements per unit of body weight have been estimated for the different age groups, with additional allowances for pregnant and nursing mothers.

The nutritive value of a food, in terms of protein, is dependent both on the quantity of protein contained in it and on its quality. The protein content of different foods varies considerably. Grains contain much more protein than starchy foods such as cassava, potatoes, and sweet potatoes. Animal prod-

ucts, pulses, oilseeds, nuts, and (on a moisture-free basis) leafy vegetables have a high content of protein. While there are a number of exceptions, the quality of proteins is generally in the ascending order: starchy foods, grains, pulses, oilseeds, and animal products.

Protein consumption levels

Protein supplies are estimated to range from 105 g per caput per day in New Zealand to 45 g in Ceylon among the countries for which food balance sheets are available. For animal protein alone, which gives a rough indication of the quality of the protein supply, the variations are even wider, ranging from 72 g in New Zealand to as little as 6 g in India. The proportion of total protein obtained from animal foods, which is a further indication of the quality of the protein supply, varies from 70 percent in the United States to 12 percent in India. Generally there is a positive correlation between the total protein intake and the percentage of animal protein.

In the economically more developed regions, where protein intakes are the highest, they have increased by about 6 percent since before the war. In the developing regions, where greater supplies of protein are most needed, they are estimated to have declined by about the same percentage.

About 70 percent of the world's supply of protein is estimated to come from vegetable sources and about 30 percent from animal sources. Grains, which are the staple food in most countries, are also by far the major source of protein, furnishing almost half of the world's total supply. Pulses, oilseeds, and nuts provide about 13 percent of the world's protein supplies, starchy roots about 5 percent, vegetables and fruit about 3 percent, meat about 13 percent, dairy products about 11 percent, eggs about 2 percent, and fish about 3 percent.

It appears that the available supplies of protein exceed average requirements on a per caput basis in almost all of the countries for which there are data. However, national average figures do not necessarily reveal the real situation so far as the most vulnerable sections of the population are concerned, because the distribution of the available supplies for consumption by different physiological and socioeconomic groups may not be in accordance with needs. It is probable that even on a world basis the total available supplies of protein are enough to satisfy the calculated requirements of the whole population. In actual fact, however, many people consume much more protein than they need, and supplies must be sufficient to take account of this as well as to satisfy minimum requirements.

Among the factors affecting protein consumption, income levels have a substantial influence. If protein consumption in different countries is plotted against income, total protein intakes are found to rise sharply up to a per caput income level of about U.S.$1,000 per year, but after that they flatten out. Intakes of animal protein show a close relationship with income over the whole range of incomes.

Income levels influence not only total protein consumption but also its composition. There are many studies indicating that as incomes rise there is a gradual shift from the cheaper foods, such as starchy roots, grains, and pulses, to more expensive ones, in particular animal products, and consequently to sources of more and better protein.

There is also evidence of differences in protein consumption between urban and rural areas. Per caput consumption of animal protein is generally higher in urban than in rural areas, mainly because of higher average incomes. On the other hand, the per caput consumption of protein from all sources is usually greater in rural areas.

Prospects for increasing protein supplies and consumption

While grains directly provide nearly half of man's total supply of protein, they are also indirectly the source of much of the protein provided by livestock products, for almost half of the world's grain crop is fed to animals, mainly in the developed countries. In their role as the staple foods of most of mankind, the various grain crops will continue to be the main sources of protein in the foreseeable future. It is unlikely, however, that their proportional contribution to the world's protein supplies can be greatly increased. There is a limit to the amount of such relatively bulky foods a person can consume (especially the young children who suffer most from protein malnutrition in developing countries), while with rising incomes the consumption of grains tends to decrease. Grains are likely to have their main importance as a source of additional supplies of protein in those tropical areas where the staple foods are now starchy roots, which have a much lower content of protein.

Many of the leafy vegetables have a high content of protein on a moisture-free basis. As with grains, their potential contribution to the world's protein supplies is limited by their bulky nature, but their consumption is still very small in many areas, and quite considerable increases are both desirable and possible.

Pulses, oilseeds, and nuts are the main protein-rich vegetable crops. They have much to contribute to the relief of protein malnutrition in many areas where high-priced animal products cannot be afforded. Pulses are very adaptable crops, and much can be done to increase their availability through relatively simple and low-cost measures. Some oilseeds, such as soybeans, contribute significant amounts of protein to the diets in some countries, but the bulk of the potential protein supplies from oilseeds in developing countries is exported in the form of whole oilseeds or oilcakes.

Clearly the developing countries, and especially the densely populated ones, are unlikely in the foreseeable future to be able to afford to devote so large a proportion of their agricultural resources to livestock production as is done in the richer countries, and vegetable sources of protein are likely to remain of greater importance than in these countries. Because the expansion of milk production in developing countries is likely to take a long time, imported milk products may have an important role for some time to come in many of these countries. This applies particularly to dried skim milk, which is not only available cheaply as a commercial import but also under concessional terms. It does not appear that meat production in the developing countries can be increased very rapidly in the immediate future, even though there are many relatively limited areas where well-chosen measures would produce worthwhile results quite quickly. Rapid improvements in poultry production have recently been made not only in the industrialized countries but also in many developing countries. However, large-scale intensive systems of poultry production require a regular market and also supplies of balanced feed mashes, and it is therefore probable that for some time to come their possibilities can be realized in the developing countries only in the vicinity of large towns.

The future potential of fish and other aquatic products as human food is of particular interest as they do not compete for land resources with other food and agricultural products. Future supplies will depend to a large extent on the success of further efforts to locate and exploit stocks that are so far not utilized, especially in tropical and Southern Hemisphere waters. Much remains to be learned about the resources in these waters. In the longer run technical progress may make various methods of modifying the resources of the sea a practicable means of obtaining a very large expansion of the world's protein supplies.

Much attention has been focused in recent years on the development and production of inexpensive protein concentrates from products, up to now inadequately exploited, which could be used as human food if carefully processed. Such protein concentrates have recently been developed in a number of countries from indigenous products such as oilseed meals and presscakes, and fish flour. They may either be treated so that they are flavorless and odorless for inclusion in staple foods, or they may be so processed as to retain their distinctive flavor and sometimes odor, and as such they are often attractive as a " relish. "

The production of protein from unconventional sources is also being closely studied for eventual possible utilization in human feeding. Generally, a main problem is one of acceptability by man, and it may well be that such sources of protein will provide large quantities of animal feed in the future.

Better marketing and related facilities are of particular importance in improving protein nutrition. Many of the most valuable sources of protein are highly perishable, and their marketing calls for special storage arrangements, especially in tropical climates. Many protein products must be dried, smoked, salted, or canned, if they are to reach consumers in good condition. Large quantities of protein foodstuffs are lost because of poor handling and marketing methods. The cost of packaging and distributing certain protein products in consumer-sized lots can in practice often have a greater influence over the final price than either raw material or processing costs. Many products call for the employment of special transport methods and facilities. The continuance of systems of marketing adapted to conditions which no longer prevail often acts as a brake on the provision of more protein at lower cost to the people who need it.

Even where foods rich in protein of high quality are readily available at a cost which puts them within reach of the mass of the population, vulnerable groups may continue to suffer severe protein malnutrition. Consumer education in nutrition is needed in order to influence food habits toward the consumption

of sufficient quantities of foods which are cheap sources of good quality protein. In the case of the very large part of the world's population who grow most of their own food, such education has to go hand in hand with agricultural and home economics extension to persuade and assist them to produce such foods themselves as well as to use them.

In the case of a new food, careful testing of its acceptability to consumers is essential, including testing of the appropriate channels of sale and distribution, and whether consumers are ready to buy it at the price at which it is offered or whether subsidized or free distribution would be necessary. In many cases campaigns to promote the consumption of new protein-rich foods, as well as general programs of nutrition education, may need to be combined with programs for the direct provision of protein-rich foods to needy groups, for example through school-feeding programs and the supply of protein supplements to those attending mother and child health centers.

Protein is one of the more costly elements in the diet. Generally speaking, animal protein costs several times as much as vegetable protein, reflecting the heavy demands its production makes on agricultural resources. Important exceptions, however, appear to be dried skim milk and certain fish products, such as dried fish and fish flour.

Orientation of food supplies to meet nutritional needs

Among the steps that can be taken by governments to improve protein nutrition, a first essential is to obtain a clear picture of the protein supplies needed to cover the nutritional needs of the population. However, in most developing countries this can only provide a guideline of a very long-term nature, because so many of the population are far from being able to afford the quantities of protein they need. In addition to the long-term target that will cover all nutritional needs for protein, it is therefore necessary also to set shorter term targets of what seems feasible in the light of consumer purchasing power.

The *Third world food survey* published by FAO contains targets for protein supplies which provide a striking illustration of the size of the increases that are needed. For these vastly increased supplies to become available entails the application of modern science and technology to the world's agriculture on a hitherto unprecedented scale. It entails also the removal of many institutional barriers to progress. Thus, although protein malnutrition can be overcome only through the higher purchasing power that may be expected to result from economic development, there is much for governments to do to insure that the necessary supplies are available to meet the growth of purchasing power.

There is also much that governments can do to improve the situation in the shorter run, in particular with the aim of making better use of the existing protein supplies, through such measures as the improvement of marketing and related facilities, consumer education in nutrition, and extension work aimed at the diversification of subsistence production. They also have a role in the development of new cheap sources of protein and in arranging, where appropriate, for the protein-enrichment of the staple food. Free or subsidized distribution of protein-rich foods, for example through school-feeding programs and mother and child health centers, is also often desirable in order to improve the protein nutrition of the most vulnerable groups of the population.

Chapter IV. - Synthetics and their effects on agricultural trade

Competition from increasing production of synthetics has, in recent years, proved to be a considerable threat to exports of agricultural raw materials, principally cotton, wool, jute and allied fibers, hard fibers (mainly abaca) and rubber. The exports of these items were valued at about $5,600 million in the period 1959-61. More than half of the total and almost the entire production of rubber, jute and allied fibers, and hard fibers originated in developing countries, where they accounted for 30 percent of total exports of agricultural products. Synthetic production, on the other hand, is heavily concentrated in developed countries and in centrally planned countries.

The principal synthetics, or more strictly man-made materials, considered in the chapter are synthetic rubber, man-made fibers, and synthetic detergents. Each of these includes a range of different materials which (and this is one of the chief advantages of synthetics) may be "tailored" to meet the requirements of specific end-uses. Another advantage stems from the factory conditions of production of synthetics which permit a greater degree of quality control than is possible with growth under natural conditions, and hence substantial savings in processing costs. Combined with their greater strength and consequently smaller losses in processing, this results in greater utility poundage, weight for weight, than the alternative natural products. Their greater utility poundage, together with the fact that they are longer lasting, partly explains why synthetic fibers have been able to make such great market gains despite their relatively high prices. Another advantage is their marked price stability in contrast to the wide fluctuations in prices of natural products.

Remarkable rates of growth have been achieved in synthetic production over the last decade, unmatched by their natural counterparts even in the prosperous 1920s before the advent of synthetics. The point has now been reached where many individual markets formerly held by natural products have virtually been completely lost to synthetics. The situation varies from country to country, but such losses are of particular importance in the passenger car tire, tire cord, and detergent markets in the United States. There are, however, still many areas where the encroachment by synthetics has assumed little importance; the blending of natural and man-made materials, which is becoming increasingly common, can help stem the losses.

When assessing the effects of this competition on the demand for agricultural raw materials it is necessary to keep in mind the fact that the markets shared by these natural and synthetic products have grown faster than those of some of the important food products, and that the sharp fall in the share of natural products is only partly due to competition from synthetics. Investment in the production of agricultural raw materials in developing countries has also been limited by deliberate policies of diversification, sometimes in favor of food crops, the shyness of foreign capital, and various noneconomic factors. Markets would have been available for larger quantities of cotton and wool, for example, had these been available.

Looking to the future, the prospects for exports of agricultural raw materials from the developing countries will depend in part upon the growth of the overall market which, with the possible exception of soap-making materials, appears favorable. It is probable, however, that synthetics will further increase their share of the total.

Rubber

Synthetic rubber production outside the centrally planned countries increased by a little more than 150 percent between 1952 and 1963. It was confined to the United States and Canada until 1957, but it was later introduced into western Europe, Japan, Australia, Brazil, and India, and there is also a substantial production in the centrally planned countries. Exports, too, were virtually a monopoly of the United States and Canada until 1959, the only other important surplus producer outside the centrally planned countries being the Federal Republic of Germany. Most of the new producing countries sell some of their output on the world market, but by 1962 only Italy and the Netherlands had achieved export balances. The volume of trade in synthetic rubber now amounts to almost one quarter of the trade in natural rubber.

Total elastomer consumption nearly doubled between 1952 and 1962, and although the United States remained the largest single consumer, rates of growth were much faster elsewhere in the world. Synthetic rubber's share increased from 38 percent to about 50 percent between 1952 and 1962, although wide differences still exist from country to country.

A comparison of trends in prices of synthetic and natural rubber shows the well-known contrast between the stability of the former and the wide fluctuations of the latter. Comparisons of the absolute levels of the two should be made with caution, however, as quoted synthetic prices do not reflect the widely varying terms and discounts which are involved in their sales. In addition, the bulk of the natural rubber consumed in tire factories is of the lower grades, while the synthetic used is generally of the even cheaper oil-extended type.

It is difficult to generalize about the effects that competition from synthetics have had on trade in natural rubber. The volume of exports of the latter has shown a small rise during the period 1952-63, in accordance with the trend in production. Imports into the United States during the same period halved, but this can be blamed only in part on synthetics;

releases from government stockpiles have also been important. In compensation, there has been a simultaneous growth of imports into the centrally planned countries, where the planned expansion of synthetic rubber capacity was not achieved.

As far as the future is concerned, three factors appear likely to influence the competition between synthetic and natural rubber. Firstly, the inherent tendency toward oligopoly and the extensive amount of vertical integration in the synthetics industry necessarily gives it a competitive " edge " on natural rubber, whose producers sell their product on an open market dominated, on the demand side, by the synthetic producers. Secondly, the structure of the industry has lent itself admirably to a heavy concentration of effort and expenditure upon research and development. Thirdly, while natural rubber has been able to command a price premium over styrene-butadiene rubber (SBR), and will probably continue to do so, it will soon have to compete in price with the new stereos. This means that relative costs of production will assume critical importance.

Yet, no matter what the competitive situation is between synthetic and natural rubber, projections of production and consumption clearly indicate that the natural rubber industry could not possibly meet the demand for elastomers which is likely to develop between now and 1970. The important question for natural rubber producers is whether the synthetic industry is likely to expand so rapidly in the future as to seriously depress prices and to give rise to major disposal difficulties for the natural product.

Apparel fibers

The man-made competitors of natural apparel fibers are the cellulosics (viscose and acetate rayon) and noncellulosics (true synthetics). Although none of them has all of the properties of either wool or cotton, all have some in varying degrees and some have additional ones.

In 1962 world production of man-made fibers is estimated to have reached 3.9 million tons (three times that of wool but only 36 percent as much as cotton); about one sixth of this moved in international trade. Of the total, 2.9 million tons represented rayon production and just over 1 million tons, synthetics. The most rapid growth during the period 1952-62 was achieved by the latter, largely because of the expansion of nylon, which accounts for 56 percent of the total. Production is still limited to a comparatively small number of countries with the result that the proportion of total output of synthetics that moves in international trade has expanded considerably.

Total world consumption of apparel fibers (natural and man-made) increased by more than 50 percent between 1952 and 1962. This is about the same rate of increase as in production, and is somewhat faster than the growth in population. All the main fibers participated in the expansion, although the advance in man-made fiber consumption (and particularly synthetics) was more rapid than that of the others. Thus by 1962 natural fibers accounted for roughly three quarters of total consumption, compared with almost 85 percent in 1952.

Data on movements in prices of natural and man-made fibers in the United States and the United Kingdom indicate the greater price stability of the latter group as well as their almost uninterrupted downward trend in recent years. Comparisons between their absolute levels are complicated by the fact that man-made fibers, and particularly synthetics, have a greater utility poundage. Even so, synthetic fibers are clearly dearer, and rayon cheaper, than cotton.

It is hard to determine just how much effect the development of man-made fibers has had on trade in natural fibers. As far as cotton is concerned, the losses in the United States market resulting from the expansion of production of man-made fibers have been absorbed domestically, while exports have been more affected by their relatively high price compared with foreign growths. Other cotton exporting countries have increased their volume of trade. As far as wool is concerned, the availability of supplies is currently more of a limiting factor than competition from man-made fibers.

Much of the competitive advantage which man-made fibers enjoy stems from the fact that they are produced by large firms, many of which are vertically integrated (although not to the same extent as the rubber industry). In addition, these fibers may be " tailored " to meet the requirements of specific end-uses. Price factors are becoming more important as natural and man-made fibers become increasingly substitutable.

Almost all of the present manufacturers of man-made fibers are planning an expansion of capacity in the future, with interest concentrated on synthetics rather than rayon. The best indication of long-term prospects comes from demand projections for

all fibers, which indicate that consumption around 1970 will reach a level some 40 to 50 percent higher than in the base period 1957-59, with the fastest rates of expansion in the low-income countries. Man-made fibers may increase by anywhere from 36 percent (assuming a constant share of the total) to 50 percent (in the latter case consumption of natural fibers would fall by 10 percent).

Fats and oils

The strongest influence on traditional outlets for fats and oils has been exerted by the rapid expansion of the synthetic detergent industry. In most of the producing countries the total detergent market has been expanding at about the same rate as population, so that expanded sales of synthetic detergents have been largely at the expense of soap. There are, however, an endless range of varieties of soap and, while synthetic detergents have made serious inroads on the sales of some, e.g., household soap powders, others have been less vulnerable. The only really dynamic sector of the soap market in industrialized countries is, however, toilet soap. In the U.S.S.R., however, which is by far the largest soap producer in the world, there is no synthetic detergent industry of any size. Similarly, in the developing countries neither soap powders nor synthetic detergents have yet challenged the bar-soap market as they have in some industrialized countries.

While some of the best synthetic detergents are derived from natural fats, their output is limited, and the displacement of soap by synthetics has generally caused corresponding reductions in the utilization of fats and oils. At the same time, however, the market situation has been favorably influenced by the growth in alternative outlets for these products, for example the manufacture of margarine and shortening.

Looking to the future it can be expected that synthetics will further increase their share of the detergent market in industrialized countries such as the U.S.S.R., although it is probable that soap production in the United States, where the synthetic market is near saturation, will at least stabilize. The most promising prospects for ordinary soaps in these countries undoubtedly lie in the toilet sector, where the natural products will almost certainly remain the most important raw material for many years to come. Thus the developing countries are likely to provide the main growth element in the market for fats and oils for soap making. The consumption of both toilet soap and bar household soap may be expected to increase in these countries as incomes rise, although competition from synthetic detergents may grow.

Hides and skins

By the early 1960s synthetics had invaded almost every use to which leather had been put: in luggage, leather had been virtually completely replaced; in the soles of children's shoes, the process was far advanced. Gloves have proved to be the exception, since the proportion made from leather has, if anything, somewhat increased. In almost all countries leather has found its most important end-use in footwear, and the future of its consumption will depend on the extent to which synthetic rubber will be increasingly used in the manufacture of this product. Synthetic rubber has many advantages: it is cheaper than leather, its price is more stable, and its preparation entails fewer hand operations because of its more uniform quality and thickness. From the consumer's viewpoint it is more durable, though it lacks the reputation of being a "quality" product and will certainly meet resistance in the more expensive price ranges.

Most of the developed countries are essentially self-sufficient in footwear production. Although statistics relating to the relative importance of leather-soled footwear are incomplete, those which are available indicate that its proportion in the total production of footwear has declined since the early 1950s. It is probable, however, that the greater part of the maximum potential loss, at least insofar as women's and children's shoes are concerned, has already taken place and that future rates of substitution for leather soling are therefore likely to be slower.

The effects of increased competition from synthetic products on trade in hides and skins is obscured to some extent by the concentration of production of hides and skins in the developed countries. Its effect on consumption, on the other hand, can be estimated at an annual rate of substitution of about $4\frac{1}{2}$ percent compound for the period 1954-57 to 1960-61. If it is assumed that this rate applies equi-proportionally to imported and home-produced hides and skins, the main impact on exports from the developing to the developed countries seems to have come from the production increases in the latter.

Future consumption of hides and skins will depend on the rate of growth in the production of manufactures which are actual or potential users of leather, and the rate at which synthetics are displacing leather or other natural materials. On the basis of assumptions made in the FAO commodity projections for 1970, consumption of cattle hides and calfskins in the developed countries in 1970 could range from 1.7 to 2.1 million metric tons, that is, from virtually no change to up to about 30 percent above the 1959-61 average. For sheep- and goatskins the increase is likely to be higher, and for both categories will be largely concentrated in western Europe. Estimates of imports of cattle hides and calfskins into western Europe and Japan range from a fall of 10 to 15 percent, assuming low income growth and a relatively high rate of substitution, to a rise of 50 percent, assuming high income growth and a lower rate of substitution. The United States is expected to supply a larger proportion of total exports to the developed countries at the expense of the developing countries, which may, however, increase their exports to the centrally planned countries.

Chapter II. - WORLD REVIEW AND OUTLOOK

Agricultural production

There was only a small increase in agricultural production in the 1963/64 season. FAO's preliminary estimates indicate a rise of between 1 and 2 percent in the world, excluding Mainland China (Table II-1). It is probable therefore that the increase in production was slightly less than the growth of population, which is now estimated as about 2 percent annually. Much more significant, however, than this comparison for a single year is that for five years now there has been no increase in world agricultural production per caput.

In eastern Europe and the U.S.S.R. the weather was particularly adverse in 1963/64, and agricultural production is estimated to have fallen in comparison with the year before (Table II-2), although the U.S.S.R. has not yet released statistics of crop production. Production is estimated to have increased in each of the other main regions of the world, but as in several past years the biggest gains were not in the developing regions where they are most needed but in North America (4 percent) and Oceania (about 3 percent).

Among the developing regions, agricultural production in Latin America is estimated to have increased only very slightly in 1963/64 for the second year in succession. There were increases of about 1 percent in Africa, 2 percent in the Far East (excluding Mainland China), and 3 percent in the Near East. For Mainland China, where almost a quarter of the world's population is to be found, there are still no official statistics of agricultural production, but it appears that there was a further increase in 1963/64.

PRODUCTION AND POPULATION

The 1963/64 season is the fifth in succession in which there has been no significant change in world

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

	Prewar average	Average 1948/49-1952/53	Average 1953/54-1957/58	Average 1958/59-1962/63	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
	Indices, average 1952/53-1956/57 = 100									
TOTAL PRODUCTION										
All agricultural products	77	89	103	119	113	116	119	120	124	126
Food products only	76	88	103	119	114	117	120	120	124	126
POPULATION	80	93	102	112	108	110	112	114	117	119
PER CAPUT PRODUCTION										
All agricultural products	95	95	101	106	105	106	106	105	106	106
Food products only	94	95	101	106	106	107	107	105	107	106

NOTE: The world and regional indices of agricultural production shown in this report have been calculated by applying regional weights, based on *1952/53-1956/57* 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. While the coverage of most of the regional groupings used is self-explanatory, it should be noted 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, Sudan, and the United Arab Republic. For Mainland China no estimates are included until more complete data are available. The prewar averages generally refer to 1934/35-1938/39 or 1935/36-1939/40.

[1] Excluding Mainland China.

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

	Prewar average	Average 1948/49-1952/53	Average 1953/54-1957/58	Average 1958/59-1962/63	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
Total production	*Indices, average 1952/53-1956/57 = 100*									
ALL AGRICULTURAL PRODUCTS										
Western Europe	82	87	103	116	109	113	118	117	123	125
Eastern Europe and U.S.S.R.	81	86	106	134	129	132	133	135	139	137
North America	68	93	100	109	106	108	109	108	112	116
Oceania	78	90	101	123	117	119	123	125	131	135
Latin America	73	88	104	122	118	121	121	125	126	126
Far East [1]	84	87	103	118	111	115	119	122	124	126
Near East	73	85	104	123	118	121	122	123	131	134
Africa	67	88	102	114	109	111	117	113	120	122
ALL ABOVE REGIONS	77	89	103	119	113	116	119	120	124	126
FOOD PRODUCTS ONLY										
Western Europe	82	86	103	116	109	113	118	118	124	125
Eastern Europe and U.S.S.R.	82	87	106	135	130	133	134	138	141	139
North America	66	92	100	111	109	110	111	110	113	118
Oceania	82	92	100	122	117	115	122	124	133	136
Latin America	70	88	104	119	117	117	119	121	122	124
Far East [1]	82	87	103	119	111	117	121	122	124	126
Near East	73	85	104	122	117	120	121	121	129	132
Africa	69	89	102	111	107	109	114	111	117	118
ALL ABOVE REGIONS	76	88	103	119	114	117	120	120	124	126
Per caput production										
ALL AGRICULTURAL PRODUCTS										
Western Europe	93	89	102	110	106	108	112	111	115	116
Eastern Europe and U.S.S.R.	83	92	104	123	122	123	122	123	124	121
North America	88	100	98	98	98	98	98	96	97	100
Oceania	103	99	99	107	107	106	107	107	110	110
Latin America	110	98	101	104	106	106	103	104	101	99
Far East [1]	109	94	101	104	103	104	105	105	104	104
Near East	96	94	101	107	107	108	106	104	107	107
Africa	91	96	100	99	99	99	102	96	100	98
ALL ABOVE REGIONS	95	95	101	106	105	106	106	105	106	106
FOOD PRODUCTS ONLY										
Western Europe	93	89	102	111	106	109	113	111	115	116
Eastern Europe and U.S.S.R.	84	92	104	124	123	124	123	125	126	122
North America	85	99	99	100	101	100	100	97	99	101
Oceania	108	102	98	106	106	102	106	105	111	111
Latin America	104	98	101	101	105	102	101	100	98	97
Far East [1]	107	94	101	105	103	105	107	106	105	104
Near East	96	93	101	105	107	107	105	102	106	106
Africa	93	97	100	97	98	97	99	94	96	96
ALL ABOVE REGIONS	94	95	101	106	106	107	107	105	107	106

NOTE: See explanatory note to Table II-1.
[1] Excluding Mainland China.

agricultural production on a per caput basis. During the earlier postwar years there was a gradual improvement in per caput production, following the wartime setback, and in 1958/59, when harvests were particularly good almost all round the world, a substantial expansion took place. Subsequently, however, there has been no sustained increase in per caput production, indicating that, while agricultural production has

just managed to keep up with population growth, there has been little or no margin available for improvements in nutritional levels.

In the developed regions per caput agricultural production has changed little during the past five years, although there has been a fairly steady rise in western Europe. In the developing regions also there has been little change in per caput production except for a sharp decline in Latin America, where the growth of population, now estimated as 2.8 percent per year, is higher than in any other major region. In the other developing regions there have been some fluctuations in per caput agricultural production from one year to another, but the broad position in 1963/64 appears to have been little different from that in 1958/59.

Agricultural production per caput is now a good deal higher than before the war in each of the developed regions. This is also the case in the Near East and Africa among the developing regions. The necessity to continue to make comparisons with the prewar level arises because this level has still not been regained in either the Far East or Latin America, although if food products alone are considered the prewar per caput level was briefly touched in both regions in a single year of particularly favorable harvests.

The situation is summarized in Figure II-1, which shows the course of food production per caput since before the war. In addition to the regional totals, for the developing regions data are also shown for subregions or, where this is not possible, for a few of the individual countries with the largest populations, although the country and subregional indices are so far available only for the period 1952/53 to 1962/63. The country and subregional series are shown in full in Annex Table 1 (total agricultural production) and Annex Table 2 (food production).

It appears from the figure that in Latin America both the earlier rise and the recent decline in per caput food production have been most marked in the Central American countries, and that changes have been much less sharp in the southern part of the region. In Central America per caput food production rose very rapidly in Mexico up to 1958/59, but subsequently leveled off, while there has also been an abrupt decline in Cuba since 1961/62. In South America there has been no very clear trend in most countries, although in Brazil, the most populous country, per caput food production increased fairly steadily until 1958/59 but here too has since tended to level off (Annex Table 2B).

In the Far East there has been especially rapid progress in Japan, though this also has slowed down in recent years. In India there was a remarkable jump of more than 10 percent in per caput food production in 1953/54, and with some fluctuation from year to year most of this gain has subsequently been held. Pakistan appears never to have fully recovered the ground lost in the disastrous season of 1955/56, when per caput food production dropped by some 10 percent. In Indonesia, after a fall of about 6 percent in 1955/56, food production per caput has changed little in most subsequent years.

A main feature in the Near East has been the sharp year-to-year fluctuations in most countries, though in the United Arab Republic, where agriculture is less dependent on the uncertain rainfall, the upward trend in per caput food production since 1952/53 was interrupted only in 1961/62. In northwest Africa too there have been large annual fluctuations, but a steep downward trend is also apparent over the past decade. Although per caput food production in Africa south of the Sahara seems to have changed very little over the last ten years or so, it must be remembered that statistics of both population and food production are still especially limited and unreliable in most of the countries of this subregion.

Production for export and domestic consumption

Attention is often drawn to the contrast between the oversupply of most agricultural products on export markets and the shortages, as evidenced by rising prices and growing imports, on domestic markets in many of the developing countries. It is therefore of interest, especially since problems of international trade have recently been even more than usually prominent, to compare the relative progress of agricultural production for export and for domestic consumption in the developing countries.

Although there are insufficient data for detailed comparisons, an approximate idea can be obtained from the trends for some of the main commodities. There are some commodities, such as sisal, rubber, abaca, cocoa and coffee, for example, of which almost all of production is exported. Equally there are commodities like the various grains, which are staples in the domestic consumption of the developing countries, and of which they export a much smaller part, if any, of their production.

FIGURE II-1. - TRENDS IN FOOD PRODUCTION PER CAPUT IN REGIONS, SUBREGIONS, AND SELECTED COUNTRIES

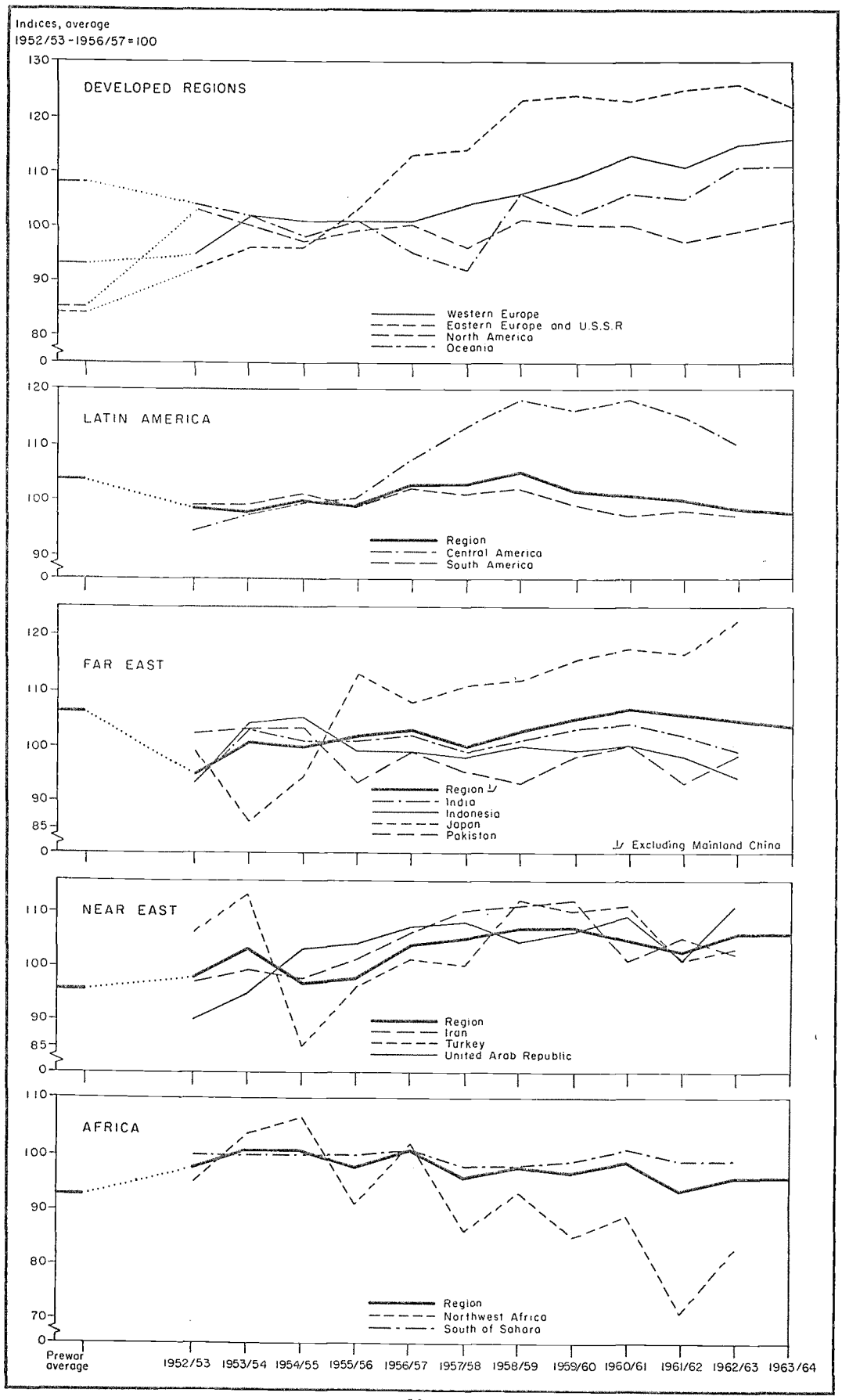


TABLE II-3. - CHANGES IN PRODUCTION FROM 1948/49-1952/53 TO 1960/61-1962/63 IN THE DEVELOPING REGIONS OF MAIN AGRICULTURAL COMMODITIES, GROUPED ACCORDING TO THE PERCENTAGE OF PRODUCTION EXPORTED IN 1960/62

	Over 75 percent of production exported		50-75 percent of production exported		25-50 percent of production exported		10-25 percent of production exported		Less than 10 percent of production exported	
	Commodity	Change in production	Commodity	Change in production	Commodity	Change in production	Commodity	Change in production	Commodity	Change in production
		Percent		*Percent*		*Percent*		*Percent*		*Percent*
LATIN AMERICA			Linseed (68) Coffee (61) Sugar (60) Cocoa (59)	+ 26 + 63 + 32 + 28	Cotton (48) Sisal and henequen (47)	+ 83 + 90	Wheat (25) Bananas (24) Tobacco (24) Groundnuts (21) Maize (11)	+ 9 + 59 + 48 + 196 + 62	Rice (5)	+ 80
FAR EAST [1]	Rubber (98) Abaca (91)	+ 16 –	Tea (62)	+ 37	Sugar (34) Jute (33)	+ 107 + 34	Tobacco (11) Soybeans (11)	+ 45 + 25	Cotton (9) Rice (4) Groundnuts (3) Wheat (–)	+ 52 + 42 + 54 + 48
NEAR EAST			Cotton (64) Tobacco (57)	+ 62 + 17	Citrus fruits (31) Sugar (28)	+ 90 + 150	Rice (14)	+ 37	Barley (5) Wheat (1) Maize (–)	+ 35 + 56 + 37
AFRICA	Sisal (100) Cocoa (91) Coffee (84) Cotton (83)	+ 65 + 70 + 193 + 26	Wine (76) Groundnuts (54) Sugar (50)	+ 30 + 68 + 77	Bananas (45)	+ 42	Maize (14)	+ 69	Wheat (6) Barley (3) Rice (3)	+ 14 — 27 + 29

NOTE: Figures in brackets denote the percentage of the region's production exported in 1960-62.
[1] Excluding Mainland China.

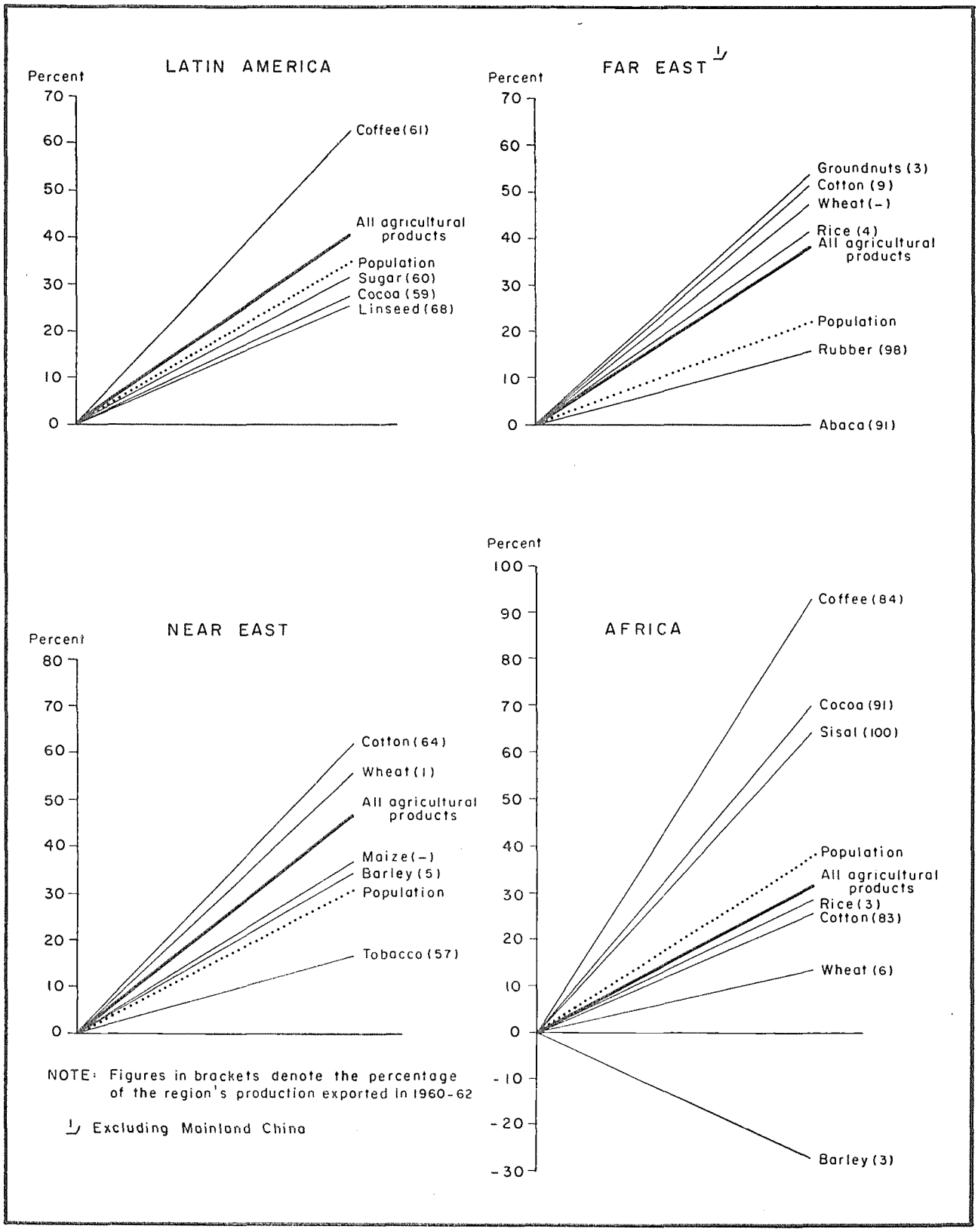
Table II-3 compares for each of the developing regions the change in production between the averages of 1948/49-1952/53 and 1960/61-1962/63 for some of the main commodities, classified according to the percentage of production exported in 1960-62. Figure II-2 shows for each region the change in production for the two extreme groups in the table in comparison with the change in production of agricultural products as a whole and with the growth of population.

No very clear picture emerges except in Africa, where the most rapid increases appear to have been in the production of commodities that are mainly exported. Even though statistics of many of the products mainly for domestic consumption in Africa, such as millets and sorghums, cassava, sweet potatoes and yams, and plantains, are very unreliable (these products are not shown separately in the table or the graph but are a major influence on the index of total agricultural production), it is fairly certain that their production has not matched the rapid increases in the production of such export products as coffee, cocoa, and sisal. While there has been a rapid increase in maize production, much of the expansion has been in South Africa, which has exported substantial quantities in recent years.

In Latin America and the Near East it is not possible to discern any overall difference in trends for products mainly exported and those mainly for domestic consumption. In the Far East, however, the most rapid increases have been in the production of sugar, of which only about a third of production is exported, and a number of other products mainly for domestic consumption, including groundnuts, cotton (of which only 10 percent was exported in 1960-62 in contrast to 30 percent in 1948-52), tobacco, and wheat and rice, the main staple foods of most of the region. For rice, however, it is of interest to note that in the last few years, in contrast to earlier trends, production in the Far East has been increasing faster in exporting countries (some of whicho export up to half their crop) than in importing countries.

In fact the situation in individual countries may often be different from that in the region as a whole, and would need to be studied in detail before a final judgment could be made. However, at least

FIGURE II-2. - CHANGES IN PRODUCTION FROM 1948/49-1952/53 TO 1960/61-1962/63 IN THE DEVELOPING REGIONS OF SELECTED COMMODITIES MAINLY EXPORTED AND MAINLY FOR DOMESTIC CONSUMPTION, IN COMPARISON WITH TOTAL AGRICULTURAL PRODUCTION AND WITH POPULATION GROWTH



in terms of broad regions it seems that, with the exception of Africa, the tendency of governments to devote a high proportion of resources to the encouragement and assistance of export production, noted in previous issues of this report, has not resulted in any notable disparity in the growth of production for export and for domestic consumption. It is likely therefore that the disparity is more on the demand side, between the slow growth of demand in the industrialized countries, which are the main markets for exports of agricultural products, and the much more rapid growth of domestic demand in the developing countries. These factors are discussed in more detail later in this chapter.

Regional agricultural production

A more detailed account follows of the recent agricultural production situation in the main regions of the world. For statistics of the regional production of the major commodities reference should be made to Annex Tables 4 to 11.

Western Europe

Following a rise of as much as 5 percent in 1962/63, agricultural production in western Europe is estimated to have increased by only 1 to 2 percent in 1963/64. The weather was unfavorable in many parts of the region, the exceptionally long and cold winter of 1962/63 being followed by droughts and also by excessive rain during the harvest season.

Total grain production, however, was only about 3 percent less than in 1962/63. Winter wheat, especially in the northwestern part of the region, was the most severely affected by the weather, and wheat production declined by 15 percent. Maize production increased by about 20 percent and barley by about 10 percent, but production of most of the other grain crops fell slightly. Sugar production rose sharply but remained well below the 1960/61 record. The area under potatoes continued to decline, but higher yields brought a substantial increase in production. Although fruit and vegetable production was affected by the weather, the production of some types was high in a number of countries. Olive oil production almost doubled. Wine harvests were large in Austria, the Federal Republic of Germany, and Spain, and small in France, Italy, and Greece, and total western European production was nearly 20 percent below the high level of 1962/63. Tobacco production increased sharply in the major producing countries.

The expansion of livestock numbers was interrupted in many countries in 1963. There was only a small increase in the output of most livestock products in the 1963/64 season, while consumption continued to increase rapidly, so that the first half of 1964 has been characterized by a tight supply situation for meat, especially beef, and rising prices in many parts of the region. Cow numbers also declined in 1963, reflecting the shortage of feed in 1962/63, the rising prices paid for slaughter cattle, and also the tendency for many small farmers to give up milk production.

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

The weather was also most unfavorable in the eastern European countries and the U.S.S.R., and FAO's preliminary estimates indicate that the region's production fell in 1963/64.

In the U.S.S.R. the severe winter and spring frosts destroyed a large part of the sowings of wheat and barley in the main European production areas (Ukraine, central black earth region, Volga, and northern Caucasus). The eastern parts of the country, including the areas where the virgin lands had been opened up, suffered from drought, and conditions in Siberia and Kazakhstan are reported to have been the worst for 75 years. Although it has been officially announced that harvests were poor for a large number of crops, especially wheat, for the first time for many years no crop production statistics have been published. All that is known is that deliveries of grain to the state were only 44.8 million tons in 1963, or 21 percent less than the year before. Deliveries of sugar beet and sunflower seed also fell, but state purchases of potatoes and vegetables were increased, in order to make up partly for the shortage of grain. An exception was cotton, of which deliveries (which in the case of this crop amount to total production) rose by 20 percent to a record level of 5.2 million tons (unginned).

For livestock products, the usual production statistics are available. The production of milk and eggs fell by 4 percent in the U.S.S.R. in 1963, lower milk yields reflecting the shortage of forage. Meat production rose as a result of the heavy slaughtering necessitated by the shortage of forage, but because of lower slaughter weights the increase in 1963 was only 7 percent, as compared with 9 percent the year

before. Cattle numbers were reduced by 2 percent by the end of 1963 and sheep by 4 percent, but the most striking development was in pig numbers, which fell by as much as 42 percent. The effects of the reductions in livestock numbers have been felt during the first quarter of 1964, when the production of meat by state enterprises was 11 percent less than a year before and that of butter 12 percent less.

In the eastern European countries also agricultural production in 1963/64 was adversely affected by the weather, but global production was everywhere above the low levels of 1962/63. Grain production was generally slightly higher than the year before, though in Hungary there was a sharp decline. Potato production dropped by 17 percent in eastern Germany and rose by about 10 percent in both Czechoslovakia and Poland. The production of sugar beet showed a substantial increase in most countries. Oilseed production was affected by the bad weather but, with the main exception of Bulgaria, harvests of fruit, vegetables and tobacco were mostly larger than in 1962/63. Livestock numbers reflected the shortage of feed. The only substantial increases in cattle numbers were in eastern Germany and Poland, but pig numbers fell by 15 percent in Poland. Meat production generally declined or remained stable in 1963, while improved yields brought increased milk production in a number of countries.

North America

The biggest regional increase in agricultural production in 1963/64 was in North America, where preliminary estimates show a rise of 4 percent over the previous year.

Growing conditions in Canada were very favorable in 1963/64, and agricultural production rose by about 8 percent to a new record level. A bumper wheat harvest, 3 percent above the previous record of 1952/53, was the main contributor to this expansion. The production of feed grains, oilseeds, and apples also increased sharply. Milk production was about the same in 1963 as the year before. Beef production increased in 1963, but pork production was lower.

In the United States agricultural production rose by about 4 percent in the calendar year 1963. Wheat production was only about 4 percent larger in 1963/64 than the small crop of 1962/63, but maize production increased by 12 percent to a new record level. The soybean crop was again a record. The production of citrus fruit declined as a result of severe frosts in Florida. Cotton and tobacco production rose slightly. There was a substantial increase in meat production, especially beef, in 1963.

Oceania

After increasing by about 5 percent in 1962/63, agricultural production in Oceania is estimated to have risen by a further 3 percent in 1963/64, according to preliminary data.

Australia's wheat crop rose by 5 percent to a new record level in 1963/64. In Australia the wool clip was the highest ever, but there was a decline in New Zealand. Sugar production in Australia was only slightly less than the previous year's record, while both dried fruit and rice were expected to set new records. Increases in the output of meat and dairy products were comparatively small.

Latin America

Preliminary estimates indicate that in 1963/64 for the second year in succession agricultural production barely increased in Latin America. If these estimates are confirmed, it would mean that the region's agricultural production was less than 1 percent greater in 1963/64 than in 1961/62, while the population has expanded by more than 5 percent during this period. Although this trend in production is largely due to the decline in coffee production that occurred in both 1962/63 and 1963/64, the situation is only slightly more favorable if food products alone are considered. Food production is estimated to have increased by about 1 percent in 1962/63 and by about 2 percent in 1963/64.

Argentina's grain production recovered sharply in 1963/64 after two years of drought. The increase in the region's total grain production was limited to about 6 percent, however, as a result of poor rice crops in a number of countries, as well as some reductions in maize production. There was also a fall of more than 40 percent in Uruguay's wheat crop. Sugar production is expected to increase slightly, in spite of another poor harvest in Cuba. Cocoa production is expected to be slightly larger in 1963/64 than the year before, but has changed rather little for three years in succession. Largely because of the 1962 drought in Brazil the region's coffee production fell by a further 5 percent in 1963/64. The production of linseed and cotton also declined;

cotton production in Mexico fell sharply owing to insect damage and some shortage of irrigation water, as well as to a shift to other crops.

The increase in the region's output of livestock products also appears to have been rather small in 1963/64. In Argentina beef production increased in spite of the depletion of herds during the drought years, but sheep slaughter was reduced in order to rebuild flocks, and since September 1963 beef production has also fallen off because of the replenishing of herds.

Far East

As in each of the previous two years, the increase in agricultural production in the Far East (excluding Mainland China) in 1963/64 is estimated at only about 2 percent.

After declining slightly in 1962/63, rice production is estimated to have increased by about 7 percent in 1963/64. There were record rice crops in both India and Pakistan, but production fell in Indonesia. The region's wheat and barley harvests, however, were lower than in 1962/63, as a result of some decline in India and a very sharp drop in production in Japan, where the spring was wet and cold and the planted area was reduced. Sugar production generally increased in 1963/64 after the setback of the previous season. Oliseed production increased, including a substantial recovery in the production of groundnuts and copra. Jute output was higher in India, Pakistan and Thailand, but the Indian cotton crop was slightly less than in 1962/63. There was a slight decline in rubber production, principally because of a smaller crop in Indonesia. The region's tea production increased slightly, with a new record crop in Ceylon.

In Mainland China, which it is still not possible to include in FAO's estimates for the Far East region, the 1963 harvest is officially reported as " relatively good. " While there are still no official production estimates for the country as a whole, more provincial estimates and percentage figures have been released. On the basis of these, observers in Hong Kong estimate total "grain" production (including potatoes and sweet potatoes) as perhaps 178 million tons in 1962 and 179 million tons in 1963, or still below the official figures of 182.5 million tons for 1956 and 185 million tons for 1957, since when the population has been advancing by 10 to 15 millions annually. The rice crop suffered from a nine-month drought until June 1963 and is estimated to have fallen to 78.4 million tons from 80.6 million tons in 1962. Wheat production was probably 21.8 million tons, as against 20 million tons in 1962. Large improvements are reported in the production of cotton, hard fibers, tobacco and sugar cane, but in the case of cotton the expansion of the sown area appears to have been largely offset by heavy floods in north central China. Only modest gains are reported in oilseeds production, and the largest increases (of 15 to 30 percent) are believed to have been in subsidiary farm products such as vegetables, fruit, pigs and poultry, probably mainly from private plots.

Near East

Agricultural production in the Near East is estimated to have increased by about 3 percent in 1963/64, following an advance of no less than 6 percent the year before. In the two previous years the increase in production had been limited by droughts over a large part of the region.

Grain production increased in 1963/64, mainly because of a very good harvest in Turkey and large rice crops in Iran and the United Arab Republic. In Afghanistan, Iraq, Jordan and Syria, however, grain production was affected by bad weather, especially in Iraq and Syria, where flood damage was extensive. The region's sugar production increased further in 1963/64. Tobacco production recovered sharply in Turkey, and the regional total regained the 1960/61 level. There was a slight reduction in cotton production, as a result of reduced acreage in the United Arab Republic and other major producing countries and insect damage in Sudan.

Africa

Preliminary estimates show a rise of only about 1 percent in agricultural production in 1963/64 in the African region (i.e., the continent minus Libya, Sudan, and the United Arab Republic), following the rise of some 6 percent in the previous year.

With good crops in northwest Africa the region's wheat production rose by 16 percent and barley by 10 percent. Madagascar's rice crop is estimated as well above the bumper harvest of the previous year. Maize production in South Africa was severely hit by drought, however, and the crop was about 20 percent less than the year before. Groundnut production in Nigeria failed to reach the record level of

1962/63, but in Senegal there was an increase. The region's sugar production rose by a further 14 percent, with large increases in Mauritius, South Africa, and some of the smaller producing countries. Cocoa production is expected to increase in 1963/64, especially if there is another large mid-crop in Ghana. Coffee production is estimated at near the record total of 1962/63.

Main agricultural commodities

Among the main commodities the largest increases in world production (excluding Mainland China) in 1963/64 were for maize, rice, sugar, cocoa, apples, and jute (Table II-4 and Annex Table 3A). The production of wheat, oats, wine, and coffee declined, but for most other main commodities there was little change from the 1962/63 level.

Wheat production, which has recently tended to fluctuate quite sharply from year to year, was probably about 6 percent less than in 1962/63, though there are no official statistics of the poor harvest in the U.S.S.R., which was the main cause of this decline. There were also smaller wheat crops in many European countries, but Argentina, Australia, and Canada had record harvests. The production of coarse grains increased sharply. Maize production rose by 8 percent, with a record crop in the United States, but the long-term decline in oats production continued. Rice production, which had hardly changed in the previous three years, is estimated to have risen by 6 percent in 1963/64. Rice harvests were particularly good in Ceylon, India, Pakistan, Thailand, and the United States, but production declined in Brazil and Indonesia.

The fall in world sugar production that began in 1961/62 was halted in 1963/64 with a rise of some 6 percent. Beet sugar production rose sharply in western Europe and the United States, but declined in the U.S.S.R. Cuba's cane harvest was further curtailed by hurricane damage. Cane sugar production was particularly large in Argentina, Australia, and Mauritius.

Table II-4. - World [1] production of main agricultural commodities

	Prewar average	Average 1948/49-1952/53	Average 1953/54-1957/58	Average 1958/59-1962/63	1962/63	1963/64 (Preliminary)	Change in production 1962/63 to 1963/64
	Million metric tons						*Percent*
Wheat	144.7	155.4	187.9	222.6	235.6	220.8	— 6
Barley	44.1	46.7	62.0	73.1	83.1	85.3	+ 3
Oats	64.0	60.6	59.2	54.1	48.5	47.0	— 3
Maize	106.4	124.1	141.0	185.2	192.8	207.7	+ 8
Rice (milled) [2]	65.7	71.3	82.7	98.4	102.0	107.8	+ 6
Sugar (centrifugal)	24.9	31.9	39.9	50.1	49.2	52.2	+ 6
Citrus fruit	11.1	15.2	17.8	20.4	19.8	20.5	+ 4
Apples [3]	6.8	9.4	10.4	14.2	14.9	15.8	+ 6
Bananas	8.1	13.7	15.7	18.7	19.8	20.4	+ 3
Vegetable oils and oilseeds [4]	10.4	12.9	15.6	18.2	19.0	20.0	+ 5
Coffee	2.41	2.24	2.69	4.09	4.09	3.95	— 3
Cocoa	0.74	0.76	0.81	1.10	1.17	1.24	+ 6
Tea	0.47	0.58	0.71	0.83	0.87	0.87	—
Wine	20.3	18.9	21.5	24.8	28.5	25.1	— 20
Tobacco	2.29	2.71	3.15	3.32	3.48	3.63	+ 4
Cotton (lint)	5.99	6.78	7.99	8.78	9.63	9.85	+ 2
Jute [5]	1.51	2.00	1.94	2.59	2.60	2.86	+ 10
Wool (greasy)	1.61	1.79	2.12	2.46	2.51	2.55	+ 2
Rubber (natural)	1.00	1.74	1.89	2.06	2.14	2.09	— 2
Milk (total)	221.0	261.3	301.5	344.0	354.7	350.9	— 1
Meat [6]	29.4	36.6	45.0	51.6	54.9	56.5	+ 3
Eggs	6.32	8.77	10.64	12.58	13.3	13.4	+ 1

[1] Excluding Mainland China. - [2] Paddy converted at 65 percent. - [3] Excluding U.S.S.R., as well as Mainland China. - [4] Oil equivalent. - [5] Including allied fibers. - [6] Beef and veal, mutton and lamb, pigmeat.

The production of citrus fruit increased slightly, though it failed to recover to the 1961/62 level. While there were increases in most of the major producing areas the Florida crop was severely affected by frost. Apple production increased to a new record level, thus running counter to the regular alternation of good and bad years hitherto evident for some time, particularly in Europe. There was only a small increase in banana production in 1963/64, as crops suffered windstorm damage in some Latin American countries. Dried fruit production generally declined in 1963/64, owing to unfavorable weather, although there was a record harvest in Australia.

The expansion in world output of vegetable oils and oilseeds was resumed in 1963/64. Olive oil production rose sharply in line with the two-year production cycle, and the production of copra and soybeans was also large, with another record United States crop of soybeans. Groundnut production also was higher, mainly as a result of heavier crops in India, Senegal, and the United States.

Wine production was down by as much as 20 percent from the high level of 1962/63, mainly because of unfavorable weather in France and Italy. There was a small further increase in world tobacco production, although flue-cured output fell slightly as a result of lower acreage allotments in the United States and Canada.

World coffee production was lower for the second year in succession, the decline of 8 percent in 1962/63 being followed by one estimated at 3 percent in 1963/64. Brazil's production fell from 1.70 million tons in 1962/63 to 1.56 million tons in 1963/64, mainly owing to frost damage in 1962. World cocoa production is estimated as about 6 percent higher than in 1962/63. Tea production is estimated as approximately unchanged.

There was only a small increase in cotton production in 1963/64. Production increased in the United States and the U.S.S.R. but was lower in Mexico, Brazil and India, and also in Sudan and the United Arab Republic, which produce most of the world's longstaple cotton. Jute output is estimated to have increased by about 10 percent, with larger crops in both India and Pakistan. The output of hard fibers was practically unchanged. Wool production increased slightly, mainly because of a 5-percent increase in the Australian clip. Natural rubber production was a little less than the record of 1962, with a big decline in Indonesia.

World milk production is believed to have fallen slightly in 1963/64, largely as a result of the severe winter of 1962/63 in Europe followed by drought in the summer of 1963. Butter production was sharply reduced, but there was some increase for cheese and other dairy products. World meat production is estimated to have risen by about 3 percent in 1963/64. Large gains were recorded in North America, but in western Europe a slowing down in the expansion of beef output coincided with a cyclical reduction in pigmeat production. The increase in world egg production was very small in 1963/64, and output in the major exporting countries was considerably lower.

Fishery production

The world fish catch is estimated to have increased by somewhat less in 1963 than the very large expansions of the past four years (Table II-5 and Annex Table 12). Preliminary estimates place the world catch at about 46 million tons, which would be about 3 percent more than in 1962.

Most European countries reported higher catches in 1963. In contrast to the previous year, herring were plentiful both in the North Sea and in the Skagerrak and Kattegat, and in addition to those used for reduction purposes considerable quantities were frozen and salted in an effort to relieve the pressure on prices in the fresh fish market. Norway had another poor winter herring season, leading to one of the lowest outputs of kippered herring on record, and both Iceland and Norway took considerably less Icelandic herring than in 1962. Although brisling for canning was abundant in Norway, high olive oil prices and heavy stocks caused a large part to be diverted to the fish meal industry. Cod fisheries were at approximately the same level in 1963 as the year before in both Iceland and Norway. United Kingdom white fish landings were slightly less than in 1962.

The Polish catch increased by a quarter in 1963. The U.S.S.R. reached a total of 4.7 million tons. This was 200,000 tons more than the planned target of 4.5 million tons, which was already three times the 1948 catch of 1.5 million tons.

The United States catch declined by about 10 percent in 1963, largely because of a drop of more than a quarter in menhaden landings. The production of groundfish fillets fell by about 10 percent, and of canned fishery products by about 7 percent. The pack of Pacific sardines was the smallest in more than 50 years, but packs of Gulf shrimp and

TABLE II-5. - ESTIMATED WORLD [1] CATCH OF FISH, CRUSTACEANS, AND MOLLUSKS

	1938	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Million metric tons, live weight												
Western Europe	5.52	6.24	6.83	7.32	7.43	7.86	7.43	7.29	7.65	7.44	7.77	7.94	8.3
Eastern Europe and U.S.S.R.	1.62	1.94	2.22	2.50	2.76	2.90	2.83	2.93	3.09	3.42	3.64	4.03	4.5
North America	3.11	3.50	3.62	3.83	3.79	4.13	3.80	3.76	3.99	3.80	4.00	4.07	4.0
Oceania	0.09	0.09	0.11	0.11	0.10	0.10	0.12	0.11	0.13	0.13	0.13	0.13	0.1
Latin America	0.28	0.60	0.73	0.80	0.97	1.09	1.33	1.83	3.19	4.68	6.58	8.52	8.7
Far East [1]	9.44	7.80	10.11	10.70	11.51	11.86	13.33	14.20	15.42	16.19	16.93	17.22	17.3
Near East	0.31	0.35	0.40	0.40	0.38	0.41	0.39	0.38	0.38	0.38	0.40	0.44	0.5
Africa	0.47	1.06	1.55	1.59	1.63	1.81	1.91	1.96	2.08	2.19	2.38	2.50	2.6
WORLD TOTAL [1]	20.84	21.58	25.57	27.25	28.57	30.16	31.14	32.46	35.93	38.23	41.83	44.85	46.0

[1] Including estimates for Mainland China.

oyster rose sharply. In Canada, however, the total catch of fish expanded by about 10 percent in 1963.

Peru's landings, at 6.9 million tons, are estimated as only slightly less than in 1962, in spite of a lengthy strike of anchoveta fishermen and greater difficulty in finding anchoveta. This species represented 98 percent of the catch, which resulted in a new record output of fish meal. In Chile, landings set a new record of 762,800 tons, but results were much below expectations; the anchoveta disappeared almost entirely from the coastal waters off north Chile for six months, and a large part of the catches was of small fish.

In the Far East, Japan's extended activities in distant-water trawl and tuna fisheries almost offset reduced catches in some other Japanese fisheries, including off-shore fisheries and Bering Sea groundfish fisheries.

The catch in South Africa and South West Africa, at 1.1 million tons, set a new record for the sixth year in succession. A drop in the Cape catch of shoalfish and a slight decline in trawl fish landings were offset by the huge Walvis Bay pilchard catch of 546,000 tons, compared with 395,000 tons in 1962. Supplies for Angola's fish meal industry, however, again declined. In Morocco the canned sardine pack dropped by 30 percent, and this, together with a similar decline in the Portuguese pack, caused some shortage of this commodity in the world market.

FORESTRY PRODUCTION

World roundwood removals rose by only about 1 percent in 1963 to an estimated 1,835 million cubic meters (Table II-6). Fuelwood production was almost unchanged, a rise in Europe to replenish stocks after the severe winter of 1962/63 being offset by further declines elsewhere in the Northern Hemisphere. Removals of industrial wood rose by about 25 million cubic meters, or 2 percent, in 1963. This expansion, which was a little more rapid than the average of recent years, occurred chiefly in North America and the U.S.S.R. In Europe removals of industrial wood declined, partly owing to logging difficulties in the early months of 1963, though recovery began later in the year. The main categories for which world removals increased were pulpwood and coniferous sawlogs in North America and the U.S.S.R., and broadleaved logs in North America, Africa, and the Far East.

The production of sawn softwood, still by far the largest single category of forest products, rose by over 2 percent to 274 million cubic meters in 1963. Most of the expansion occurred in only a few countries: the United States, where there was further recovery from the low level of 1961; the U.S.S.R.; Canada, where there was a record output; and Japan, where higher production was made possible by increased imports of coniferous logs. European production in 1963 was lower than in any of the three previous years, while in other regions there were only small changes.

Sawn hardwood production has increased in recent years rather faster than sawn softwood production, and the 1963 output of about 77 million cubic meters was 4 percent higher than in 1962. Expansion took place in some temperate-zone countries, notably the U.S.S.R., Romania, Yugoslavia, and Japan, and there was further recovery in the United States, while a

number of tropical countries, including Burma, Cameroon, Ivory Coast, and Malaysia also raised production for export.

Particle board output continued to expand rapidly in 1963, and is estimated as at least 20 percent more than in 1962. The production of plywood and of fibreboard grew by 8 and 6 percent respectively. The main increases in plywood production in 1963 took place in North America (chiefly coniferous plywood) and in the Far East (based on indigenous and imported hardwoods). Some countries in the Far East, such as China (Taiwan), reported that the market approached saturation point during 1963 owing to limited local markets and intense competition overseas, especially in the United States. Others, however, (e.g., Japan) found the depreciating quality of imported veneer logs, mainly lauan from the Philippines, an impediment to increasing production.

World output of pulp and pulp products continued the expansion which has been virtually unchecked since 1945. The main producing and consuming regions, North America and Europe, accounted for the major part of the expansion in 1963, although growth was relatively faster in Asia, Oceania, and Africa. Most of the increased output was of chemical pulp.

Newsprint production rose by less than 500,000 tons in 1963. There was a slight decrease in North America, owing to reduced demand at the beginning of the year, but elsewhere production rose. However, for other paper and paperboard there were more marked increases in production. North America and Europe accounted for nearly three quarters of the increase, but there was also a big increase in output in Japan, the second largest producer of paper other than newsprint after the United States.

The expansion of 6 percent in 1963 in world output of chemical pulp and paper and paperboard other than newsprint checked the trend of the two previous years for the expansion of capacity to exceed that of demand and output. Operating ratios improved for the second year running in North America. In Europe also, particularly in northern Europe where there was much surplus capacity, the position appeared to improve during the year, notably for bleached and sulfate pulps. At the same time surplus capacity for mechanical pulp and newsprint, located chiefly in Canada and northern Europe, remained substantial. Newsprint capacity is estimated to have grown by about 700,000 tons in 1963 compared with a production increase of some 400,000 tons.

Data recently compiled by FAO on pulp and paper capacities indicate that in recent years paper capacity has grown faster than that of pulp in Europe (except northern Europe), the Far East (notably Japan and

TABLE II-6. - ESTIMATED WORLD [1] ROUNDWOOD REMOVALS AND PRODUCTION OF MAJOR FOREST PRODUCTS

	Average 1948-52	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
ROUNDWOOD REMOVALS					*Million cubic meters*					
Industrial wood	[2] 738	927	951	940	942	1 004	1 024	1 016	1 040	1 065
Fuelwood	[2] 708	801	795	808	796	803	786	780	772	770
Total	[2] 1 446	1 728	1 746	1 748	1 738	1 807	1 810	1 796	1 812	1 835
PRODUCTION OF FOREST PRODUCTS										
Sawn softwood	192.7	237.8	238.7	237.3	247.9	266.4	265.6	265.2	267.6	274.4
Sawn hardwood	47.8	61.7	64.4	62.7	65 6	68.0	71.0	72.9	74.2	77.0
Plywood	6.3	10.9	11.3	11.8	13.1	14.9	15.4	16.8	17.9	19.3
					Million metric tons					
Fibreboard	2.1	3.2	3.3	3.4	3.6	4.1	4.3	4.5	4.8	5.1
Particle board	...	...	0.5	0.8	1.1	1.4	1.8	2.3	2.8	3.4
Woodpulp	34.1	46.4	49.5	50.1	49.9	54.9	59.1	62.6	64.8	68.6
Newsprint	8.8	11.2	12.0	12.3	12.1	13.1	14.0	14.4	14.6	15.0
Other paper and board	33.7	45.5	48.2	49.2	50.5	55.8	59.7	63.2	66.3	70.1

[1] Including estimates for Mainland China. - [2] Pre-1955 data are not strictly comparable with those for 1955 and subsequent years.

India), and Oceania. Pulp capacity expanded faster than paper capacity in North America, northern Europe and to a lesser extent in the U.S.S.R. and Africa. This uneven regional growth of pulp and paper capacities has important repercussions on world trade in pulp. The growth of pulp and paper output in regions other than North America and Europe has in general been sufficient to meet the growth in demand, with the result that home production has gradually been taking a larger share of consumption. At the same time, however, the number of countries in these regions with increasing surpluses of pulp and paper for export remains few.

Agricultural production outlook for 1964/65

It is still too early to form any clear picture of the likely level of the 1964/65 harvests. Such information as is available at the time of writing (July 1964) is summarized below, region by region.

In western Europe there are generally good prospects for grain production. Increases in wheat production over the low 1963/64 level are forecast at 17 percent in Italy, one third in the Netherlands, 30 percent in the United Kingdom, and 40 percent in France. The sugar-beet acreage is estimated to have increased by a further 10 percent, with particularly large expansions in Denmark, Finland, the Netherlands, and Spain. Beef is likely to continue to be in short supply in view of the reduced herds at the beginning of 1964. Pigmeat production was somewhat smaller in the first half of 1964 that the corresponding period of 1963, but large supplies are expected in the second half of 1964. Production of poultry meat, eggs, and butter expanded considerably during the first half of 1964.

In the U.S.S.R. prospects for grain production in 1964/65 are reported as good, particularly in the northern Caucasus, where high yields are anticipated. However, as a result of the late spring the harvests of a number of crops are likely to be concentrated in a short space of time, which will put a strain on the available labor resources. The planned sugar-beet area for 1964/65 is 4.3 million hectares, an increase of 13 percent over 1963/64. In eastern Europe the sugar-beet area is estimated to have increased by 7 percent over 1963/64, with a particularly large expansion in Poland.

The United States wheat crop in 1964/65 is expected to be about 12 percent above the reduced 1963/64 level. Declines are forecast for most other grain crops, however, estimated at 5 percent for maize (of which production was an all-time record in 1963/64), 8 percent for oats, and 9 percent for barley. The sugar-beet acreage is reported as 4 percent above the 1963/64 record. Cotton acreage is likely to be slightly less than in 1963/64, and acreage allotments for flue-cured tobacco have been cut by 10 percent, but the acreage of soybeans is larger. In Canada the acreage of wheat is greater than in 1963/64, but that of coarse grains, especially barley, has declined. Increases in the output of most livestock are expected in Canada in 1963/64.

Droughts in various parts of Latin America in the spring and summer of 1964 will probably affect livestock and the production of staple food crops in the highland areas and reduce the amount of irrigation water for summer crops in the lowlands and valleys. While the extent of the frost, fire and drought damage to coffee trees in 1962 and 1963 is still subject to widely differing estimates, forecasts are that Brazil's 1964/65 coffee crop will be from 0.5 to 0.7 million tons, as compared with 1.6 million tons in 1963/64.

In the Far East, the current food situation in India presents disturbing aspects. Total food production in India is unlikely to be higher than in 1963/64, and what little increase is expected in rice production will probably be offset by reduced output of wheat, other grains, and pulses. There have been heavy losses in the spring crops because of inadequate rains and an unprecedented cold wave in the north. Food shortages have been especially severe in Rajasthan, Maharashtra, and West Bengal.

In the Near East the winter and spring rains were very favorable, and large grain harvests are generally expected, especially in Syria and Turkey. However, in Iran the third successive crop failure in the Khuzistan Province has led to food shortages, and a poor harvest is also expected in central Iraq. In Libya the grain crop is likely to be reduced as a result of late rains, and olives and citrus have suffered insect damage. Large cotton acreages are anticipated in most of the region.

Information is particularly scanty regarding crop prospects in Africa. In northwest Africa, grain crops appear likely to be smaller than in 1963/64 as a result of poor weather conditions.

Changes in stocks

There appears to have been a further slight reduction during 1963/64 in the overall level of unsold stocks of agricultural products. Movements differed rather sharply, however, among the main commodities of which there are large stocks. There were substantial reductions in stocks of wheat and also of dairy products. On the other hand, the level of stocks of coarse grains turned upward again and cotton stocks increased further. Most other stocks on which data are available showed only small changes in 1963/64, but there is very little information on the stocks of some important commodities, in particular coffee.

The wheat stocks of the four major exporting countries are expected to decline by 17 percent to about 38.9 million tons by the end of the 1963/64 season (Table II-7). This is the third year in succession in which wheat stocks have been reduced, and a decline of this magnitude would take them to their lowest level for a decade. The reduction results from the exceptionally large import demand for wheat in 1963/64 in Europe, the U.S.S.R., and Mainland China. United States stocks were mainly affected, and were expected to show a decline of about a quarter. Canadian and Australian stocks changed less, since their recent large sales have come mainly from current bumper harvests. Argentina's wheat stocks are likely to rise sharply as a result of the large 1963/64 harvest, despite the steep increase in its exports.

Trends were very different for coarse grains, however, and North American stocks, which decreased in each of the last two seasons, are expected to show a renewed rise of about 4 percent by the end of the 1963/64 season. This chiefly reflects the record United States maize crop.

As a result of the lower milk output in Europe and the United States, stocks of dairy products were sharply reduced during 1963 from the high levels of the previous year. The largest reductions were in United States stocks of butter, dried skim milk, and cheese. United States stocks of liquid edible vegetable oils and oilseeds, however, are forecast to show a further substantial increase by the end of the 1963/64 season, mainly as a result of the large soybean harvest.

With the recovery in world production, the decline in sugar stocks is likely to have been halted, but it is too early for an accurate estimate for the current season. The shortage of information is particularly marked in respect of coffee stocks, and an evaluation of the world situation is at present being carried out under the aegis of the International Coffee Organization. It seems certain, however, that as a result of the further fall in Brazilian production in 1963/64 any addition to stocks was the smallest for some years. Furthermore the quality of some of the earlier holdings may no longer be suitable for export.

World cotton stocks showed a substantial increase for the second consecutive year, and are expected to have risen by about 9 percent during 1963/64 to the record level of 5.42 million tons. The increase is very largely in United States stocks, which, at 2.73 million tons, have been exceeded only in 1956. United States cotton stocks, which by 1961 had been reduced to half the peak 1956 level, have now been rising again for three years.

The somewhat divergent movements in stocks discussed above are brought together in Figure II-3 in terms of a price-weighted index. From this it appears that, on balance, there was a slight reduction in world stocks of agricultural products in 1963/64, for the third year in succession.

The index also shows that the proportion of total world stocks that are in North America remains close to 70 percent. The total value of the holdings of the United States Commodity Credit Corporation fell slightly during the year ending 30 April

FIGURE II-3. - INDICES OF THE MAIN STOCKS OF AGRICULTURAL COMMODITIES IN THE WORLD AND IN NORTH AMERICA

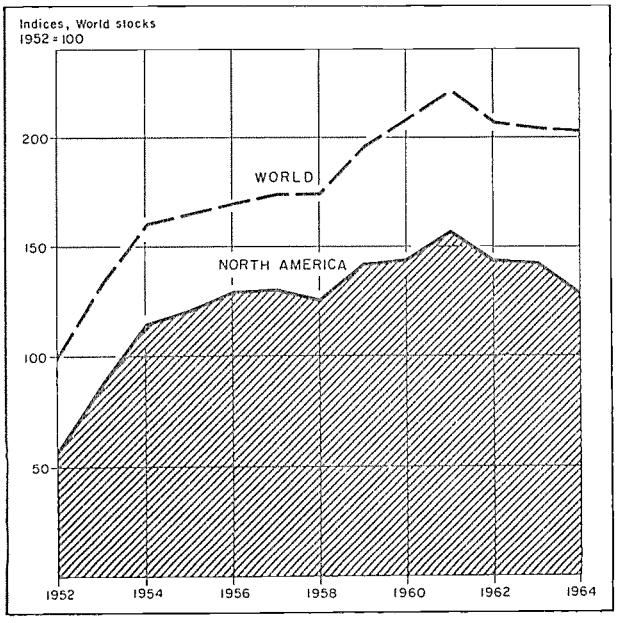


TABLE II-7. - ESTIMATED STOCKS OF MAJOR AGRICULTURAL AND FOREST PRODUCTS

	Date	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964 (Forecast)
WHEAT		*Million metric tons*												
United States	1 July	7.0	16.5	25.4	28.2	28.1	24.7	24.0	35.2	35.7	38.4	36.0	32.5	24.2
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	13.3
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	0.3	1.0
Australia	1 Dec.	0.5	1.0	2.6	2.6	2.4	1.1	0.5	1.8	1.7	0.7	0.5	0.6	0.4
Total 4 major exporters		13.5	29.9	46.4	47.8	47.5	47.3	43.4	54.4	54.9	56.4	47.3	46.7	38.9
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	0.2	0.3	...
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
Total of above		0.8	1.4	1.8	1.6	1.8	1.2	1.1	1.0	0.7	0.5	0.4	0.5	...
COARSE GRAINS [2]														
United States	1 July [3]	18.5	24.7	29.4	37.3	39.3	44.4	53.8	61.6	67.9	77.2	65.4	57.4	58.5
Canada	1 Aug.	3.6	5.1	5.6	3.7	4.3	6.6	5.2	5.1	4.6	4.5	2.8	4.5	5.8
Total 2 major exporters		22.1	29.8	35.0	41.0	43.6	51.0	59.0	66.7	72.5	81.7	68.2	61.9	64.3
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	...
Canada		0.02	0.03	0.04	0.05	0.04	0.03	0.04	0.05	0.06	0.09	0.11	0.10	...
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	...
Australia and NewZealand		0.05	0.05	0.06	0.06	0.05	0.06	0.06	0.05	0.07	0.07	0.06	0.05	...
Total of above	31 Dec.	0.14	0.27	0.32	0.22	0.20	0.25	0.21	0.17	0.28	0.40	0.44	0.36	...
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	...
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	...
DRIED SKIM MILK														
United States [5]	31 Dec.	0.08	0.23	0.06	0.04	0.04	0.05	0.06	0.04	0.14	0.14	0.28	0.17	...
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	0.13	...
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	...	...
LIQUID EDIBLE VEGETABLE OILS AND OILSEEDS (oil equivalent)														
United States	1 Oct. [6]	0.24	0.63	0.52	0.35	0.29	0.29	0.33	0.56	0.39	0.46	0.76	0.80	0.97

Continued on following page

TABLE II-7. - ESTIMATED STOCKS OF MAJOR AGRICULTURAL AND FOREST PRODUCTS (*concluded*)

	Date	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964 (Forecast)
SUGAR (raw value)		*Million metric tons*												
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	...
World total[7]	31 Aug.	10.0	9.4	10.8	10.5	9.1	8.7	8.5	11.8	12.5	13.2	10.7	8.1	...
COFFEE														
Brazil		0.18	0.20	0.20	0.20	0.63	0.44	0.87	1.45	2.83	3.19	3.83	...	...
Total 5 countries[8]	30 June	0.53	0.51	0.49	0.38	0.84	0.69	1.17	1.85	3.42	3.84	4.35	...	...
World total	30 Sept.	...	...	...	...	...	...	1.37	2.06	3.76	4.12	4.82	...	...
TOBACCO (farm weight)														
United States[9]	1 Oct.	1.56	1.66	1.69	1.83	1.89	2.00	1.89	1.81	1.74	1.70	1.83	2.00	...
COTTON (lint)														
United States		0.61	1.22	2.11	2.43	3.15	2.47	1.89	1.93	1.64	1.57	1.70	2.43	2.73
World total[10]	31 July	3.41	4.05	4.59	4.84	5.33	5.11	4.80	4.60	4.41	4.38	4.26	4.97	5.42
NATURAL RUBBER														
World total[11]	31 Dec.	0.73	0.72	0.73	0.76	0.74	0.76	0.75	0.70	0.76	0.75	0.76	0.69	0.67
NEWSPRINT														
North America[12]	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	...
SAWN SOFTWOOD														
European importers[13]	31 Dec.	5.74	6.19	5.10	6.09	5.32	5.62	5.42	5.12	6.22	6.14	6.00	6.12	...
European exporters[14]	31 Dec.	...	1.55	1.42	1.53	1.50	1.71	1.78	1.57	1.48	1.75	2.13	1.90	...
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	...
SAWN HARDWOOD														
European importers[15]	31 Dec.	1.29	1.13	1.06	1.22	1.31	1.25	1.26	1.19	1.25	1.33	1.25	1.18	...
European exporters[16]	31 Dec.	...	0.42	0.41	0.50	0.59	0.62	0.57	0.55	0.54	0.73	0.68	0.62	...
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	...

NOTE: Quantities shown include normal carry-over 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] Cottonseed, 1 August. - [7] Excluding the U.S.S.R. and Mainland China. - [8] Brazil, Colombia, Ivory Coast, Uganda, and United States. - [9] Flue-cured types, 1 July. - [10] Including estimates of cotton afloat. - [11] Including estimates of rubber afloat, but excluding strategic stockpiles. - [12] United States and Canadian mills and United States consumers. - [13] Belgium-Luxembourg, Denmark, Federal Republic of Germany, Netherlands, Switzerland, United Kingdom. - [14] Austria, Poland, Yugoslavia. - [15] Belgium-Luxembourg, Federal Republic of Germany, United Kingdom. - [16] Austria, Bulgaria, Yugoslavia.

1964, thus renewing the downward trend that was interrupted the year before. Holdings of wheat and dairy products were considerably reduced, but those of cotton and tobacco increased (Annex Table 13).

Stocks of forest products, which are not included in Figure II-3, also showed divergent trends during 1963. In Europe a new phase of stock-building resulted in higher stocks of sawn softwood and of pulp in importing countries at the end of 1963. Increased exports reduced stocks of sawnwood and

of pulp in the European exporting countries. In North America stocks of sawn softwood at the end of 1963 were at the lowest level for many years and were 25 percent below the peak reached in December 1960. North American stocks of sawn hardwood, however, rose during 1963, since the recovery in production outpaced consumption. Stocks of newsprint in North America were reduced during 1963. The decline in Canadian production and deliveries to the United States at the beginning of the year was followed by a rise in United States consumption, so that consumers' stocks were reduced to about 38 days' supply in December 1963, compared with 50 days' supply a year before.

Economic activity and the demand for agricultural products

In mid-1964 economic activity was at a high level in most industrialized countries. In the United States the steady increase in economic activity that has gone on for more than three years, the longest period of expansion in peacetime, showed no sign of coming to an end. Partly because of the tax cuts enacted in February 1964, the gross national product is expected to rise by about 6 percent in 1964, compared with an increase of less than 4 percent the year before. Despite the long period of expansion there has so far been only a fractional increase in consumer prices, but the threat of inflationary pressure is causing concern. The employment situation, however, improved only slightly, and the seasonally adjusted monthly unemployment rate for the 12 months ending in June 1964 remained at 5.4 percent of the civilian labor force. The balance of payments deficit, at more than $3,000 million, was greater in 1963 than in both 1961 and 1962, although there has been substantial improvement since the middle of 1963, reflecting government measures to stem the outflow of gold and dollars, as well as increases in exports.

Demand for agricultural products remained strong in the United States. At the high levels of income that have been reached, however, demand for agricultural products increases rather little, except for the more expensive foodstuffs and some raw materials. Thus in 1963 imports of coffee were 8 percent greater than in 1960, of tea 9 percent, and of cocoa 14 percent, although only for tea did the value increase as well as the volume. Foreign demand for United States agricultural exports also increased considerably.

In Canada the gross national product increased by 6 percent in 1963; this was slower than in 1962, but the rate of increase accelerated toward the end of the year. While unemployment still averaged 5.5 percent of the civilian labor force in 1963, this was the lowest annual rate for six years. The record wheat harvest found vastly increased outlets in Mainland China, the U.S.S.R., and eastern Europe, adding over $1,000 million to export receipts. Domestic demand for agricultural products remained high. Consumer and wholesale prices rose by only about 2 percent in 1963, but the rise became more rapid in early 1964. In both the United States and Canada a continuing though probably slower expansion at relatively stable prices is expected for 1964/65.

Expansion continued in western Europe in 1963 for the fifth year in succession, though in continental Europe the rate of growth of the combined gross national product fell from 4.9 percent (in real terms) in 1962 to 3.9 percent. The increasing consumer demand pushed up retail prices, and in a few countries, including France, Italy, and Switzerland, necessitated disinflationary measures. In the United Kingdom it was felt necessary to try to reduce the rate of growth, which had reached 6 percent, and as precautionary steps the bank rate was raised (this was also found necessary in a number of other countries) and excise taxes on tobacco and alcoholic beverages increased. International arrangements to maintain the stability of currencies affected by inflationary trends included a massive support of the Italian exchange reserves by the United States, some European central banks, and the International Monetary Fund. In spite of the restrictive measures that have been adopted, economic growth in western Europe is likely to continue at about the same rate in 1964, though there may be a slight reduction in the rate of growth in 1965.

Australia and New Zealand experienced boom conditions in 1963/64, based mainly on considerably increased exports of agricultural products at higher prices. Only in Australia, however, was there a substantial increase in foreign exchange reserves, and in New Zealand quantitative import restrictions had to be maintained. In South Africa the gross national

product rose by 8 percent in real terms in 1963, and retail sales increased by 9 percent, necessitating some restrictive measures.

In Japan the rapid economic expansion continued in 1963/64, gross national product in real terms increasing by 8 percent in 1963. In spite of an increase of 10 percent in the value of exports, the trade deficit rose by 80 percent in 1963. In addition to an increase in the bank rate and some tightening of bank credit, various measures to promote exports were also adopted. The growth of domestic demand was expected to be reduced in 1964.

In eastern Europe and the U.S.S.R. the rate of economic expansion in 1963 appears generally to have matched that in 1962, but in Czechoslovakia and the U.S.S.R. the rate of increase slowed down, partly because of the poor harvests. The substantial increase in the agricultural imports of the centrally planned countries is discussed later in this chapter.

The developing countries have benefited from the larger demand and higher prices for food and agricultural products. However, it is probable that much of the increase in their gold and dollar holdings, which rose by $1,500 in 1963 as against $500 million in 1962, was due to further borrowing abroad. The foreign indebtedness of the Latin American countries is reported to have doubled between 1957 and 1963. Servicing this debt will absorb 17 percent of export revenues in 1964, compared with 7 to 8 percent five years ago; for certain countries the proportion will soon reach 25 to 30 percent, and in one extreme case more than 50 percent. At the same time it is reported that a large part of the increases in foreign exchange reserves of western European countries has come from the developing countries.

Many of the developing countries have in recent months been faced by mounting inflationary pressures, often with detrimental efects on the execution of their development plans, and have been forced to take various short-term measures, mainly fiscal and monetary, to remedy the situation.

Food supplies and consumption

The indices of per caput food production shown in Table II-2 above should not be taken as indicating the course of actual food supplies and consumption in the different regions of the world. Considerable quantities of food move in international trade, especially from the developing to the more developed regions. Even though imports of food in developing countries are generally very small in relation to their total domestic production, they are sometimes quite large in relation to marketed production and urban food supplies. Furthermore the marginal effect on total food supplies of changes in these imports, and also in exports of food, may often be substantial.

Table II-8 makes an approximate comparison of trends in food production and food supplies per caput in each of the main regions. The food supply data take account of changes in imports and exports as well as production. It has been possible to make allowances for changes in the level of stocks only in the case of North America, but in other regions the stocks are too small to have much effect on supplies. Difficulties in matching production and trade seasons are lessened by considering averages for several years.

From this comparison it appears that, whereas in the developed regions the increase in per caput food production over the prewar level has been greater than that in apparent consumption (i.e., per caput food supplies), in the developing regions the contrary is the case and food supplies per caput have improved somewhat more than production. Thus in both Latin America and the Far East (excluding Mainland China), where per caput food production remains below the prewar level, per caput supplies in 1961-63 are estimated as slightly greater than before the war. The increase in per caput supplies appears to have been greater, however, in the developed regions considered as a group than in the developing group, which suggests a widening of the gap between their food consumption levels in comparison with the prewar period.

Figure II-4 shows more clearly the part that has been played by trade in these changes. Among the developing regions both the Far East (excluding Mainland China) and the Near East were small net exporters of food before the war, but have had a growing net import during the postwar period. Although Latin America and Africa remain substantial net exporters of food, in Africa the net export has in-

TABLE II-8. - COMPARISON OF ESTIMATED TREND OF FOOD PRODUCTION AND SUPPLIES, PER CAPUT, BY REGION

	Average 1948-52	Average 1953-57	Average 1958-60	Average 1961-63
	Indices, prewar average = 100			
WESTERN EUROPE				
Production	96	109	117	123
Supplies	92	103	111	117
NORTH AMERICA				
Production	116	116	118	116
Supplies	107	107	105	107
OCEANIA				
Production	94	90	97	99
Supplies	98	107	96	92
THREE ABOVE REGIONS				
Production	108	115	121	123
Supplies	100	107	110	114
LATIN AMERICA				
Production	93	97	98	95
Supplies	104	108	109	105
FAR EAST [1]				
Production	88	95	99	98
Supplies	93	101	105	105
NEAR EAST				
Production	97	106	110	109
Supplies	101	109	118	118
AFRICA				
Production	104	107	105	102
Supplies	108	110	109	105
FOUR ABOVE REGIONS				
Production	94	100	103	101
Supplies	99	106	110	109

NOTE: See explanatory note to Table II-1 for calculation of food production indices. Food supply indices are net of changes in imports and exports of food, and in the case of North America of changes in stocks.

[1] Excluding Mainland China.

creased only slowly and in Latin America it is less than before the war. The growth of net imports or the slow rate of expansion of net exports in some cases reflects reduced gross exports in comparison with before the war, as for example oilseeds from the Far East and meat from Latin America, as well as increases in gross imports.

In the developed regions the main long-term change has been in North America, where in the postwar years there has been a rapidly growing net export of food instead of the prewar net import. In western Europe, on the other hand, the large net import of food has expanded steadily, though less rapidly than production. In Oceania, where a very large proportion of production is exported, net exports have increased at about the same rate as production. Some of these trends in international trade are discussed in more detail in the next section of this chapter.

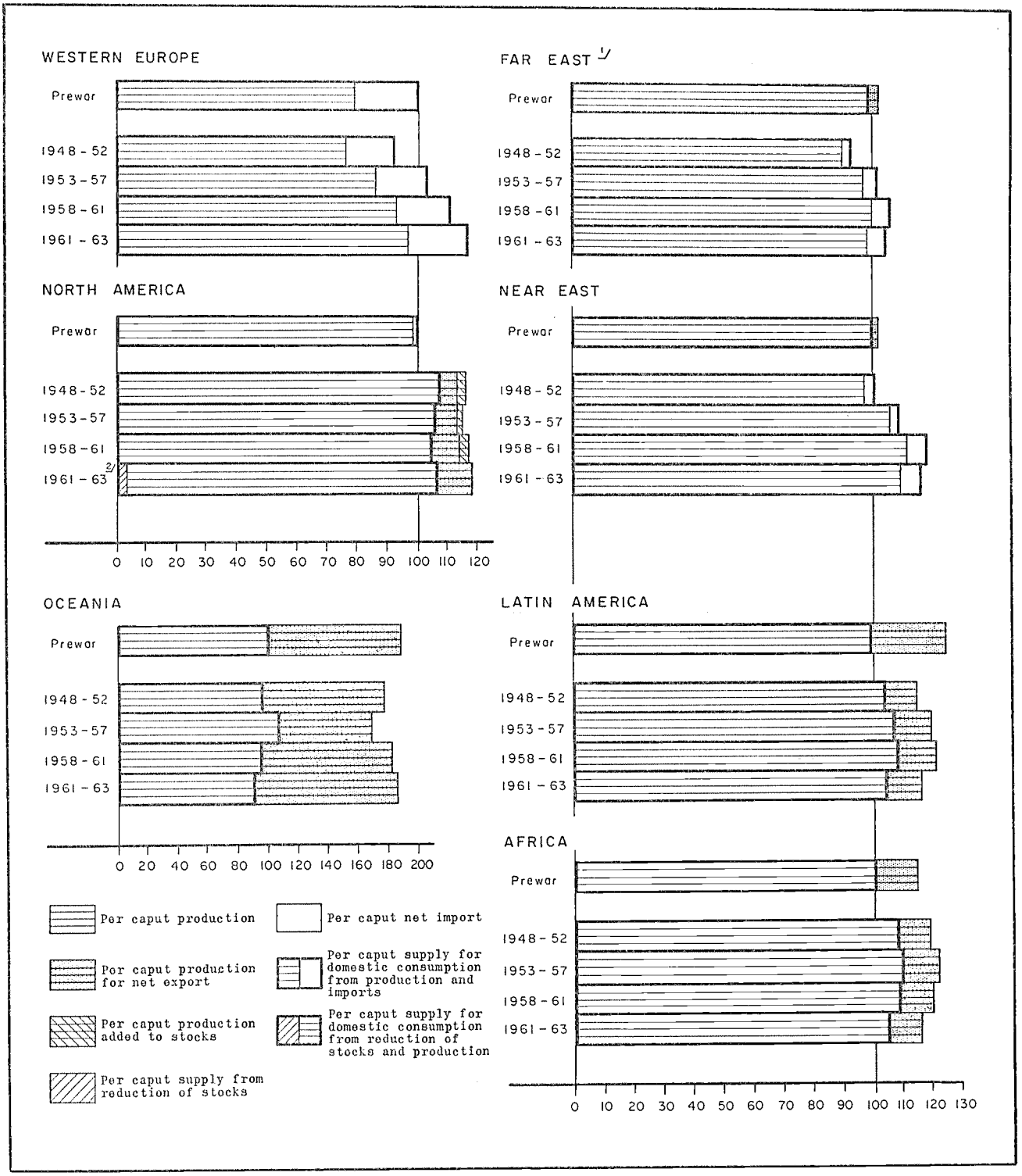
In the shorter run there are generally only small changes in per caput food supplies. Harvest fluctuations tend to be offset, or at least mitigated, by changes in imports and exports, particularly in view of the ready availability, often on concessional terms, of large exportable supplies of grains, the staple food of most of mankind.

It is not possible to include data for eastern Europe, the U.S.S.R. and Mainland China in Table II-8 and Figure II-4, because of the inadequacy of information on the trade between these countries. However, massive food imports from the rest of the world have recently played a large part in their food supply situation. The U.S.S.R. is expected to import about 12 million tons of grain in 1963/64; this would be roughly equal to the reported decline in state deliveries of grain between 1962 and 1963, though the total shortfall in the harvest has not been announced, nor are full details yet available of U.S.S.R. grain exports in 1963/64. Mainland China has continued to import large quantities of grains, estimated at almost 6 million tons in 1963.

The data in Table II-8 and Figure II-4 are in terms of price-weighted indices, so that part of the improvement they show in food supplies, especially in the developed regions, may not be in the quantity but in the composition of the diet, through a shift to more expensive foodstuffs such as livestock products. Thus, although they are not based on nutritional considerations they do to some extent reflect the nutritional quality of the diet, since this is roughly related to its cost.

Details of the nutritional composition of the diet in recent years are shown in Annex Table 14 for those countries for which it is possible to calculate food balance sheets. While there have been only very small changes in the total calorie and protein

FIGURE II-4. - ESTIMATED PER CAPUT FOOD PRODUCTION, NET TRADE, AND SUPPLIES, BY REGION



[1] Excluding Mainland China. - [2] Stocks reduced during this period.

content of diets, shifts in the relative contribution of the different food groups have been more marked. Particularly striking are the increases in meat consumption which have occurred in many European countries, especially those in the southern part of the region.

International trade in agricultural products

The three most significant developments in world agricultural trade during the period under review were:

(*a*) the substantial and widespread strengthening of agricultural prices in international markets during 1963 and the first months of 1964 which materially increased earnings from agricultural exports;

(*b*) the sharp rise in imports into the U.S.S.R., which together with the continued high level of imports into Mainland China also contributed largely to the expansion of agricultural trade;

(*c*) the convening of the first United Nations Conference on Trade and Development in the spring of 1964.

While revealing the sharply divergent views of developed and developing countries on many questions of trade and aid, the Conference brought home forcefully the urgency and magnitude of the development problems of the economically less advanced countries and the key role of trade in providing the sinews for economic growth. Though a number of countries expressed reservations with regard to some of the recommendations of the Conference, there can be little doubt that future national and international thinking on trade and aid will be greatly influenced by its conclusions and by the new organizational machinery which it proposed.

Main developments in 1963

For the year 1963 as a whole, the average export unit value (price) of all agricultural products was no less than 8 percent higher than in 1962. This was the first major upturn in the average price level

Table II-9. - Indices of the volume, unit value and total value of world trade [1]

	Average 1948-52	Average 1953-57	1958	1959	1960	1961	1962	1963 (Preliminary)	Change 1962 to 1963
	Indices, average 1952-53 = 100								*Percent*
Total volume of world trade (agricultural and nonagricultural) [2]	87	118	133	142	157	164	173	186	+ 8
Trade in agricultural products									
Volume of exports	95	111	120	128	136	144	146	152	+ 4
Volume of commercial exports [3]	95	106	113	120	126	134	137	142	+ 3
Average export unit value									
At current prices	100	95	87	85	85	83	82	89	+ 8
In real terms [4]	104	96	85	83	82	79	78	84	+ 8
Total value of exports									
At current prices	94	105	105	108	115	119	120	133	+ 10
In real terms [4]	98	106	102	106	111	113	115	126	+ 10
Value of commercial exports									
In real terms [4]	98	102	97	100	104	106	108	119	+ 10
Average export unit value of manufactured goods [5]	97	99	103	102	104	105	105	105	—

[1] Excluding U.S.S.R., eastern Europe and Mainland China. - [2] United Nations index of the volume of world trade, adjusted to 1952-53 base. - [3] Excluding United States shipments on special terms from 1955. - [4] Deflated by the United Nations index of export unit value of manufactured goods. - [5] United Nations index adjusted to 1952-53 base.

since 1951. Since the prices of manufactured products in international trade again remained stable, the purchasing power of agricultural products in terms of manufactures (the " terms of trade ") rose in the same proportion, thus regaining more than one third of the 22 percent loss suffered over the previous decade. Present indications based on market price indices are that this rise in prices continued until the first months of 1964, after which a slight decline set in.

Although the steep increase in sugar prices was an important factor contributing to the higher average for 1963, a remarkable feature of the increase was its widespread incidence. Of the 49 major products included in the FAO indices on which this analysis in based, no fewer than 32, representing almost 60 percent of the total value for all the products covered, showed some increase in the average export unit value. The crucial question of how far the recent upward movement of agricultural prices is likely to be sustained is discussed in a later section.

The effect of the higher prices on the value of trade was reinforced by an increase of about 4 percent in 1963 in the volume of agricultural trade to the highest level yet recorded. Total earnings from agricultural exports (excluding those of the U.S.S.R., eastern Europe and Mainland China) thus rose by 10 percent over the 1962 level (Table II-9).

As in most recent years, the largest gains in exports were made by the economically advanced countries of western Europe and North America as well as Oceania. The combined exports of these regions rose by 9 percent in volume and 14 percent in value. The volume of exports from the developing regions as a whole fell by about 1 percent, but owing to the higher prices their export earnings increased by amounts ranging from 6 percent in Latin America to 10 percent in the Near East and 12 percent in Africa. Only in the Far East (excluding Mainland China) did the value of exports show no significant rise over the preceding year's level.

The increased value of trade in 1963 was particularly influenced by two products, namely sugar and grains, especially wheat. Between them sugar and grains accounted for about 60 percent of the total increase in the value index of world agricultural exports. In the case of sugar the increase was due entirely to much higher average export prices. In contrast, the larger value of trade in wheat was caused by an increase of more than a quarter in the volume of trade, mainly because of a sharp increase in exports from North America and Australia to the U.S.S.R. where there was a poor grain crop. Smaller but still substantial increases were also recorded in the value of world exports of dairy products and wool.

There was an increase of more than a tenth in the volume of food imports into the Far East, where Japan, and to a lesser extent the developing countries of the region, imported larger quantities of foodstuffs. In the other less developed regions, however, imports of food were smaller than in 1962, in the Near East and Africa for the second year running,

TABLE II-10. - INDICES OF THE VOLUME OF AGRICULTURAL IMPORTS BY REGIONS

	Average 1948-52	Average 1953-57	1958	1959	1960	1961	1962	1963 (Preliminary)	Change 1962 to 1963
	Indices, average 1952-53 = 100								*Percent*
Western Europe	95	115	123	130	135	137	144	143	—
North America	100	94	96	107	101	106	113	110	— 2
Japan	64	120	124	140	156	180	167	197	+ 18
Oceania	99	121	138	129	131	126	123	122	— 1
Total of above	94	110	116	125	128	132	138	139	+ 1
Latin America	91	107	122	114	119	123	125	125	— 1
Far East [1]	92	101	120	118	148	142	143	147	+ 3
Near East	91	120	155	183	202	226	228	224	— 2
Africa	86	121	130	150	165	181	177	176	— 1
Total of above	91	108	127	131	151	155	155	156	+ 1
WORLD [2]	94	109	118	126	132	136	141	142	+ 1

[1] Excluding Mainland China and Japan. - [2] Excluding U.S.S.R., eastern Europe and Mainland China.

TABLE II-11. - INDICES OF VOLUME AND VALUE OF WORLD [1] AGRICULTURAL EXPORTS, BY MAIN COMMODITY GROUPS

	Average 1948-52	Average 1953-57	1958	1959	1960	1961	1962	1963 (Preliminary)	Change 1962 to 1963
	Indices, average 1952-53 = 100								*Percent*
FOODS AND FEEDSTUFFS									
Volume	93	113	128	134	143	155	159	169	+ 6
Value	94	105	112	116	123	134	139	160	+ 15
BEVERAGES AND TOBACCO									
Volume	95	108	112	121	127	134	138	140	+ 1
Value	81	112	111	103	105	105	106	111	+ 4
AGRICULTURAL RAW MATERIALS									
Volume	98	110	111	124	130	132	129	131	+ 1
Value	105	102	87	98	110	106	99	103	+ 4
ALL AGRICULTURAL PRODUCTS									
Volume	95	111	120	128	136	144	146	152	+ 4
Value	94	105	105	108	115	119	120	133	+ 10

[1] Excluding U.S.S.R., eastern Europe and Mainland China.

reflecting the end of the long period of drought in a number of countries. Indeed, the volume of imports both of foodstuffs and of agricultural products as a whole into the developing regions has shown little increase since 1960, though during the 1950s it rose by well over 50 percent (Table II-10).

Agricultural imports into the more developed regions, other than Japan, also showed no increase in volume in 1963, though over the past decade imports into western Europe have increased by over 40 percent. A large part of this increase, however, represents the growth of intraregional trade. Comparable figures to those in Table II-10 are not available, but from detailed estimates prepared for the United Nations Trade Conference it appears that about three quarters of the increase in the value of western European agricultural imports between 1955-57 and 1959-61, including also forest and fisheries products, came from other western European countries.

Mainly because of higher sugar prices and larger wheat shipments, the increase in the volume and value of world trade in food and feeding stuffs in 1963 (6 and 15 percent respectively) was much greater than the rise in nonfood products (Table II-11 and Annex Table 15.)

World trade both in beverages and tobacco and in raw materials increased by only about 1 percent in volume and about 4 percent in value in 1963. North America imported somewhat less coffee and cocoa than the year before, and its imports of raw materials fell by 5 percent despite the high level of industrial activity. Western European imports of raw materials were also fractionally smaller, but those of Japan resumed their rise after the temporary decline in 1962.

Among exporters, Far East exports of rubber and jute fell sharply in 1963, while the volume of cotton exports from North and Latin America, the Near East and Africa were larger than in 1962. Wool supplies were relatively short; exports from Oceania remained stable and those from Latin America fell slightly.

Forest products

The volume of world trade in forest products rose by some 7 percent in 1963 compared with an increase of 3 percent in 1962 (Table II-12). Prices for most forest products were either stable or somewhat higher than in 1962, so that the total value of world trade in forest products rose in roughly the same proportion.

TABLE II-12. - WORLD EXPORTS OF MAIN GROUPS OF FOREST PRODUCTS

	1961	1962	1963	Change 1962 to 1963
	Million cubic meters, roundwood equivalent			*Percent*
Roundwood	38.8	38.7	41.2	+ 6
Sawnwood.....	70.1	73.5	78.1	+ 6
Woodpulp.....	44.8	46.8	52.0	+ 11
Paper and paperboard	35.4	35.5	37.8	+ 6
Panel products	7.2	8.1	8.7	+ 7
Total	196.3	202.6	217.8	+ 7

European imports of roundwood declined between 1961 and 1963 owing to stock reductions for pulpwood and a falling consumption of pitprops. A rapid fall in Finnish roundwood exports, owing to fast rising domestic consumption of pulp and paper, has to some extent been replaced by larger shipments from the U.S.S.R., eastern European countries and Sweden. Japanese roundwood imports continued to expand rapidly in 1963, from both North America and the Philippines. African exports of broadleaved logs increased by more than one tenth.

The 6 percent expansion in world trade in sawn softwood in 1963 was confined to the Northern Hemisphere. Exports from Canada, which has accounted for half of the increase in recent years, rose by 15 percent. The remaining increase came from the U.S.S.R. and eastern Europe, continuing the trend of recent years to replace lagging shipments from the leading western European shippers, Austria, Finland, and Sweden. Most of the expanding shipments have gone to the United States, Japan, the United Kingdom, France, Italy and Spain. The volume of world trade in sawn hardwood rose by over 5 percent in 1963.

International trade in pulp has expanded particularly rapidly, with net imports of pulp into both Europe and Asia rising by over 60 percent between 1960 and 1963, while North American net exports rose by 45 percent during the some period. In 1963 there was an increase in net exports of both pulp and paper from North America, while in Europe net imports of pulp continued to increase and net exports of paper to decline. The share of intra-regional trade in the European exports increased further.

Trade in panel products continued to expand in 1963, and Finland overtook Japan to become the world's largest exporter of plywood. United States imports of hardwood plywood increased further, mainly from Japan, China (Taiwan) and the Philippines.

Nearly nine tenths of the world's exports of fibreboard come from Europe, and in 1963 this region raised shipments by about 4 percent. Australia and New Zealand reported sharply increased exports to Far Eastern countries. Trade in particle board is as yet largely confined to Europe. At about 270,000 tons, trade in 1963 accounted for less than 10 percent of the region's production.

Fisheries products

A major development in world trade in fisheries products for some years has been the growth of trade in frozen fish and fishmeal, at the expense of fresh and cured fish. Between 1959 and 1962, the share of fresh fish in world trade declined from 42 to 36 percent and that of cured fish from 20 to 17 percent. The proportion of trade in canned fish has shown little change. Growth has been fastest for fishmeal, of which no less than three quarters of world exports come from Peru. In 1963 trade in fishmeal rose by a further 5 percent to 1.65 million tons, compared with only one million tons as recently as in 1960. Trade in frozen fish also expanded, a steep drop in Japan's exports to the United States being more than offset by larger Norwegian exports to other European countries.

Canada exported 10 percent more canned fish than in 1962. There was also a heavy demand for Newfoundland salt cod in many European markets due to poor cod fisheries in northern Europe. United States imports of edible fish fell somewhat, in line with a recent tendency for per caput fish consumption in that country to decline, probably because of heavy competition from beef and poultry. United States imports of fishmeal rose by 52 percent to 382,000 tons, owing to reduced domestic output.

PRICE TRENDS

The rising tendency of agricultural prices in international markets already noted had started in 1962 and continued, although with fluctuations, through 1963 and the early months of 1964. In

TABLE II-13. - INDICES OF AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL PRODUCTS, BY COMMODITY GROUPS AND PRINCIPAL COMMODITIES

	Average 1948-52	Average 1953-57	1958	1959	1960	1961	1962	1963 (Preliminary)	Change 1962 to 1963
	Indices, average 1952-53 = 100								*Percent*
ALL AGRICULTURAL PRODUCTS	100	95	87	85	85	83	82	89	+ 8
FOOD AND FEEDSTUFFS	102	92	87	87	86	86	88	98	+ 12
Cereals	100	83	74	73	72	72	77	76	— 1
Sugar	103	97	95	90	86	98	102	156	+ 53
Fruit	104	108	118	102	102	105	104	116	+ 12
Oilseeds and vegetable oils	110	93	90	98	92	86	83	89	+ 7
Livestock products and cattle	98	100	96	101	100	98	95	100	+ 5
BEVERAGES AND TOBACCO	87	105	99	87	83	79	77	81	+ 5
Coffee	75	101	82	67	64	61	59	58	—
Cocoa	93	110	125	110	88	70	67	70	+ 4
Tea	109	128	124	123	125	123	118	123	+ 4
RAW MATERIALS	107	93	79	78	86	81	77	79	+ 3
Wool	103	100	75	72	78	76	76	86	+ 14
Cotton	105	88	77	67	71	73	70	68	— 2
Rubber	110	100	90	115	129	95	87	84	— 4

1962, the increase had started too late and affected too few products to do more than check the long downward trend at a point some 18 percent below the 1952-53 average. In 1963, however, the average export unit value for all farm products rose by some 8 percent both in current values and in real terms. This was the first major increase in international prices of agricultural products since the Korean war boom.

The largest and most publicized rise was in the price of sugar. In May and November 1963 the free market price reached its highest level since 1920, and for the year as a whole it averaged about three times the 1962 level. The average unit value of sugar exports rose much less, owing partly to the large share in total trade of shipments under inter-governmental arrangements with more stable prices, and partly to the limited amount of free market trade carried on during the period of peak prices. Even so, the average unit value for all sugar exports exceeded the 1962 level by over 50 percent, an even larger increase than at the time of the Korean War and the Suez crisis.

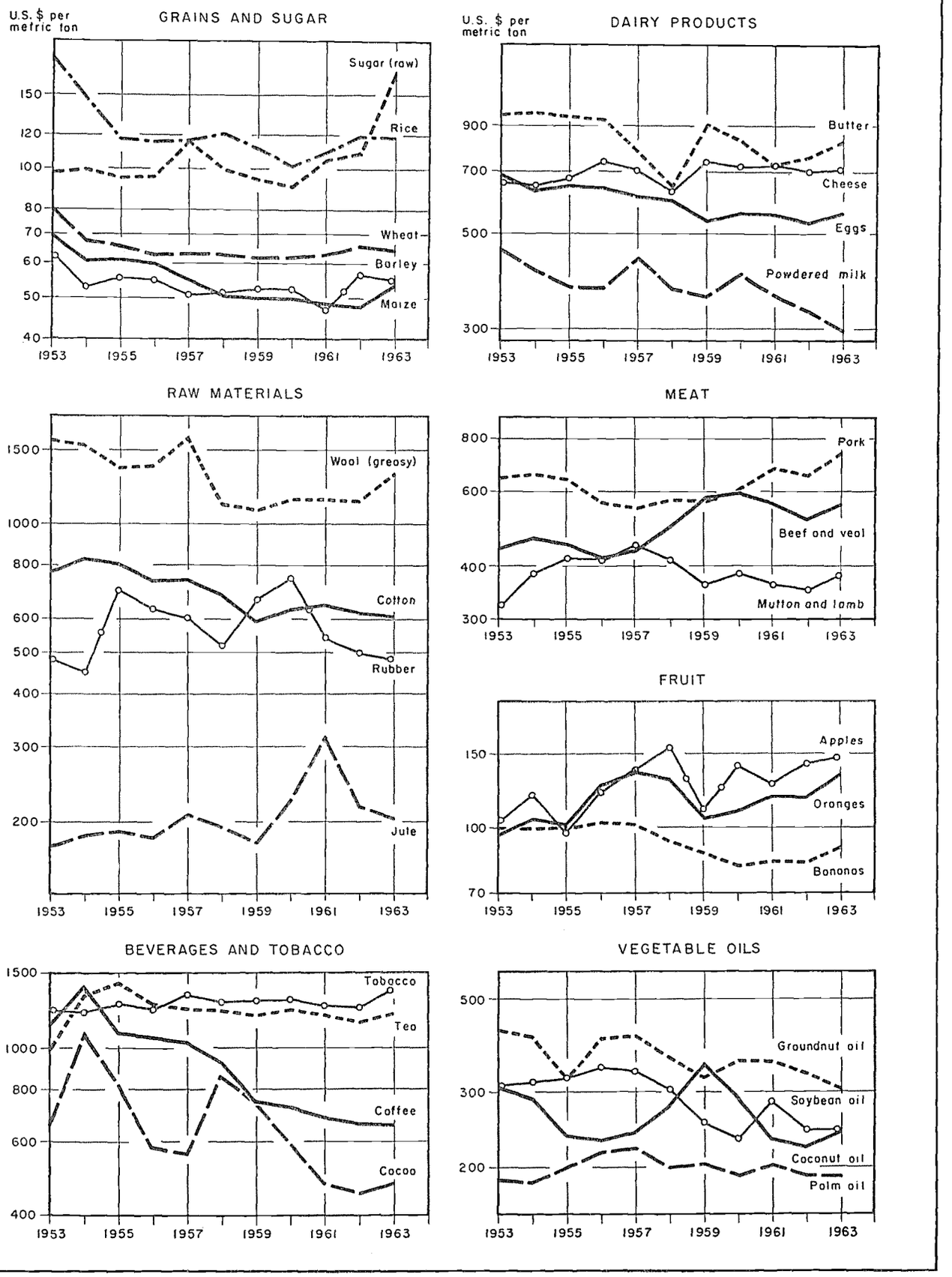
The high price of sugar was, however, by no means the only major factor behind the higher average for the year. Among foodstuffs, the unit value for eggs was up by 25 percent from the low 1962 level and that for olive oil by 35 percent. For a number of products, including coarse grains (other than barley), some fruits, lauric acid oils, most meats, and butter, the increase ranged from 7 to 15 percent, and smaller rises were registered for several other products. Wheat prices reached high levels toward the end of 1963 and in early 1964 but the average for 1963 as a whole remained somewhat below the 1962 level.

Among beverage crops, unit values of tea and cocoa averaged about 4 percent more than in 1962, and there were somewhat larger increases in prices of tobacco and wine. Coffee prices showed no improvement for the year as a whole compared with 1962, but were rising in late 1963 and early 1964.

Unit values of raw materials as a whole averaged only about 3 percent higher than in 1962. Large price increases for wool, sisal and silk were offset by lower prices for cotton, jute and rubber. Data for some of the main commodities are shown in Table II-13 and Figure II-5. More detailed price data are shown in Annex Table 16A.

There was also some increase in average export unit values of a number of forest products in 1963 (Annex Table 16B). In the main this was of the nature of a recovery from the decline in 1962 and

FIGURE II-5. - AVERAGE EXPORT UNIT VALUES (AVERAGE PRICES) OF SELECTED AGRICULTURAL PRODUCTS IN WORLD TRADE



it did not match the rise in prices of agricultural products. Stronger import demand and renewed stock-building of imported materials in Europe and Japan led to steadily rising prices for such key commodities as sawn softwood and woodpulp. Although the annual average for these products showed little change, by the end of 1963 c.i.f. import prices in Europe had recovered about half of the fall that had taken place since 1961. The rise continued in the early part of 1964, and it was expected that later in the year sawn softwood prices would approach the high 1955 level. Pulp prices in Europe and North America recovered in 1963 from the decline in the two preceding years. The increase in paper prices was more modest. Export prices of tropical hardwood logs rose in some countries owing to mounting costs and shortage of supplies of required quality, while import prices were also affected in the second half of the year by rising freight rates. Prices of other categories of roundwood were fairly stable, although toward the end of the year higher prices for standing timber in northern Europe and heavier buying in the forward market led to some increase, especially for pulpwood.

The sharp upturn of agricultural prices on world markets has naturally led to widespread discussion as to whether 1963 marks a turning point in the long downward trend in the prices and terms of trade for agricultural products. While it is too soon to reach any final judgment, it seems important to bear in mind that for a good many commodities, including some of those whose prices have gone up most sharply, the rise is largely explicable by changes in supply and demand relationships which do not seem likely to be of a long-term nature.

The most striking example, that of sugar, reflects primarily the dislocation arising from events in Cuba, reinforced in 1963 by hurricane damage in the Caribbean area and short crops in Europe. Larger sugar crops are expected in a number of major producing countries in 1964, though it is not yet certain whether the supplies will be sufficient to permit a resumption of the steady postwar rise in sugar consumption. But by 1965 new cane plantings resulting from recent high prices will come into production and it seems unlikely that the current shortage of sugar can persist for long.

Similarly the shortfalls in wheat production in the U.S.S.R. and in importing countries, which caused so large a volume of trade in 1963/64, may well be made good by 1964/65. In that case the high wheat prices of early 1964 seem unlikely to persist, the more so since United States stocks are still very large. To some extent lower wheat prices may also affect the prices of coarse grains, although the longer term upward trend of demand will be strengthened by the anticipated smaller crops in 1964 in western Europe, the main importing region.

Again, the production of dairy products and eggs has by now recovered from the effects of the unfavorable weather that caused production to fall in 1963. Egg prices have already fallen and are likely to remain under pressure because of the increasing self-sufficiency in the Federal Republic of Germany and in Italy, the main importers. Nor is there any reason to suppose that supplies of milk in the more developed countries will not again become ample.

Tobacco prices have already started to weaken under the pressure of expanding supplies. Although a number of price-raising factors continue to affect the prices of lauric acid oils, the larger production of olive oil in 1963/64 and of butter in Europe in the first half of 1964, together with the large United States 1963/64 soybean crop, will exert a contrary influence, and the average for the group seems unlikely to rise further.

Many short-term indications are thus against the continuance of the recent rising tendency of prices. For some commodities, on the other hand, firmer markets may persist longer. Sisal continues in strong demand owing to the need to build up stocks depleted in 1962, when there had been a heavy demand for baling twine to bring in the large grain harvests. Wool consumption in major importing countries exceeded in 1963, as in the preceding year, the supplies available from the major exporting countries, and stocks have been reduced to very low levels. Several developing countries are entering the wool market as importers, though against this must be set increasing competition from synthetic fibers.

Some other factors may be noted, moreover, which may tend to maintain prices in the longer run. One is the continuing rapid growth of demand for livestock products, especially meat. This growing demand was reflected in the record level of trade in coarse grains in 1963, and the large increases in imports of beef and other meat into a number of western European countries, as well as into the United States. It is also reflected in higher prices of some coarse grains. Another factor is the import demand for food in many developing countries which, at least until 1960, showed a tendency to grow

rapidly as domestic production for the market lagged behind the fast rising urban demand. Although the additional import requirements of the developing countries have been largely met from the surplus stocks of some industrialized countries, this additional import demand must have some impact on the market. Finally, some recent developments in commodity policy, including the entry into force of the International Coffee Agreement, and the new arrangements for butter, bacon and grains negotiated by the United Kingdom with her main suppliers, may be expected to help to support price levels in the coming years.

A major unknown element is the future imports of the centrally planned countries. Imports of grains to the U.S.S.R. seem unlikely often to recur on the scale of 1963/64. Yet the magnitude of this trade and the recent emphasis in the U.S.S.R. on raising the efficiency of farming suggests that adverse weather may not be the full explanation of this year's shortfall, and that for the time being consumer demand is running ahead of the growth of supply. This would apply especially to livestock products and feedstuffs. The recent decision to build up and maintain stocks equal to six months' supply is also likely to influence the Soviet grain trade for the next few years, unless exceptionally large harvests are gathered. Even if the U.S.S.R. does not become a regular net importer of grain, its exports to other countries of the CMEA [1] might be affected, which in turn would lead to larger imports into those countries from elsewhere. As for Mainland China, there is wide agreement among observers that grain imports will continue at a substantial level for at least the next few years. More important from the point of view of the developing countries are the prospects for growing shipments of beverages and other tropical products into the CMEA countries.

AGRICULTURAL TRADE OF THE U.S.S.R., EASTERN EUROPE AND MAINLAND CHINA

The unexpected upsurge of grain imports into the U.S.S.R. in late 1963 and early 1964, as already noted, resulted from the steeply reduced grain harvest of 1963/64. In consequence the U.S.S.R. not only had to curtail its grain exports in order to safeguard

[1] Council for Mutual Economic Assistance, abbreviated also as COMECON.

TABLE II-14. - GROSS IMPORTS AND EXPORTS OF CERTAIN AGRICULTURAL COMMODITIES: U.S.S.R., EASTERN EUROPE AND MAINLAND CHINA

	1959	1960	1961	1962	1963 [1]
	Million metric tons				
Gross Imports					
GRAINS (excluding rice)					
U.S.S.R.	0.3	0.3	0.7	0.1	...
of which: wheat and wheat flour (wheat equivalent)	0.3	0.1	0.7	0.1	
Eastern Europe	5.7	6.5	6.9	6.5	...
of which: wheat	4.3	5.0	4.7	4.2	
Mainland China	–	–	5.6	4.7	5.7
of which: wheat and wheat flour	–	–	4.0	3.9	5.0
barley	–	–	1.3	0.3	...
maize	–	–	0.1	0.5	..
SUGAR (raw value)					
U.S.S.R.	0.3	1.7	[2] 3.6	2.5	1.1
Eastern Europe	0.1	0.3	0.6	0.9	0.6
Mainland China	—	0.5	[2] 1.6	1.0	0.5
TOTAL	0.4	2.5	[2] 5.3	4.4	2.2
NATURAL RUBBER					
U.S.S.R.	0.24	0.19	0.36	0.36	0.30
Eastern Europe	0.11	0.15	0.16	0.12	0.13
Mainland China	0.15	0.14	0.08	0.11	0.11
TOTAL	0.50	0.48	0.60	0.59	0.54
Gross Exports					
GRAINS (excluding rice)					
U.S.S.R.	7.1	6.8	7.8	8.2	6.2
of which: wheat and wheat flour (wheat equivalent)	6.2	5.7	5.1	5.1	..
Romania [3]	0.2	0.7	1.2	1.1	1.4
RICE					
Mainland China	1.7	1.2	0.4	0.6	[4] 0.6
VEGETABLE OILS AND OILSEEDS					
Mainland China	0.51	0.45	0.18	0.15	...
of which: to U.S.S.R. and eastern Europe	0.34	0.25	0.11	0.09	...
to other countries	0.17	0.20	0.07	0.06	...
SUGAR (raw value)					
U.S.S.R.	0.2	0.3	[5] 1.0	0.9	0.9
Eastern Europe	1.1	1.1	2.3	2.3	1.1
TOTAL	1.3	1.4	3.3	3.2	2.0

[1] Largely estimated, especially data for Mainland China. - [2] A 500,000-ton shipment of Cuban sugar through the U.S.S.R. to Mainland China has been included for both countries, but is counted only once in the total. - [3] The grain exports are understood to be primarily maize. - [4] Excluding exports to the U.S.S.R. - [5] Excluding 500,000 tons from shipment of Cuban sugar to Mainland China.

domestic supplies, but also had to enter international markets in the latter part of 1963 as a major buyer.

Soviet grain trade in 1962 had been characterized by a small increase in the total volume of exports, together with a slight reduction in the export of wheat. There had been a drastic reduction in the (hitherto always marginal) imports of wheat and coarse grains, in part compensated however by a substantial increase in the import of rice to 337,000 tons against barely 20,000 tons in 1961. The official statistics of U.S.S.R. trade in 1963 had not been published at the time of writing. However, it has been reported [2] that in the 1963 calendar year the U.S.S.R. exported 6.2 million tons of all grains against 8.2 million tons in 1962 (Table II-14 and Annex Table 5B). As for imports, a speech of Mr. Krushchev on 13 July 1964 indicated that purchases of all grains in 1963/64 would amount to about 12 million tons, a quantity which corresponds closely to the decline in the state deliveries of grains from the 1963 as compared with the 1962 harvest. Known contracts for imports of wheat in the cereal year 1963/64 amount to over 10 million tons. The main suppliers will be Canada (5.35 million tons), Australia (1.75 million tons) and the United States (1.71 million tons). These purchases will have made the U.S.S.R. the world's largest grain importer, and turned its grain trade balance from an average net export of some 6.4 million tons in 1958-62 to a net import.

It is not possible at this stage to judge how far the U.S.S.R.'s exports in 1964 will be curtailed, but some of its normal customers have already negotiated grain imports from other countries. Eastern European countries as a whole imported some 6.5 million tons of grain in 1962, of which nearly 5 million tons came from the U.S.S.R. Their total imports from the U.S.S.R. in 1963 are not known, but those from other sources appear to have been at about the same level as in 1962.

Mainland China, which in 1961 and 1962 had imported substantial amounts of grains from non-Communist countries, remained a major buyer in 1963. Despite reports of some further improvement in domestic food production, wheat purchases in the 1963/64 season, mainly from Australia, Argentina and Canada, amounted to nearly 5 million tons, or about the same as in 1962/63.

[2] By the U.S.S.R. delegate to the 1964 session of the Economic Commission for Europe.

Gross imports of sugar into the centrally planned countries, which had risen more than tenfold between 1959 and 1961, to 5.3 million tons, had fallen to some 4.4 million tons in 1962 as availabilities from Cuba declined. They were further reduced in 1963 to only 2.2 million tons. The largest fall was in the imports of the U.S.S.R. An agreement concluded in early 1964 between Cuba and the U.S.S.R. foresees, however, a recovery of these imports to 2.1 million tons in 1965 and a subsequent growth to 5 million tons a year in 1968-70, at a fixed price of 6 U.S. cents per pound.

Natural rubber imports into the centrally planned countries declined by nearly one tenth to 540,000 tons in 1963, following a smaller fall in 1962. Longer term import prospects for this product will almost certainly be much influenced by the planned expansion of synthetic rubber capacity in both the U.S.S.R. and the eastern European countries.

Imports of tropical beverages are growing, though less rapidly in recent years than had been generally expected. Total imports of coffee into the U.S.S.R. and eastern Europe in 1963 apparently remained unchanged, while those of cocoa fell by about one tenth to 86,000 tons. Import unit values of coffee and cocoa beans bought by the U.S.S.R., which fell sharply in the preceding years in line with trends in world markets, again rose slightly in 1962. Data for 1963 are not yet available.

Imports of citrus fruits are rising slowly. In 1962 the U.S.S.R. and eastern European countries imported 244,000 tons of oranges and lemons, against 232,000 tons in 1961. Recently the U.S.S.R. has concluded an agreement with Italy specifying prospective citrus imports from 1966 to 1969. In the latter year imports of Italian citrus fruits are expected to reach 90,000 tons, against 25,000 in 1962 out of a total import of 105,000 tons.

Following the decline in oilseed shipments from Mainland China to the U.S.S.R., which last year stopped altogether, Soviet imports have come increasingly from African countries. They should grow further following the trade agreements made in the second half of 1963 between the U.S.S.R. and six African countries (Algeria, Cameroon, Dahomey, Libya, Nigeria and Tanganyika). Eastern European countries are also increasing their imports of oilseeds and vegetable oils from Africa.

Trade relations of the CMEA countries with Cuba are closely related to the credits given by the U.S.S.R., Czechoslovakia, Poland, Romania and Bulgaria. The centrally planned countries in 1961 already received

75 percent of Cuban exports, and supplied more than 85 percent of its imports. The trade of the CMEA countries with the developing countries continues to increase, though relatively slowly.

The decline in trade between Mainland China and the U.S.S.R. and eastern European countries, to which attention was drawn in last year's report, continued in 1962. Total imports of the U.S.S.R. from Mainland China fell by 6 percent to 465 million rubles, while Soviet exports to Mainland China fell by 24 percent to 210 million rubles. The corresponding aggregates for 1959 were as high as 990 million and 859 million rubles respectively. However, the value of agricultural imports was larger in 1962 than in the preceding year, as the U.S.S.R. sharply increased its imports of rice from 2,000 tons to 150,000 tons. Statistics for 1963 are not yet available.

Earnings from agricultural exports

The main factor leading up to the United Nations Conference on Trade and Development was the slow growth of export earnings of the developing countries. Even when augmented by various forms of multilateral and bilateral investment and aid, the resources of foreign exchange available to most developing countries have been so limited as to constitute a serious brake on economic development. The export earnings of the developing countries, as is well known, at present come overwhelmingly from exports of primary products, and among these (except in the petroleum and mineral producing countries) agricultural products are much the most important. Before discussing the Conference, it is therefore appropriate to review the growth of earnings from agricultural exports over the past decade, and the policy measures taken by developing countries to expand these earnings. Brief notes are also included on the trade policies of the developed countries and of the centrally planned countries and on international efforts to stabilize and increase earnings from agricultural exports.

The underlying reasons for the slow growth of agricultural trade in comparison to the growth of world trade as a whole have been analyzed in earlier issues of this report and elsewhere, including the documentation prepared for the United Nations Conference. They are now widely recognized and need be only briefly recapitulated here. Among the more important are:

(*a*) the slow growth of demand for food at the fairly high income levels now reached in the main importing countries, especially in terms of quantity, leaving aside the added cost due to more elaborate processing and methods of distribution;

(*b*) the rather slow growth of population in western Europe, the largest importing region;

(*c*) the competition of synthetic substitutes with many natural raw materials of agricultural origin, and more economical use of raw materials in general;

Table II-15. - Indices of value of agricultural exports, by region

	Average 1948-52	Average 1953-57	1958	1959	1960	1961	1962	1963 (Preliminary)	Change 1962 to 1963
	Indices, average 1952-53 = 100								*Percent*
Western Europe	83	116	131	131	145	152	156	177	+ 14
North America	102	97	104	103	124	133	127	145	+ 14
Japan	63	98	65	107	118	116	122	106	— 12
Oceania	95	102	87	107	104	114	116	137	+ 18
Total of above	94	104	107	112	125	134	133	152	+ 14
Latin America	92	106	90	95	98	104	107	114	+ 6
Far East [1]	102	104	98	107	112	107	108	109	+ 1
Near East	97	106	98	105	111	104	107	118	+ 10
Africa	86	112	121	117	117	120	123	138	+ 12
Total of above	94	106	103	104	107	108	111	118	+ 7
World [2]	94	105	105	108	115	119	120	133	+ 10

[1] Excluding Mainland China and Japan. - [2] Excluding U.S.S.R., eastern Europe and Mainland China.

(*d*) increased agricultural production in the developed countries (including the largest importing countries) as a result of improved methods of agriculture, generally encouraged further by price supports and subsidies paid mainly for social reasons (this applies mainly to temperate and subtropical products).

While all the above factors tending to limit the growth of trade appear to be of a permanent character, reference should also be made to some factors making for increasing agricultural trade, notably the more rapidly growing demand among developing and semi-developed countries and the special drive to expand exports, including the export of surplus products under special terms.

The FAO indices of earnings from agricultural exports are set out in Table II-15. This shows that during the ten years from 1952-53 to 1962 the earnings (at current prices) of the developing regions as a whole increased by only 11 percent or only about 1 percent per year. For the developed regions the corresponding figure was 33 percent, but it should be borne in mind that this includes large shipments under special terms. The increase in commercial exports of agricultural products from the developed regions as a whole was only 17 percent.

In 1963, on the other hand, recovery of prices and a larger volume of trade resulted in an increase of no less than 10 percent over the year before in the value of agricultural exports of all regions combined (excluding the U.S.S.R., eastern Europe and Mainland China). For the industrialized regions the increase amounted to about 14 percent, and for the developing regions about 7 percent. While these figures for 1963 are still preliminary, they are likely to be of the right order of magnitude.

Of the developing regions Africa fared best with an increase of 12 percent over 1962 and of 38 percent over the 1952-53 base period. At the other extreme, the Far East showed an increase of only about 1 percent over 1962 and of 9 percent over 1952-53; Latin America and the Near East took an intermediate position.

All the above figures represent earnings at current prices. The trend in the developing regions is analyzed in more detail in Table II-16, which compares the growth of agricultural export earnings in the past two years with the growth in the volume of exports, and shows also agricultural export earnings in real terms, i.e., deflated by the United Nations index of export unit values of manufactured goods,

TABLE II-16. - INDICES OF THE VOLUME OF AGRICULTURAL EXPORTS AND OF EARNINGS FROM AGRICULTURAL EXPORTS IN CURRENT VALUES AND IN REAL TERMS

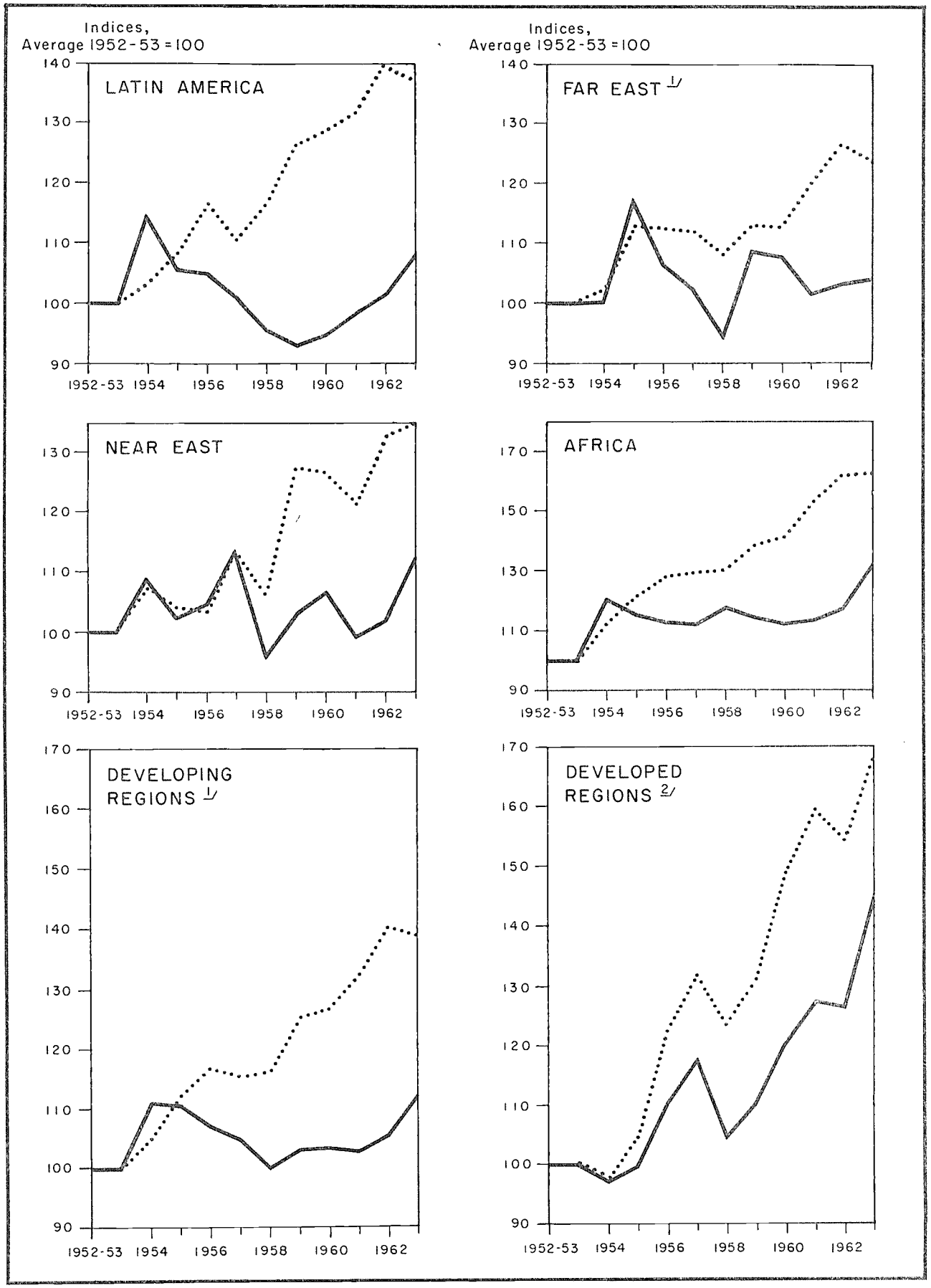
		Volume of agricultural exports	Export earnings		Terms of trade
			At current prices	In real terms [1]	
		(a)	(b)	(c)	(c) / (a)
		.. *Indices, average 1952-53 = 100* ..			
Latin America	1962	140	07	102	73
	1963	138	114	107	78
Far East [2]	1962	127	108	103	81
	1963	125	109	104	83
Near East	1962	132	107	102	77
	1963	136	118	112	82
Africa	1962	162	123	117	72
	1963	163	138	131	80
All developing regions	1962	140	111	105	75
	1963	139	118	112	80
DEVELOPED REGIONS [3]					
Total exports	1962	154	133	126	82
	1963	168	152	144	86
Commercial exports [4]	1962	134	117	111	83
	1963	146	135	128	88
WORLD [5]	1962	146	120	115	78
	1963	152	133	126	83

[1] Average export unit values deflated by United Nations index of export unit value of manufactured goods. - [2] Excluding Japan and Mainland China. - [3] Western Europe, North America, Oceania, Japan. - [4] Excluding U.S. exports on concessional terms. - [5] Excluding U.S.S.R., eastern Europe and Mainland China.

indicating their purchasing capacity of agricultural exports for manufactured imports. The volume and real value of agricultural exports are also shown graphically over the whole period to 1963 in Figure II-6.

The disparity between the curves for the volume and real value of exports, due to the fall in the terms of trade, is especially marked in the case of Africa. In both 1962 and 1963 the volume of African agricultural exports was rather more than 60 percent above the 1952-53 average, while real earnings had increased by only 17 percent and 31 percent respectively. Other regions have shown a less dramatic expansion in the volume of exports, but also a much smaller increase in earnings. Latin America, with an increase in volume of the order of 40 percent over 1952-53, showed an increased purchasing capacity for manufactures of only 2 percent and 8 percent

FIGURE II-6. - VOLUME AND REAL VALUE OF AGRICULTURAL EXPORTS, BY REGION



------ Volume ——— Real value (deflated by United Nations index of export unit value of manufactured goods)

[1] Excluding Mainland China. - [2] Including exports on special terms.

in 1962 and 1963. In the Far East and the Near East, increases in the volume of exports of about one quarter and one third respectively brought less than 5 percent more earnings in real terms, apart from the recovery in the Near East in 1963.

These figures suggest that the marked growth in the volume of exports has in itself been an important contributing factor to the fall in prices. The developing regions as a whole would in all probability have received higher earnings from a smaller volume of exports, even though individual countries (especially new exporters) may have increased their share of the market and total receipts of foreign exchange. This matter is clearly of the utmost importance for the development plans and programs of the developing countries. For the figures suggest that in these countries as a whole resources invested in expanding export production not only brought hardly any real return, but may for some products even have brought about a reduction in total receipts of foreign exchange. Hence the case for commodity arrangements involving some form of regulation of the volume of shipments.

Here it is important to recognize that the interests of individual producers do not necessarily coincide with those of national governments or of the developing countries as a whole. Especially in largely subsistence economies it may well be profitable, even with a falling market, for individual producers to expand their output of a commodity. They may have no other means of maintaining their incomes, and if working with family labor the increased output may entail very little in the way of additional monetary expenses. Producers may be able to compensate for a lower price by increased efficiency. Such individual decisions of farmers, perhaps just as much as the continuous policies of governments, have contributed to the growth of exports and the weakening of prices. This is especially so in Africa where a large share of agricultural exports is produced on peasant farms and where there are still large unused agricultural resources.

For national governments, whose main interest at least in the short run is in foreign exchange earnings, the increase in productivity or the utilization of new resources offers no immediate compensation for the loss in prices and earnings. Similar conflicts of interest arise between producing countries with widely differing levels of efficiency and costs in the production of individual commodities. These differences are one of the principal difficulties encountered in negotiating quotas and price levels for international commodity agreements.

Agricultural trade policies in developing countries

A principal aim of the developing countries' trade policies over the past decade has of course been to maximize the availability of foreign exchange for priority imports, in particular those required for the implementation of economic development projects and plans. Allied to this has been the aim of making the growth of foreign exchange earnings as predictable as possible, particularly to facilitate orderly planning and avoid an erratic and wasteful rhythm in the implementation of major development projects. The low level of remaining foreign exchange reserves in most developing countries has increased the importance of an even inflow of export earnings. Nonetheless, the still more pressing problems arising from the long-term decline in the terms of trade have meant that the main emphasis in recent years has necessarily been on achieving a more rapid growth of earnings.

Apart from the technical, economic, and institutional measures taken to encourage the production of export products, developing countries have therefore embarked on a series of commercial policies aimed at expanding sales and at enhancing returns. State trading and centralized sales through, e.g., marketing boards have been widely used in this connection. Bilateral agreements have been made to provide secure outlets and more stable returns. At the same time there has been a search for wider markets, and for a wider range of export commodities to reduce the risks inherent in heavy dependence on a few crops. Other measures include the processing of primary products for export as semifinished or finished goods, increased attention to quality and grading, and various fiscal measures.

The more important national measures are briefly reviewed below. In general it appears that they have attained only limited success, as was perhaps inevitable. It is seldom that an exporting country has control of a large enough proportion of the world trade in any commodity to be able to have a major influence unilaterally on world markets. And to a large extent the trade policies of the developing countries were conceived in isolation without fully taking into account the reactions and policies of their competitors or their customers.

State trading

State trading is a natural offshoot of the current emphasis on government initiative and planning in

developing countries. It is one of the more characteristic methods by which the expansion of agricultural exports is being pursued. A recent ECAFE (Economic Commission for Asia and the Far East) study [3] lists the following 14 "most common" objectives of state trading, most of which are highly relevant to the problem of expanding and stabilizing agricultural export earnings:

"(*a*) ensure adequate and regular supplies at reasonable and stable prices of essential commodities to meet local demand;
(*b*) secure better prices for export and import products through increased bargaining power;
(*c*) encourage production of essential agricultural and industrial commodities by means of price and other incentives;
(*d*) stabilize the domestic prices of specified products by controlling their production and marketing;
(*e*) explore export markets for products and dispose of exportable surpluses of commodities;
(*f*) secure the advantages of bulk transactions;
(*g*) facilitate trade with centrally planned economies;
(*h*) facilitate the import of goods financed under foreign aid programs;
(*i*) facilitate the implementation of trade agreements and barter deals;
(*j*) transfer trade from the control of non-nationals;
(*k*) direct trade in accordance with development policies;
(*l*) raise revenues for the treasury;
(*m*) influence the changes in the distribution of income derived from foreign trade operations;
(*n*) facilitate sanitary and public health controls."

The form and scope of state trading are very varied, ranging from assistance to exporters by a state agency to the complete control of procurement, exports, imports, and distribution by a state monopoly. The agency may have any form between a marketing board with private participation, a trading corporation under government control, or a government import and/or export office. Such agencies may deal with a single product, especially in the case of marketing boards established to handle trade in main export staples, or they may exercise a comprehensive control over most export products as well as a large share of the country's import trade.

The quantitative importance of state trading in developing countries can be estimated only approximately, owing to difficulties of definition and statistical deficiencies. In the Far East, it has been estimated to have amounted in 1962 to about three quarters of the total exports from Burma (where complete state trading is to be introduced from 1964 onward), two thirds in China (Taiwan), one half in Indonesia, and about one tenth in Ceylon, where it is limited to trade with centrally planned countries. In Thailand, government-to-government contracts account for some 30 percent of the total rice exports.

In Latin America state trading is no longer widespread since its abandonment by Argentina, though most of the trade of Cuba is now on this basis. In Africa and the Near East comprehensive state trading is important in a number of countries, for example in the United Arab Republic, Mali and until recently Guinea. The more typical organizations in Africa, however, are marketing boards or *caisses de stabilisation* for single or for only a few commodities, which control a large share of the total African agricultural exports.

The advantages of state trading to developing countries have been set out above. The chief dangers probably lie in the field of price policy. On the one hand the agency may attempt to maintain too high a price to producers on a falling market and exhaust its reserves. If on the other hand, as has not infrequently happened, the agency becomes an important source of revenue, the search for profits may lead it to set buying prices to producers so low as to jeopardize the flow of supplies (as formerly in Argentina), or to set selling prices so high as to encourage importers to seek alternative markets or synthetic substitutes. Not a few examples of all these mistakes could be cited from postwar experience.

Bilateral trade and payments agreements

Such agreements are widely used both in trade within the less developed regions, and in trade with outside countries. In the Far East, major examples of intraregional agreements are those of Burma for the sale of rice to Ceylon, Mainland China, India,

[3] *State trading in countries of the ECAFE region.* Document E/CONF.46/32 of the United Nations Conference on Trade and Development.

Indonesia, North Korea and Pakistan, and the Ceylon-Mainland China rubber-rice barter agreement. A number of intraregional agreements have been concluded also in Africa. Among agreements with outside countries, the majority are with the centrally planned countries of eastern Europe and the U.S.S.R. In the Far East, however, there have been some changes in the nature of these agreements. Burma, Ceylon and Indonesia are moving toward multilateral arrangements, following difficulties in balancing bilateral accounts, while India's trade relations have moved in the opposite direction, with a system of payments in nonconvertible rupees and a final settlement in movement of goods. The apparent success of the Indian experiment was probably the reason why the Report of Experts to the Manila Ministerial Conference in 1963 recommended bilateral agreements as an important means for fostering additional trade. In Africa, over 300 bilateral agreements have been negotiated since 1955, mainly with countries outside the region. Bilateral agreements have been used particularly by countries of northwestern Africa, and the number of agreements concluded by the franc area countries of west Africa is increasing.

In Latin America there was formerly a complex network of bilateral agreements with the main trading partners, but in recent years this has been largely replaced by multilateral trade and payments arrangements. The dismantling of intraregional bilateral agreements has mainly taken place within the framework of the trade liberalization under the Latin American Free Trade Area. The Latin American countries, however, carry on much of their trade with the centrally planned countries under bilateral agreements.

Among bilateral arrangements may also be mentioned the various preferential systems between some major importers and exporting countries with close political and economic links. The most important examples include the Commonwealth, franc area and EEC (European Economic Community) preferential systems and, among those limited to single products, the Commonwealth Sugar Agreement.

The advantages given to the Commonwealth primary exporters by the United Kingdom, by far the largest importer of the group, have declined with the passage of time as many were established before the war on a specific rather than ad valorem basis. In 1957 it was estimated that the average margin of preference granted by the United Kingdom was 6 percent on foodstuffs and 2 percent on raw materials. A number of important products, including wheat, rice, mutton and lamb, rubber, most natural fibers, hides and skins and, more recently, tea, enter the United Kingdom duty free from any source. The preferences have recently been further diluted by the granting of duty-free entry to certain agricultural products from other EFTA (European Free Trade Association) countries, e.g., to butter from Denmark. Their overall significance to the exporters' economies is to some extent also offset by the reciprocal preference given to imports from the United Kingdom by some, though not all, of the exporters.

Under the Commonwealth Sugar Agreement of 1951, currently running until 1971, the United Kingdom and other Commonwealth importers purchase nearly two thirds of the total annual exports of the participating exporting countries and territories, some of whom, such as Mauritius and the Caribbean territories, depend very heavily on sugar for their export earnings and farm incomes. Of the total, amounting to 2,175,000 long tons, or rather over 10 percent of the world sugar trade, a minimum of 1.4 million tons is purchased by the United Kingdom Sugar Board at the "negotiated price," related to the estimated costs of production of efficient producers, rather than to the world market price. For the rest, participating exporters receive the benefit of a preference of £3.15.0 per ton in the United Kingdom where Commonwealth sugar enters duty free, and the equivalent of about £8 per long ton in Canada. The price paid under the agreement has, except in a few years of peak prices, been higher than the free market price, and it has been without fluctuations.

Within the franc area system, guaranteed prices were paid in France for cotton, groundnuts and coffee. Of these, cotton and groundnuts from the participating exporters went almost exclusively to France. In the case of cotton, deficiency payments relative to an annually fixed guaranteed price have been made to exporters since 1956 from a fund fed by a levy on textile manufacturing. As a rule the guaranteed price has been above the market price, and by the end of 1960 the fund had paid out, for distribution through the individual *caisses de stabilisation*, a total of NF 55 million, equal to about 16 percent of the value of the participating countries' cotton exports. For groundnuts, the *caisses* received supported prices for shipments to France, which were pooled to stabilize the income from the exporting country's total shipments to

all destinations. Only in the case of Senegal, however, are exports of groundnuts to countries outside the franc area of any significance. In 1955-58, the difference between the support price and the world price was about 40 percent, but in recent years the advantage has narrowed to about 10 percent.

Benefits from the franc area arrangements have been less in the case of coffee. Prices paid since 1959-60 for exports to France have ranged around 50 percent above the world price, but the effect has been limited by the relatively small and diminishing share of the total exports shipped to France. For cocoa, nearly all of which is exported outside the franc area, there are no support prices. The stability of earnings from coffee and cocoa exports has, therefore, been influenced principally through the normal short-term stabilization activities of the *caisses*.

The arrangements between France and the franc area countries were largely unaffected by the signing of the First Convention of Association with the EEC in 1957. The Second Convention of Association, in operation since 1 June 1964, will have greater consequences. It implies a smaller degree of preference, although extended to the whole EEC and not only to France, and embodies measures for prices gradually to approach world levels, the consequent loss of preferences being compensated by larger financial assistance.

The United States also provides, under the Sugar Act of 1948, an assured market for specified foreign suppliers, mainly in Latin America, at prices which are relatively stable and normally above the world market level. Under the 1962 amendments of the Act, foreign suppliers as a group have a share of about 40 percent of the total United States market at a basic level of 9.7 million short tons, and of about 35 percent of the growth above that level. The Philippines has a fixed quota of 1.05 million short tons a year. In 1962, the Cuban quota, which previously had accounted for the bulk of the foreign supplies, was halved in favor of other specified countries. The remaining 1.5 million short tons of the Cuban quota is currently allotted as a "global quota." Imports under the latter are subject to a variable import fee and command in effect the free market price.

There is little doubt that these bilateral preferential arrangements have brought appreciably higher and more stable earnings to the exporters involved, at the cost of the treasury or of consumers in the importing countries, who have, furthermore, enjoyed stable import prices. Objections have, however, been raised against their discriminatory nature.

Wider markets

As well as seeking the security offered by bilateral agreements, developing countries have sought constantly for wider markets. This applies particularly to newly independent countries whose trade had been primarily with the former metropolitan countries. For example, the share of France in the exports of the countries of the African and Malagasy Union fell from 62 percent in 1959 to 57 percent in 1962. This trend, however, was already much in evidence before independence. Thus the share of Nigerian exports shipped to the United Kingdom fell steadily from 80 percent in 1950 to 51 percent in 1959, shortly before independence, and declined further to 41 percent in 1963. The share of the United Kingdom in exports from Kenya fell from 35 percent in 1950 to 24 percent in 1960, and in those from Uganda from 28 to 16 percent during the same period.

The loosening of the commercial ties with the former metropolitan countries, however, is only the

TABLE II-17. - DESTINATION OF AGRICULTURAL EXPORTS OF DEVELOPING REGIONS IN 1955-57 AND 1959-61 (value)

	Period	Share of exports going to				Change in total agricultural exports
		Developed countries	Countries in the same region	Other developing countries	Centrally planned countries	
		..... Percent				
Latin America .	1955-57	87	9	2	3	— 4
	1959-61	84	7	2	7	
Near East	1955-57	57	16	8	18	+ 2
	1959-61	49	15	8	27	
Far East[1]	1955-57	64	25	6	5	+ 5
	1959-61	62	24	6	8	
Africa	1955-57	88	6	3	1	+ 8
	1959-61	88	6	3	2	
ALL DEVELOPING REGIONS	1955-57	77		18	4	+ 2
	1959-61	75		17	8	

SOURCE: *FAO Commodity review 1964*, Special Supplement, Vol. 2, part IV.

[1] Excluding Mainland China.

most striking example of a general tendency toward a wider range of markets for the exports of the developing countries (Table II-17). The wide country groupings in the table necessarily conceal some of the changes in the pattern of trade between individual developing countries and their industrialized trading partners. But it is evident that there has been some decline in the share of the developing countries' exports going to the industrialized countries of western Europe and North America as a whole, partly compensated by larger shipments to Japan, and a significant increase in the share going to the centrally planned economies. The latter have become a major destination in particular for exports from the Near East. The least dynamic sector of agricultural trade has been the trade between the less developed countries themselves. The share of intraregional trade has fallen in all cases but one, and that of exports to other developing regions has generally remained unchanged.

Regional integration

The search for wider markets and for increased trade between the developing countries themselves lies behind the rather widespread discussions of regional trading arrangements in the developing regions, encouraged no doubt by the example of the European Economic Community. Progress has so far been greatest in Latin America, where both the Latin American Free Trade Area and the Central American Integration Scheme have embarked on programs of eliminating tariffs in the trade between the member countries and of developing common economic policies.

In the Far East, apart from informal trade discussions under the aegis of ECAFE, only a limited beginning of subregional integration has been made in the form of the Association of Southeast Asia (ASA) which was formed in 1961 and expanded in 1963 to take in the countries which had joined to form Malaysia. In Africa, the African Heads of State meeting in May 1963 decided that the newly established Organization of African Unity should strive for economic co-operation between African countries, but no concrete program has yet been formulated. Some progress has been achieved at subregional level. Thus 14 African countries,[4] mainly ex-French territories, constitute the African and Malagasy Union of Economic Co-operation (UAMCE) which aims at harmonizing the economic policies and development plans of the member countries, at the creation of a common external tariff and at co-ordination of efforts to obtain higher prices for the members' commodity exports. Within the UAMCE, moreover, there are smaller economic groups, such as the Equatorial Customs Union and the West African Customs Union. In other parts of the continent, Kenya, Tanganyika, and Uganda constitute the East African Common Market. No final decisions have been made as yet in the Near East on the proposals for an Arab Common Market. A number of bilateral agreements on economic co-operation have, however, been concluded, e.g., between Iraq and the United Arab Republic and between Jordan and Saudi Arabia.

As is clear from Table II-17, agricultural trade within the developing regions has grown slowly and its share in the total exports of developing countries has tended to fall. Several reasons may be suggested. The pattern of agricultural production within a region is often rather uniform, and more competitive than complementary in nature, though this does not apply to Latin America with its wide range of climates. Traditional trade connections, and often transport facilities, between developing countries are usually limited. Import demand in these countries is generally growing most rapidly for products, such as wheat, which other less developed countries can supply in only limited quantities, either because they do not produce them, or because their own domestic demand is running ahead of production. In any case, grains and other agricultural products imported by the developing countries are available under surplus disposal and food aid programs, involving little or no expenditure of foreign exchange. For other commodities, such as sugar, which can be efficiently produced over a fairly wide range of conditions, most developing countries are attempting to become self-sufficient.

Diversification of exports

The heavy dependence of many developing countries on exports of a limited range of products is well known, and commodity diversification of exports is today a common feature of development plans. Thus, a recent ECA (Economic Commission for

[4] Cameroon, Central African Republic, Chad, Congo (Brazzaville), Dahomey, Gabon, Ivory Coast, Madagascar, Mauritania, Niger, Rwanda, Senegal, Togo, and Upper Volta.

Africa) survey of development plans in Africa[5] showed that, of the eight countries whose current plans include export targets, six aim to reduce the share of their main export staples in the total export earnings. The United Arab Republic proposes to reduce the share of cotton in total exports from 67 to 55 percent, Ethiopia the share of coffee from 51 to 41 percent, and Ghana the share of cocoa from 58 to 51 percent.

Data on changes in the share of different products in total exports must be interpreted with caution. A decrease in the share of the principal export staples in the total due to rapid growth in exports of other products is a different matter from one caused by a fall in the exports of the established staple products, as has happened in some Latin American coffee-exporting countries. Changes in the commodity pattern may reflect changes in relative prices as well as in volume. They may have taken place within the context of a rapidly growing export trade, or a relatively stagnant one. On the whole, however, it would seem that progress toward diversification has generally been slow. Only a few countries, e.g., China (Taiwan), Brazil, Pakistan and Thailand, have shown any significant reduction in their dependence on the traditional main staples, and in some cases the concentration has increased.

There are, of course, strong reasons, apart from tradition, for the stability of the pattern of exports. For example, there are advantages in specialization, such as the greater ease of improving crop varieties, and of teaching skills to farmers and workers. Diversification is necessarily more costly in terms of marketing facilities, of experimentation and capital investment, and there are risks involved, particularly in the case of tree crops that mature slowly. The failure of cocoa production to take root in Malaysia after years of government-sponsored and private experiment is an example of the difficulties in starting new export crops.

With generally ample supplies of nearly all agricultural products on international markets, diversification seems unlikely to add to the global earnings of developing countries. Indeed, further increases in supplies might depress prices further. For example, efforts at diversification contributed substantially to current or recent surpluses of coffee, cocoa and cotton.

For an individual country, however, diversification can add to the stability of its export earnings, and if the country has natural or economic advantages it may increase its share of world markets, though at the expense of other countries. Again, there is an evident lack of co-ordination between the plans of different countries. Thus today while Brazil, Colombia and Guatemala have started projects to shift coffee land to other crops, coffee is on the program of export diversification in a number of other countries in Latin America, among them Bolivia and Honduras, as well as in several African countries.

Processing

A policy being increasingly pursued by developing countries is to encourage the processing of agricultural products before export. If, for example, oilseeds can be exported as oil, hides as leather, cotton and jute as manufactured textiles, the exporting country benefits not only from the added value, but also from the impetus to industrialization based on domestic raw materials. The total value of exports of processed goods is still small,[6] but it is rising rapidly. As noted in the special supplement to the *FAO Commodity review 1964*, from 1953-55 to 1959-61 the value of processed agricultural products[7] exported from developing to developed countries increased by as much as 50 percent, while exports of the same commodities in unprocessed form rose by only 3 percent. This is a trend likely to become more marked, though hampered by the scarcity of skills and capital in developing countries, and in a good many instances by differential duties in importing countries which favor imports of unprocessed rather than processed materials.

In some cases the difference in tariffs on unprocessed and on processed goods appears relatively small. It may sometimes be partly offset by the value of any residual materials left in the exporting country, or by lower freight costs when there is a considerable saving in bulk as the result of processing. It should be noted, however, that even a small difference in the rate of tariff may represent a high degree of protection to the processors in importing countries

[5] *Foreign trade plans in selected countries in Africa*. Document E/CONF. 46/85 of the United Nations Conference on Trade and Development.

[6] In 1959-61, processed agricultural products accounted for less than one tenth of the value of developing countries' exports (other than fuel) to developed regions.

[7] Processed meat, fish and fruit, vegetable oils and oilcake, processed wood, leather, textiles, rubber manufactures, pulp and paper.

if it is considered in relation to the value added in processing rather than to the total value of the finished product.

Other export measures

These include improvements in quality standards through grading, inspection and price incentives; promotional campaigns; export subsidies; differential exchange rates; changes in export taxes; subsidies on inland and overseas transport, etc. All of these may be of considerable importance in individual circumstances.

Little need be said of the importance of uniform and dependable standards of quality in improving the competitive position of a country's exports. Quality grades have been almost universally established in the more advanced economies, and in developing countries too have been long established for a number of widely traded commodities. Examples include the introduction by the Nigerian Marketing Board of a premium for a special grade of palm oil which resulted in an increase in the proportion of this grade in the total purchases from producers from 5 percent in 1950 to 73 percent in 1957. In the Ivory Coast, the proportion of the best grade of coffee in the total purchases for export rose from 52 percent in 1955/56 to 79 percent in 1960/61, and that of cocoa from 5 percent in the first year to 81 percent in the second.

Because of their limited resources, developing countries cannot use subsidies as a major means of promoting their agricultural exports, though they have been used in a few instances for limited quantities. Thus the Indian Government pays a subsidy on sugar exports, financed from a fund created by a levy on domestic sugar. A more general system of export subsidy has been operating in the Republic of Korea since 1961, although in 1963 the system was made more selective, with the particular aim of promoting exports of " new " products or to new markets. Iran subsidizes its exports of raisins and hides and skins, to offset the freight advantages enjoyed by some of the competing exporters.

The manipulation of exchange rates to encourage export was formerly widely used in Latin America. Intended in part to even out the income effects of fluctuations in export prices, the changes in exchange rates amount in effect to partial devaluation when prices fall, thus functioning as an export incentive. Aside from Latin America, differential exchange rates and exchange retention schemes have been used also in, e.g., Cambodia, India, Indonesia and Pakistan as a means of promoting exports of specified products. For instance, under Pakistan's Export Bonus Scheme, introduced in 1959, exporters of cotton and jute goods and long grain rice receive import certificates valued at 20 percent of their export proceeds in foreign exchange. Somewhat similar systems have been used also by India and Burma.

In many countries reductions in export taxes are used as an export incentive at times of falling prices. To quote only a few examples, the export duty on cotton in Pakistan was progressively reduced during the 1950s, and India first reduced in 1962 and entirely abolished in 1963 its export duty on tea. Thailand, too, abolished export duties in 1958 on all but its main exports of rice, rubber and some types of leather.

Import substitution

As well as trying to expand export earnings, many developing countries have sought to increase the share of their foreign exchange resources available for economic development by economizing imports of consumer goods, including agricultural products. Greater agricultural self-sufficiency is an implicit or explicit objective of most of the current development plans of developing countries. Given the substantial rural underemployment in most developing countries and the low crop yields, the social cost of increased food production is low, and it is on this basis rather than on the basis of monetary costs in domestic currency that increased farm production for the local market is an attractive policy objective. There is the further point that such an aim is largely within the control of the country itself, while measures to expand export earnings may be frustrated by external developments entirely outside the country's control. As a rule it is likely that in developing countries policies to reduce dependence on food imports are economically justified.

Over the past decade, however, the agricultural imports of most of the developing regions have grown appreciably faster than their exports (Table II-18). The reasons for this divergence obviously vary from country to country. A major factor has undoubtedly been the generally faster rate of growth of demand for agricultural products in the home market than in the export markets, to which reference was made in the section on agricultural pro-

TABLE II-18. - VOLUME OF AGRICULTURAL IMPORTS AND EXPORTS OF DEVELOPING REGIONS, 1961-63 AVERAGE

	All agricultural products	
	Gross imports	Gross exports
	Indices, average 1952-53 = 100	
Latin America	124	136
Far East[1]	144	124
Near East	226	130
Africa	178	160
ALL DEVELOPING REGIONS	155	137

[1] Excluding Japan and Mainland China.

duction above. In many countries, moreover, there has probably been a tendency to concentrate technical and advisory services on the export sector, in part because of the more "visible" nature of the foreign exchange returns from exports than from import saving, and also because the advisory services concerned with export crops are frequently self-financing, being maintained by marketing boards or other agencies responsible for the purchase and export of the product in question. Finally, the availability of many foodstuffs since the mid-1950s on concessional terms may in some cases have diverted efforts from import substitution to other fields, including the promotion of production for export.

AGRICULTURAL TRADE POLICIES IN INDUSTRIALIZED COUNTRIES

Most of the agricultural trade policies of the industrialized countries, excluding those with centrally planned economies, which are discussed later, are motivated largely by the desire to reduce income disparities between agriculture and other sectors, rather than to provide incentives to production or to protect consumers. Being concerned mainly with temperate products, they affect principally the trade and production of other industrial countries and of economically more advanced primary producing countries. Some less developed countries, however, are also affected, in particular those exporting temperate zone products, such as grains, and products such as sugar, fats and oils, cotton and some fruits and vegetables, which compete for markets with exports from developed countries.

Space does not permit a full discussion of the variety of trade measures evolved for the purpose of supporting domestic agriculture. Buffer stocks under some degree of official control are often used to iron out seasonal price fluctuations. Policies aiming at controlling the quantity of imports include direct government control through licensing or some form of state trading. Imports of seasonal products such as fruit and vegetables may be regulated according to the availability of domestic produce, by means of seasonal import licensing or seasonally varying tariffs. Increasingly, fixed tariffs on agricultural produce have been replaced by variable levies, which permit the maintenance of domestic prices at desired levels despite fluctuations in world market prices. For commodities of which there are no imports, the maintenance of domestic price levels often necessitates the encouraging of exports by means of subsidies or other measures of export promotion, including more recently, bilateral programs of food aid.

The effect of these policies on the food imports and exports of the main industrial countries is shown in Tables II-19 and 20. For all foodstuffs combined, the increases in self-sufficiency have been rather small. Thus in western Europe the total degree of self-sufficiency in the products listed in Table II-19 has hardly changed since 1953-55. For some individual products, notably wheat and sugar, the region's self-sufficiency has increased significantly, but the share of imports in total supplies has increased for coarse grains, oilseeds and vegetable oils, and tobacco. North America's self-sufficiency for the two major temperate zone or competing foodstuffs for which it is still a net importer, i.e., meat and sugar, decreased slightly during the period covered by the table. The largest changes have been in the ratio of home production to consumption in Japan. Rice imports have been almost eliminated, but dependence on imported coarse grains, wheat, and vegetable oils and oilseeds has increased sharply.

In North America the growth of output has, however, had a substantial effect on exportable supplies, especially since 1953-55. As Table II-20 shows, the exported proportion of the production of wheat, coarse grains and fats and oils has risen sharply, despite the large increases in stocks. Fats and oils in particular compete directly with the exports of the developing countries. Smaller increases have occurred for most of the other products listed.

TABLE II-19. - SELF-SUFFICIENCY OF INDUSTRIAL COUNTRIES IN FOODSTUFFS

Commodity	Western Europe			North America			Japan		
	1948-52	1953-55	1959-61	1948-52	1953-55	1959-61	1948-52	1953-55	1959-61
	Percent								
TEMPERATE ZONE PRODUCTS									
Wheat	69	77	81	(1)			47	46	35
Coarse grains	81	81	78	(1)			76	72	58
Dairy products and eggs	93	98	97	(1)			92	98	97
Meat	91	95	95	100	99	98	98	101	89
Total	84	89	89	100	99	98	68	74	69
PRODUCTS OF BOTH TEMPERATE AND TROPICAL ZONES									
Rice	90	93	83	(1)			96	86	99
Oilseeds and vegetable oils	46	41	40	(1)			71	54	42
Animal fats	80	80	82	(1)			—	—	—
Sugar	64	72	74	44	45	45	8	6	13
Citrus fruit	80	77	76	(1)			(1)		
Tobacco	46	49	43	(1)			98	94	98
Total	58	60	58	44	45	45	92	81	89
ALL ABOVE PRODUCTS	79	83	83	94	94	92	88	79	85

NOTE: Self-sufficiency is measured by domestic production as a percentage of the total supply available for domestic consumption. Only products of which the region or country is a net importer are included.

(1) Net exporter.

In western Europe the gradual introduction of the Common Agricultural Policy of the European Economic Community is replacing the earlier national systems of agricultural protection of the six member nations. The principal features of the Policy have been reviewed in previous issues of this report. Although the use of quantitative controls has been reduced and protection is based mainly on a common external tariff and variable import levies, the Community's agricultural trade policy is not essentially different from those previously followed by the six individual nations or, for that matter, from those of the majority of industrial countries.

Until recently a different approach was followed by the United Kingdom, where market prices were determined by unrestricted imports at world prices, while farm incomes were supported by direct deficiency payments from government revenues. This system was designed to give consumers the benefit of the lower food prices on world markets. Latterly, however, the wide fluctuations and frequently very low levels of import prices, largely resulting from

TABLE II-20. - PROPORTION OF PRODUCTION OF FOODSTUFFS EXPORTED (1) IN NORTH AMERICA

Commodity	1948-52	1953-55	1959-61
	Percent		
TEMPERATE ZONE PRODUCTS			
Wheat	40	35	56
Coarse grains	4	5	8
Dairy products and eggs	3	3	4
Total	12	10	16
PRODUCTS OF BOTH TEMPERATE AND TROPICAL ZONES			
Rice	26	21	30
Oilseeds and vegetable oils	2	7	21
Animal fats	18	27	29
Citrus fruit	1	3	2
Tobacco	18	19	17
Total	11	14	20
ALL ABOVE PRODUCTS	12	11	16

(1) Net exports.

a concentration of supplies on the unrestricted United Kingdom import market, have made the budgetary costs of farm income support much higher than originally anticipated. To remedy this, and at the same time to give greater stability to the export markets of its principal suppliers, the United Kingdom Government has recently instituted, in consultation with the major supplying countries, methods of controlling the quantities and prices of imports. The new measures were first introduced in 1962 for butter, and for bacon in April 1964. An agreement with the major grain suppliers was also concluded in 1964, to provide for minimum import prices. Negotiations on import regulations for beef and lamb have been started.

Of more direct interest to developing countries are tropical products, such as coffee, cocoa and tea. Postwar quantitative restrictions on these were gradually abolished during the 1950s. By 1962 only France among the developed countries imposed quantitative controls on imports of coffee (because of preferential trade arrangements with franc area exporters), and only Japan on imports of tea which, however, it produces itself.

Most of the fiscal charges traditionally levied on these products have now been eliminated. Nonetheless they are still rather generally subject to revenue raising import duties in many industrial countries. In the United States duties are applied only to two processed products (cocoa paste and powder), and even these rates are low (below 5 percent), as are all of the rates applied by the United Kingdom. Tea enters the United Kingdom duty free from all sources. None of the industrialized countries, however, allow duty free entry to *all* tropical products except from countries receiving preferential treatment (United Kingdom and Canada to other Commonwealth countries and France to overseas franc area countries).

Faced with the lower prices in world markets and sometimes reduced market outlets, traditional low-cost exporters in developed regions have had a choice between increasing still further the efficiency of production to meet the lower prices, or providing their own farmers with price and income supports. Efforts to raise productivity naturally remain important, but by the late 1950s or early 1960s it had become clear in most countries that improved technical methods could compensate only in part for lower prices, and these countries, too, found their agricultural incomes falling further behind incomes in other sectors. Double price systems and income supports have therefore been generally introduced. In Denmark, for example, a floor price was set for some dairy products in domestic markets in 1959. The domestic prices for butter and milk were fixed in 1961, and in 1962 a system of levies was introduced on domestically consumed pork beef, poultry and eggs. In Australia, stabilization and support programs for wheat and dairy products have been in operation for many years, although it is only since the 1959/60 season that the funds collected under the wheat program have been supplemented by a budgetary allocation. In addition, Australia has tried to protect and expand its market outlets by means of a series of trade agreements which aim at maintaining its share in the markets of its traditional export outlets and at building up new markets.

The export of agricultural products on concessional terms, chiefly from the United States, has largely been a result of such policies. At first seen as a temporary expedient to relieve the pressure of mounting stocks, these measures have gradually come to be viewed as a means of providing developing countries with urgently needed food requirements that they cannot afford to purchase commercially. In most years since 1954 shipments on special terms have accounted for some 30 to 33 percent of the total agricultural exports of the United States, and they have been largely responsible for the relatively rapid growth of agricultural exports from North America.

There seems little doubt that concessional sales of agricultural surpluses to assist the poorer countries in their development efforts will, for some time to come, be a regular and important feature of world agricultural trade. Indeed, " planned surpluses " form an integral part of some recent proposals for international commodity arrangements. But valuable though concessional sales or food aid can be when properly used with adequate safeguards, they carry with them potential dangers. To recipient countries continuing reliance on concessional food imports may be detrimental to their own basic agricultural development. To donor countries the continued production of unsalable surpluses is liable to defer structural adjustments in their economies which in the long run are inevitable, and which would contribute to the overall rate of growth of their economies. In most cases these forms of surplus disposal seem more defensible as a means of easing difficult structural adjustments in both donor and recipient countries than as continuing policies.

AGRICULTURAL TRADE POLICIES IN CENTRALLY PLANNED COUNTRIES

The motivation of the agricultural trade policies of the U.S.S.R. and the centrally planned countries of eastern Europe is very different from that of the industrialized countries with market economies, and resembles in some respects that of the developing countries. Plans for foreign trade, details of which are seldom published, are in the centrally planned countries an integral part of their overall economic plans. They are implemented by state agencies with only a limited amount of freedom with regard to the timing of the operations and choice of trading partners. The role of such measures as tariffs is therefore limited.[8] In making the basic decisions about foreign trade, efforts are made to take into account the relative costs of production by means of formulas for calculation of the "real" profitability of possible alternatives. More fundamentally, however, the import and export programs are likely to depend on basic decisions about the degree of self-sufficiency desired for different products, the extent to which the various commodities are considered vital in relation to the country's national investment and consumption plans, and, in the case of imports, the availability of foreign exchange. Short-term decisions are, moreover, limited by the long-term bilateral trade agreements and contracts.

The centrally planned industrial countries are not self-sufficient in agricultural products even as a group. The heavy emphasis on industrial development has in many of them resulted in a relative neglect of the farm sector, necessitating imports of a number of temperate zone products, although the very large grain imports of the U.S.S.R. in 1963-64 are unlikely often to recur on the same scale. Recent public statements suggest, however, that the joint longer term aim of the countries of the Council for Mutual Economic Assistance (CMEA)[9] is to reach self-sufficiency in all major temperate zone products.

As in the case of the developing countries, a number of factors operating in these countries push them in the direction of self-sufficiency. One of them is their relatively limited overall exports to the rest of the world, caused by both economic and political factors, and consequently their limited supplies of convertible foreign currencies. Another is the tendency of their planners to consider domestic supplies as more certain than imports. In the field of agriculture, the long-term role of imports is thus to a large extent limited (as in many market economy countries, although for different reasons) to making up for shortages caused by poor crops.

Changes in demand, which in market economy countries are determined by changes in incomes and prices and are thus only partially under government control, are of much less importance in centrally planned countries. The practice is rather to determine the domestic prices of both imported and home-produced goods in such a manner as to match the demand with the available supplies. Hence the large difference often found between the import and retail prices of many products, to which attention is increasingly drawn by the less developed countries. The shortage of foreign exchange (or the limited capacity of developing countries to absorb products of the centrally planned countries under bilateral agreements) and the relatively low priority given, at least until recently, to the consumption of such products as coffee, cocoa, citrus fruit, etc., have restricted the supplies of tropical and semi-tropical products. All recent studies agree, however, that the prospects for the growth of imports of tropical products into the centrally planned countries, in contrast to imports of temperate zone products, are potentially very favorable.

Aside from rigidities imposed by planning and by the existence of long-term agreements, foreign trade decisions in the centrally planned countries may frequently be hampered by the practice of bilateral balancing of trade accounts, particularly in trade between centrally planned countries. The recent establishment of the International Bank of Economic Cooperation by the CMEA countries, which provides for multilateral settlement of the member countries' trade accounts, will tend to reduce this rigidity. In another sense, moreover, the low current levels of consumption and the state control over imports and domestic prices of agricultural products give these countries much more flexibility in their foreign trade decisions than is possessed by most market economy countries. For instance, a sudden large increase in the absorption of sugar by the

[8] They do, however, have some effect. The managerial incentives used by the state trading agencies in centrally planned countries include the profit made from the purchase and sale of imported goods. The profit, in turn, depends to some extent on shares of purchases made from areas to which differing tariff rates are applied. The recent abolition by the U.S.S.R. of duties on all imports from developing countries may thus have some effect on the imports from developing countries.

[9] The U.S.S.R., eastern European countries and Mongolia. Mainland China and other Asian centrally planned countries are not members.

domestic markets, such as took place in the U.S.S.R., eastern European countries and Mainland China after the establishment of close political and commercial ties with Cuba, could only have taken place in countries with a large unsatisfied consumer demand of a type unlikely to occur in normal conditions in countries with a market economy.

International commodity agreements and consultations

As already noted, the widely dispersed production of most agricultural commodities effectively precludes any single exporting country from greatly influencing the world market situation. Early attempts for coffee by Brazil and rubber by Malaya, which at the time were dominant world producers of these products, soon led to increased production elsewhere and were effective for only a short time. Nor are the opportunities much greater on a regional basis, for most major agricultural products are produced in more than one region. Jute is an exception, being produced mainly in Pakistan and almost exclusively in the Far East, but it can be substituted by other materials or its consumption can be reduced, e.g., by bulk handling of grain and other products. Even a regional arrangement to regulate jute supplies and prices could therefore operate only within fairly narrow limits.

An example of regional producers' co-operation to regulate world markets was the Latin American coffee exporters' agreements, starting in 1957 and joined later by some African exporters. The African coffee producers, whose market is to some extent specialized, have claimed some success in price maintenance for robusta coffees through the action of their own association, the Inter-African Coffee Organization. The effectiveness of these regional operations was limited, however, and in 1963 negotiations culminated in the entry into force of the new International Coffee Agreement, on a world basis, and including importers as well as exporters.

Other examples of exporters' associations are the Cocoa Producers' Alliance, which includes Brazil and five major African cocoa producers, the proposed African Groundnut Council, and the Indonesian-Philippine Coconut Commission. The first mentioned organization, whose activities have gained in importance since the failure in October 1963 of the negotiations for an International Cocoa Agreement, covers some 85 percent of the world exports, and has thus some possibility of effectively regulating the flow of supplies to the world market. The possible market effects of the two other schemes are much smaller. The African Groundnut Council, proposed in mid-1962 by Nigeria and Senegal, has so far not found much support among the other African groundnut exporters. Groundnuts have some of the requisites for stabilization programs, in that they can be stored, and also because the main African exporters already possess the marketing institutions that would be necessary for implementing a regional scheme. However, the substantial exports from outside the region and in particular the possibility of substituting other oils for groundnut oil would greatly limit the possibility of marketing regulation. The same considerations apply to the Indonesian-Philippine Coconut Commission, which covers some 40 percent of the world exports of coconut products. For groundnuts and many other products, another difficulty is the existence of bilateral agreements, including the preferential treatment received by some exporters.

The above considerations indicate the limitations of national, regional or even interregional producers' associations as a means of stabilizing world prices, and point to the need for the broadest international consultations and commodity arrangements. General principles of international commodity agreements had gradually evolved from experience since the first world war, although the earliest agreements date from around the turn of the century. They were given an institutional form in Chapter VI of the Havana Charter of 1948, which was taken over by the United Nations Economic and Social Council (ECOSOC) and the Interim Co-ordinating Committee for International Commodity Arrangements (ICCICA) as a code of guiding principles for international commodity negotiations.

Principal features of the Havana Charter code are the equal participation of exporting and importing countries, and the assumption that commodity agreements should be resorted to only in a situation of relative emergency, when either "burdensome surplus" or widespread unemployment has arisen or is expected to arise in connection with the product, and the situation could not be remedied by the operation of normal market forces without undue hardship to producers. Their objectives would include the prevention of pronounced price fluctuations and the provision of a framework for the consideration and development of measures leading to the adjustment of supply and demand, either

through increased consumption or through a shift of resources and man power away from the production of the commodity.

This last point shows that even in the immediate postwar years the use of commodity agreements to raise general price levels was recognized. In practice, however, they were thought of principally as a means of smoothing out short-term fluctuations in prices. It is only recently that commodity agreements have been increasingly looked at as a means of reversing the long downward trend in the prices of many primary products, and providing primary exporting countries, particularly in developing regions, with not only more stable but also more rapidly expanding export incomes.

Experience of commodity agreements since the second world war has so far been disappointing, and only five have been negotiated – for wheat, sugar, coffee, olive oil and tin. Of these, one (the Olive Oil Agreement) is not primarily designed to regulate international trade, and another (the International Sugar Agreement) is not currently operating owing to the inability of the members to arrive at a new distribution of export quotas following the radical changes in the pattern of the world sugar trade in recent years.

Despite the lengthy period of operation of some of the postwar agreements – that for sugar started operating in 1953 and that for wheat in 1949 – it is not easy to judge how successful the agreements in themselves have been. In the case of the successive wheat agreements, the effectiveness of the agreement in preventing price falls has not been tested. During the first and second agreements, starting in 1949 and 1953, market prices were nearly always above the agreed price range, while since prices started falling the main factor keeping them from declining still further has been not the Agreement but the stockholding policies of the major exporters, particularly the United States.

The quota provisions of the International Sugar Agreement applied to rather less than half of the world sugar trade, the rest being under various bilateral arrangements. It succeeded in maintaining the "free" market price of sugar within the agreement range from its inception in 1953 until the Suez crisis in 1956. This was done by means of adjustments in export quotas in accordance with changes in estimated import demand and in the prevailing free market prices, coupled with stockholding obligations on the member exporters. The quota and buffer stock provisions of the Agreement were not, however, strong enough to handle such large fluctuations in supply or demand as were caused by the Suez crisis in late 1956, when for nearly a year prices were above the agreed range, later by the excess supply partly called forth by the earlier high prices, and finally by the disruption in markets caused by the shift in the direction of Cuba's exports. The United Nations Sugar Conference of 1961 was unable to provide for regulation of exports in 1962 and 1963, and the quota and other economic provisions of the Agreement therefore became inoperative. However, the life of the Agreement has been extended and preparations are being made for a new negotiating conference as soon as the situation is judged appropriate.

The International Coffee Agreement, which came into force in 1963, in many ways resembles the older commodity agreements. It includes both the major importing and exporting countries, and like the sugar agreement relies on changes in export quotas and national stocks as an instrument to regulate the market. Unlike the sugar agreement, however, it does not aim at maintaining any given price range. Its objective is "to increase the purchasing power of coffee-exporting countries by keeping prices at equitable levels and by increasing consumption." It thus aims not only at evening out short-term price fluctuations, but also at reversing the long-term decline in coffee prices since 1954. The Agreement has some new features. It provides for limited competition by recognizing "new markets" where quota restrictions do not apply.[10] Implicitly it recognizes the principle of "aid through trade" by including among its aims raising the purchasing power of coffee exporters at the expense of importing countries. Finally, for the first time it makes provision for long-run adjustments in the production of exporting countries. Exporters have agreed that countries not adopting production programs consistent with the goals recommended by the Council may not share fully in future export quota redistributions.

The successful negotiation of the coffee agreement gave hope for the negotiation of an International Cocoa Agreement, for which preparations had been made by the FAO Cocoa Study Group. In the event, however, the views of the producing and importing countries on the desirable range of

[10] A two-price system in international markets is also of course implicit in the International Wheat Agreement by the accommodation of concessional sales within the framework of the agreement.

cocoa prices were so divergent that the negotiating conference was adjourned in October 1963.

Although success in negotiating full-scale commodity agreements has been limited, more progress has been made in respect of the more modest goal of international commodity consultations. These aim at bringing together all interested parties to discuss the problems affecting the particular commodity and to approve and exchange statistical and other information. Several such groups were already established before the war, and a number of others have been set up in the postwar period.

The establishment of commodity study groups was envisaged under the Havana Charter (Article 58), to " investigate the production, consumption and trade situation in regard to the commodity " in connection with " special difficulties which exist or may be expected to arise. " Apart from groups concerned with administering commodity agreements, there are now ten such study groups for agricultural products. Of these six, dealing respectively with grains, rice, cocoa, coconut and coconut products, citrus fruit, and jute and allied fibers, have been established under FAO's Committee on Commodity Problems. The other four, established before the war, are concerned with rubber, cotton, tea and wool. The Committee on Commodity Problems has also on occasion established *ad hoc* groups to study problems of specific commodities. Other *ad hoc* study groups, e.g., on grains, meat, and dairy products, have been established by GATT (General Agreement on Tariffs and Trade) and the OEEC (Organization for European Economic Cooperation). All these groups have contributed to the stability of commodity markets by the exchange of commercial and statistical information, and by the wider understanding of the problems and policies of the participating countries.

Finally, reference must be made to the successive " rounds " of tariff negotiations which have been held since 1947 under the auspices of GATT. Considerable progress has been made in the past five rounds on liberalization of trade in manufactured goods, but the advance in the field of agricultural trade has been limited. However, a successful outcome of the sixth, so-called Kennedy, round, which was officially opened in May 1964, would mean substantial changes in the agricultural trade policies of the developed countries, with regard to both temperate and tropical products. The plans for the negotiations were given a strong initial impetus by the prospects for an enlarged EEC through the membership of the United Kingdom and other countries, and by the authority given to the United States President by the Trade Expansion Act of 1962 to make sweeping tariff cuts on large groups of products, ranging from 50 percent to total elimination.[11] The breakdown of negotiations for the entry of the United Kingdom removed some of the momentum and lessened the significance of some of the provisions of the Trade Expansion Act.

Preliminary agreement has however been reached on a number of important points. Thus a 50-percent " linear " cut in tariffs has been recognized as the basic objective of the tariff negotiations. It has also been agreed that agricultural products will be included in the negotiations, and that both tariff and non-tariff barriers are negotiable. But views still differ widely as to the exact way in which the negotiations on agricultural products should be carried out. In part this is because of the continued delay of the EEC countries to agree on some key points of their common agricultural policy, such as the level of their grain prices, on which the size of the EEC production and hence imports will substantially depend. Other problems still to be solved before the actual negotiations can begin include those of " tariff disparities," caused by the greater number of very high duties in the tariff structure of the United States and the United Kingdom than in that of the EEC, exceptions to tariff cutting, and the procedure of negotiations on nontariff barriers.

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

The above review of agricultural trade policies brings out the main developments over the past decade. Developing countries, in largely unilateral attempts to maximize their export earnings in the face of a slowly growing demand in their main markets, have been frustrated by a steady weakening of prices, intensified by their own efforts to increase the volume of exports. Economically advanced countries, concerned principally with supporting the income levels of their own farmers, have shifted much of the burden of adjustment onto international mar-

[11] On tropical products, on the condition that the EEC does the same, on other agricultural products provided the EEC takes similar action and that such action will increase the United States exports of these products, and on any product for which 80 percent or more of world trade is carried out between the United States and the EEC.

kets by means of import controls and export assistance. International measures to deal with trade problems have developed only slowly and have been unable to deal with the pressing problems of falling terms of trade for primary products and the insufficient growth of the export earnings of the developing countries. The slow growth in the exports of the developing countries, compared with those of industrialized countries, especially of manufactures, had reduced their share in world trade from nearly one third in 1950 to little more than one fifth in 1962.

It was against this background that the United Nations Conference on Trade and Development brought together the representatives of 120 countries, "determined ... to seek a better and more effective system of international economic co-operation, whereby the division of the world into areas of poverty and plenty may be banished and prosperity achieved by all..." [12]. To this end they made an exhaustive diagnosis of the situation in international trade and its implications for economic development. At the end of the Conference they adopted a Final Act which, with some reservations on the part of some of the developed countries, defined principles of international behavior in trade relations and policies, made recommendations for policies and measures for adoption in these fields, and recommended new intergovernmental machinery on trade and development to carry forward the work initiated by the Conference.

Space permits only the briefest summary of the most relevant parts of the Final Act of the Conference. Of most direct interest for the present review are the sections dealing with measures for the expansion of trade in primary products, including recommendations on such matters as international commodity arrangements, the removal of obstacles to trade, the competition of synthetics and other substitutes with natural products, and the compensatory financing of shortfalls in export earnings.

Commodity arrangements and the removal of barriers to trade

The Conference was of the view that these measures were complementary and should be undertaken simultaneously. "Owing to the particular features of each commodity market and the variety of national policies governing commodity trade," a commodity-by-commodity approach was needed. The Conference recognized that "a basic objective of international commodity arrangements is in general to stimulate a dynamic and steady growth and ensure reasonable predictability in the real export earnings of developing countries, so as to provide them with expanding resources for their economic and social development, while taking into account the interests of consumers in importing countries." This is a step forward from earlier approaches, which, as noted above, viewed commodity arrangements mainly as a means of eliminating or moderating short-term fluctuations in export prices of primary products or of rescuing exporting countries from emergency situations caused by unprofitable prices.

As a corollary to its recognition of the wider and more dynamic role of commodity arrangements, the Conference considered that "an attempt should be made to extend the scope of commodity arrangements and make them comprehensive..." To that effect, they should include not only provisions on prices and quantities traded, but also provisions on the "co-ordination of national production and consumption policies, ... realistic guarantees to developing countries of terms of access to markets of developed countries ensuring a fair and reasonable share of the market and of market growth," and market promotion and improvement. So far only the 1963 Coffee Agreement has included provisions for the co-ordination of production. In a wider framework, the emphasis on international co-ordination can be seen as a step toward the world indicative plan for agriculture, for which the need was stressed at the World Food Congress in 1963.

The emphasis on more comprehensive and dynamic commodity arrangements led the Conference to recommend a number of specific policy measures, including, in addition to such "traditional" approaches as price ranges, quotas, long-term contracts, etc., "systems of levies in the developed importing countries which, if adopted, would provide for the reimbursement of the proceeds to the developing exporting countries through appropriate international funds." By this means it was presumably thought that the terms of trade of the developing countries might be improved without an unwelcome incentive for a too rapid growth of supplies. Funds were also recommended to "ensure ... the implementation of agreed diversification programs of production and trade in favor of developing exporting countries."

[12] Quotations throughout this section are taken from the *Final Act of the United Nations Conference on Trade and Development* (Document E/CONF. 46/L/28).

The Conference recommended to the proposed Committee on Commodities (to be established within new United Nations machinery described below) to arrange, within a period of two years from the end of the Conference, negotiations for commodities for which there is a demand for international arrangements from countries " having a significant share in the world trade " of the product in question. Where adequate data were not available, expert studies should be undertaken.

Liberalization of access to markets of developed countries

The Conference recommended that developed countries with market economies should effect a standstill on all tariff or nontariff barriers against imports of primary products of particular interest to developing countries, and that they should lower and finally eliminate those already existing. Existing discriminatory preferential arrangements in favor of developing countries " should be abolished *pari passu* with the effective application of international measures providing at least equivalent advantages " to the countries now benefiting from them.

The Conference also recommended that " developed countries, in formulating and implementing their domestic policies affecting trade in primary products, should not take measures which stimulate in their countries uneconomic production in such a way as to deprive developing countries of the opportunity to obtain a fair and reasonable share of world markets and market growth. " This recommendation, included also in the General Principles formulated by the Conference for international trade relations, parallels recommendations in the FAO Guiding Principles for National Price Stabilization and Support Policies approved in 1961 by the FAO Conference and formally accepted by some 50 countries.

It was recommended, too, that all " developed countries should avoid subsidization of exports of primary products which cause direct or indirect injury to the exports of developing countries." A system of consultation when developing countries thought their interests were harmed was recommended.

In the disposal of agricultural surpluses, countries should undertake to apply the FAO Principles on Surplus Disposal, " so as not to affect adversely the export prospects of developing countries and other countries highly dependent on a narrow range of primary products, the intraregional trade and agricultural development of developing countries, or the position of countries receiving those surpluses as assistance. " The sale of surplus inventories, including strategic stockpiles, should also be carried out in accordance with internationally determined criteria.

Recommendations were addressed specifically to the centrally planned countries to " refrain from taking any measures which would adversely affect the expansion of imports from the developing countries, " to " take duly into consideration the trade needs of the developing countries " when fixing their plan targets, and to increase their multilateral trading with developing countries.

Synthetic and other substitutes for natural products

Conflicting attitudes are evident in the Conference's approach to this problem which, as is shown in Chapter IV of this report, has had a major impact on the trade of the developing countries. In an age when economic progress is based largely on technological improvement, it is widely felt that obstacles to scientific and technical innovation would be a retrograde step and would not contribute to the long-term economic betterment of mankind. At the same time, the urgent trade and development problems of the poorer countries make it imperative to smooth the process of adjustment necessitated by technological progress.

With this in mind the Conference made a number of recommendations designed both to increase the competitiveness of natural products from developing countries and to reduce the effects of competition from substitutes on the export earnings of developing countries. Among these recommendations were:

"1. raising the technical efficiency of the production of natural products so as to reduce costs;
2. improving quality and grading;
3. intensifying technical and market research on the uses of natural products;
4. prohibiting... the representation of a synthetic product as if it were a natural one;
5. granting... consideration to the phenomenon of interchangeability of certain products in the determination of agricultural and industrial policies, particularly in the developed countries;
6. improving the statistical information regarding both natural and synthetic sectors of the industries...;

7. increasing access to developed countries' markets for natural and semiprocessed products facing competition from synthetics...;
8. giving special attention in study groups or in... commodity agreements to the need for measures to mitigate short-term fluctuations in the prices of the natural products facing competition from synthetics;
9. bringing about as much co-ordination as possible in investment planning policies in the... natural and synthetic sectors;
10. introducing... financial measures with a view to reducing the impact of... synthetics on the long-term prospects for the export earnings of developing countries and to assist them in... the necessary structural adjustments;
11. where feasible and necessary... adopt mixing regulations or comparable actions in order to ensure that the proportion of utilization of natural products is not reduced."

In addition, developed countries were urged to "avoid giving special encouragement to the production of new synthetics... and to additional investment in the production of synthetic materials competing with the natural products exported from developing countries..." Recommendations were also made for studies on the feasibility of mixing regulations and of commodity agreements covering both the natural product and its synthetic substitutes.

Compensatory financing

Recognizing that its recommendations on trade, however completely implemented, could not fully solve the twin problems of lagging growth and wide fluctuations in the export earnings of developing countries, the Conference made parallel recommendations on compensatory financing. On short-term payments difficulties it was recommended that governments members of the IMF (International Monetary Fund) should study measures for expanding and strengthening the compensatory financing system operated by the Fund since February 1963.

At the same time the Conference was conscious of the limitations of the existing IMF scheme, especially its inability to deal with longer term adverse movements in export proceeds. It therefore recommended that the International Bank for Reconstruction and Development be invited to study the feasibility of a scheme to provide long-term supplementary assistance to developing countries experiencing shortfall from reasonable expectations of export proceeds.

It also recommended the study, by its proposed continuing organization, of compensatory financing involving the establishment of a United Nations Fund to provide under specified criteria additional financial resources to developing countries in the form of non-reimbursable or concessional transfers.

Other recommendations

A number of other major recommendations of the Conference should be briefly noted, though they lie somewhat outside the scope of the present review. There were, for example, important recommendations on the need of the developing countries to diversify and expand their exports of manufactures and semi-manufactures; on international financing of the expansion of international trade and of economic development; and on measures to improve the invisible trade of developing countries. With respect to aid, the Conference endorsed the view that "each economically advanced country should endeavor to supply financial resources to the developing countries of a minimum net amount approaching as nearly as possible to 1 percent of its national income."

Continuing machinery

The Conference could hardly have achieved major substantive results in a period of three months. While it sharply pointed up the trade and development problems of the developing countries and succeeded in bringing them to the center of world attention, its ultimate success must be judged by the extent that its recommendations can be put into practice. The machinery recommended by the Conference to continue its work and to implement its recommendations and conclusions is thus of particular interest. Briefly, in its Final Act the Conference recommended to the General Assembly of the United Nations (*a*) a periodic United Nations Conference on Trade and Development; (*b*) a Trade and Development Board, and (*c*) a permanent secretariat. Their functions are set out below.

The United Nations Conference on Trade and Development is proposed as an organ of the General

Assembly, to be convened at intervals of not more than three years, with the next session due to take place early in 1966.

Its principal functions will include the following:

1. " to promote international trade, especially with a view to accelerating economic development . . .";
2. " to formulate principles and policies of international trade and related problems of economic development ";
3. " to make proposals for putting these principles and policies into effect . . . ";
4. " to review and facilitate the co-ordination of activities of other institutions within the United Nations system in the field of international trade and related problems of economic development, and in this regard to co-operate with the General Assembly and the Economic and Social Council in respect to the performance of their Charter responsibilities for co-ordination ";
5. " to initiate action . . . in co-operation with the competent organs of the United Nations for the negotiation and adoption of multilateral legal instruments in the field of trade, with due regard to the adequacy of existing organs of negotiation and without duplication of their activities "; and
6. " to be available as a center for harmonizing the trade and related development policies of governments and regional economic groupings . . . "

The Trade and Development Board is envisaged as a permanent organ of the Conference. It is to consist of 55 member countries, elected by the Conference with " full regard for both equitable geographical distribution and the desirability of continuing representation for the principal trading states. " The Board is normally to meet twice a year. The Board shall establish any subsidiary organs necessary for effectively discharging its functions, and in particular three committees:

1. A committee on commodities which, *inter alia*, will carry out the functions which are now performed by the Commission on International Commodity Trade and the Interim Co-ordinating Committee for International Commodity Arrangements (ICCICA). " In this connection ICCICA shall be maintained as an advisory body of the Board; "
2. A committee on manufactures;
3. A committee on invisibles and financing related to trade . . .

Decisions of the Board are to be taken by a simple majority of the representatives present and voting (in the Conference, decisions on matters of substance are to be taken by a two thirds majority). It is recommended, however, that a special committee be appointed by the Secretary-General of the United Nations to " prepare proposals for procedures... to establish a process of conciliation to take place before voting, and to provide an adequate basis for the adoption of recommendations with regard to proposals of a specific nature for action substantially affecting the economic and financial interests of particular countries. "

Finally, the Conference recommended that arrangements should be made for the immediate establishment of " an adequate, permanent and full-time secretariat " within the United Nations Secretariat, with the task of servicing the Conference, the Board and subsidiary bodies.

To conclude, the recommendations of the Conference went in many respects well beyond the accepted " philosophy " of international relations in the field of trade, aid and development. Adopted as they were, although with reservations on the part of some governments, by a body of near-universal membership and continuity, such as the Conference was and may be expected to become, they may well prove to be the beginnings of a universally accepted code of principles for international relations in the field of trade and development.

Although individually the innovations may be small, it is by such small steps that progress in intergovernmental relations is usually achieved. To appreciate this, it is enough to consider the changes in world thinking and attitudes over the past decade or two on many economic questions of today, such as the role of economic planning, the volume and forms of development financing, food aid, the uses of international commodity agreements, and others. At no time was there any decisive change or turning point, yet attitudes which at first were considered by many as radical or visionary are today largely taken for granted. The same may be expected of the recommendations contained in the Final Act of the United Nations Conference on Trade and Development. In that case there can be little doubt that in years to come the Conference and the new machinery it initiated will be considered an important milestone in the development of international economic co-operation.

Farm prices and incomes

As in the previous year, prices received by farmers increased in 1963 in most of the countries for which data are available. There were particularly large increases in some parts of western Europe, where prices averaged as much as 6 to 15 percent more in 1963 or 1963/64 than the year before in six countries (Belgium, Denmark, Finland, France, Greece, and the Netherlands). Canada, Ireland, Portugal, and the United States were exceptions to the general rising trend.

In western Europe increases in support prices were widespread, and in addition market forces brought substantial increases in livestock prices, especially for cattle and pigs. In the Netherlands, where average prices received by farmers had hitherto been fairly stable for several years, they are estimated on the basis of data for 10 months to have risen by about 15 percent in 1963/64. Higher export prices for butter and beef were major influences, and the target price for wheat was raised by 7 percent. In both Belgium and France, where prices rose by 9 percent in 1963, pig prices by November 1963 were more than 50 percent higher than a year before; support prices for milk, butter and sugar beet were raised in Belgium, and also target prices for wheat in both countries. In France there had already been a rise in prices received by farmers of similar magnitude in 1962. Prices received by farmers rose by 8 percent in Greece (on the basis of data for 9 months) and by 6 percent in Denmark and Finland in 1963. In Denmark, where prices received by farmers had fallen the year before, minimum domestic prices for pigs, cattle, poultry, eggs, and butter were raised by 4 to 6 percent in 1963, and there were substantial increases in export unit values for butter, cheese and, especially, cattle, for which the rise was as much as 35 percent. In Finland target prices were raised for all of the basic commodities.

Elsewhere in western Europe, so far as data are available, it appears that the increase in prices was more limited. In Austria and the Federal Republic of Germany the slow rise in prices received by farmers continued in 1963. In Norway and Sweden, where there had been sharp increases in 1962, there was only a small upward movement in 1963. In Ireland the index of prices received by farmers was unchanged in 1963, and in Portugal, after a steep rise in 1962, prices dropped by 8 percent in 1963 and returned to the 1961 level.

The index of prices received by farmers in Canada, after rising by about 4 percent in each of the two preceding years, shows a decline of as much as 5 percent in 1963, though this figure may be altered when final payments for grains are known. Prices of beef and pigmeat fell because of abundant supplies, and prices of durum wheat, oats, and barley were also less than the year before. Prices received by farmers also fell slightly in the United States in 1963, again largely because of lower prices for livestock products.

In Japan prices received by farmers are estimated (on the basis of data for 11 months) to have risen by about 4 percent in 1963/64, which is much less than the large increases of each of the three preceding years. Official purchase prices for rice, wheat and barley, and support prices for soybeans and rapeseed were raised.

The only developing country for which recent data on overall farm prices are available is India, where prices in Assam, which have fluctuated rather sharply in the last few years, rose by about 2 percent in 1963. Procurement prices for wheat and rice were increased, and sugarcane prices and the floor price for cotton were also raised.

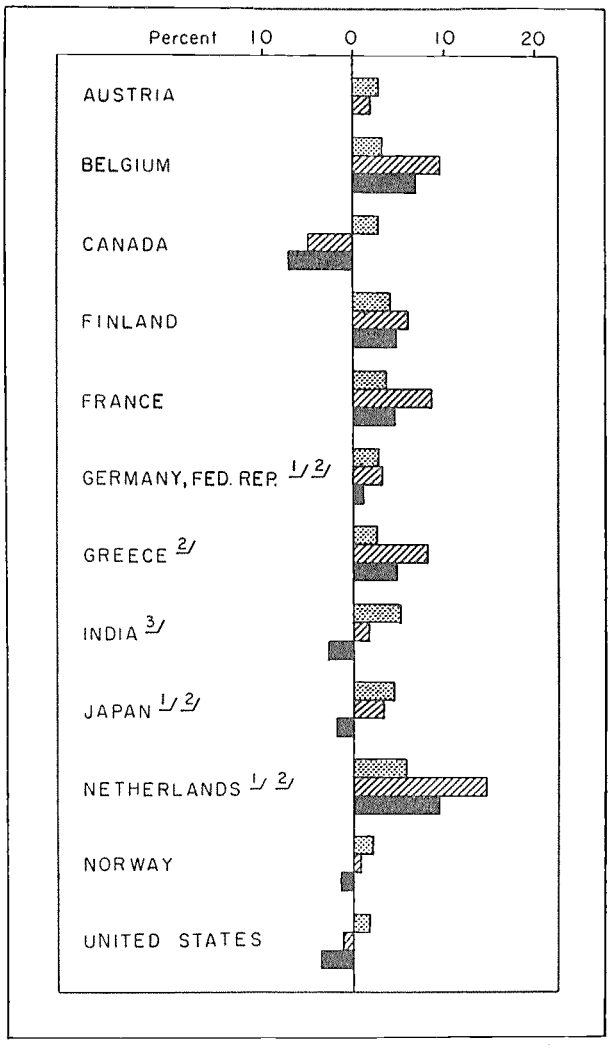
For some other developing countries an indication of the trend of prices received by farmers can be obtained from changes in government fixed prices for some of the main commodities. Paddy prices were increased slightly in Burma for the 1963/64 crop. In Indonesia, where there was rapid inflation, the official procurement price for rice was more than trebled. The purchase price for rice was also considerably raised in the Republic of Korea, though the quantity to be purchased by the government was reduced.

In Argentina support prices for grains and oilseeds were raised by 19 to 48 percent for 1963/64. The producer price for cotton was again raised in the United Arab Republic. In Sierra Leone the price of palm oil was reduced. In Nigeria producer prices of oil palm products and cocoa were raised, but groundnut and cotton prices remained unchanged. The producer price of coffee was increased substantially in the Ivory Coast and also in Cameroon and Togo. The cocoa price also was raised in Cameroon. In Uganda cotton prices were reduced for 1963/64 and also coffee prices for part of the season. Cotton prices were also lowered in Kenya and Tanganyika. The producer price of rice was

raised in Senegal. In South Africa the producers' price for maize was raised in 1963/64.

Thus it seems that increases in prices received by farmers were particularly widespread in 1963 and 1963/64. From this it should not be concluded, however, that there was necessarily a general improvement in the economic position of farmers. The price which farmers have to pay for production requisites, wages, interest, taxes, and other farm expenses have continued to rise in all of the countries for which such data are available.

FIGURE II-7. - CHANGES IN INDICES OF PRICES PAID AND RECEIVED BY FARMERS, AND IN THE RELATIONSHIP BETWEEN THE TWO INDICES, 1963 IN RELATION TO THE PREVIOUS YEAR



Index of prices paid by farmers

Index of prices received by farmers

Ratio of prices received/prices paid

[1] 1963/64 in relation to 1962/63. - [2] Average of less than 12 months. - [3] Assam.

TABLE II-21. - SUPPORTED OR STABILIZED PRODUCER PRICES OF WHEAT: 1963/64 IN COMPARISON WITH 1958/59

	Price in U.S.$ per 100 kg 1963/64	1963/64 prices in national currencies: as percent of 1958/59	
		at current prices	deflated by cost of living index [1]
Canada (initial payment only)	5.11	107	101
Yugoslavia	6.40	133	94
Argentina	6.42	[2] 283	[2] 126
Australia	6.52	109	100
Iran	6.60	100	78
United Arab Republic	6.70	100	101
New Zealand	6.90	117	105
Mexico [3]	7.06	100	90
Denmark	7.10	102	84
Morocco	7.11	109	91
United Kingdom	7.30	94	84
United States	7.35	110	104
Ireland [3]	7.50	103	95
Kenya	7.59	100	93
Pakistan	7.60	108	103
India [4]	7.88	[2] 108	[2] 93
Turkey	8.33	183	120
Netherlands [3]	8.56	106	98
France	8.73	116	97
Belgium [3]	8.94	95	91
Greece	9.00	[2] 115	[2] 108
Austria [3]	9.50	99	89
Sweden	10.24	130	113
Portugal	14.47	100	91
Italy	10.54	98	84
Germany, Fed. Rep.	11.06	107	96
Cyprus	11.38	100	96
Ecuador	11.50	100	86
Japan	12.00	118	93
Norway	14.28	113	99
Switzerland [3]	16.42	109	102
Finland	16.88	[2] 111	[2] 96

[1] Sources of cost-of-living indices: United Nations. *Monthly Bulletin of Statistics*. - [2] 1959/60 = 100. - [3] 1962/63 prices. - [4] Support policies operated to a very limited extent.

For 10 countries it is possible to calculate the ratio of prices received to prices paid by farmers in 1963 or 1963/64, and for these countries the change in relation to the year before is shown in Figure II-7. In those countries of western Europe where there was a large increase in prices received by farmers, the ratio of prices received to prices paid moved in favor of farmers in each country where data are available for comparison, though much less than the increase in prices received. In several countries where the increase in prices received was smaller, however, notably Austria, India and Japan, the ratio moved against farmers. This was also the case in those countries (Canada and the United States) where prices received by farmers fell in 1963.

Another measure of the " purchasing power " of farm prices is shown in Table II-21, where the change over the six-year period 1958/59-1963/64 in supported

or stabilized prices for wheat in different countries is shown in current prices and also deflated by the change in the cost-of-living index over the same period. From this it appears that these prices have been increased over this period in the majority of countries for which data are available, but that only in a few cases has the increase kept pace with or exceeded the rise in the cost of living.[13]

Farm incomes

While the price relationships discussed above provide some indication of the economic situation of farmers, their actual net incomes will also depend on a number of other factors, in particular the volume of output, but also the volume of inputs, any grants and subsidies they may receive, and changes in farm-held inventories. Recent data on farm incomes are available for very few countries, all of them developed countries. In almost all of those countries for which data are available, farm incomes increased in 1963 or 1963/64.

In western Europe the unfavorable weather caused agricultural production in a number of countries to be lower in 1963/64 than the year before, but in most cases the increase in prices, especially for livestock products, nevertheless brought an increase in the level of incomes. Thus in Italy the volume of production declined by more than 3 percent, but prices rose by 6 percent, bringing a rise of almost 5 percent in the gross salable production at current prices; farm expenditures and amortization rose by 11 percent, and the increase in net product was about 3 percent. Similarly in France, Ireland and the Netherlands the volume of output declined, but higher prices brought a rise in the gross value of output. In the United Kingdom, on the other hand, the lower level of production in 1963/64 is estimated to have resulted in a decline of 9 percent in net farm income.

In most other countries of western Europe both the volume and value of output increased in 1963/64. In the Federal Republic of Germany gross receipts from farm sales rose by 6 percent, and as expenses declined slightly there was also a substantial increase in net incomes. The gross value of output also increased in Austria, Belgium, Greece, Switzerland and Yugoslavia in 1963/64. The gross revenue of farmers in Norway was about the same in 1963 as in 1962, but a decrease in costs improved the returns to labor and capital by more than 4 percent.

There were particularly large increases in farm incomes in Australia and New Zealand in 1963/64. In Australia net farm income is estimated to have risen by almost 25 percent to reach £A 685 million, the second highest figure on record. Wheat production and wool prices increased substantially, and costs of production were stable. In New Zealand a 4-percent increase in the volume of production, combined with higher prices, particularly for wool, mutton, lamb and beef, brought the gross agricultural income to £NZ 326.4 million in 1963/64, an increase of 9 percent over the previous year.

In Canada the volume of farm output rose by 8 percent in 1963/64, and in spite of lower prices cash income increased by 2 percent to a record level of $3,200 million. This increase, combined with a substantial rise in farm-held inventories of grains and livestock, more than offset the increase in farm operating expenses and depreciation, and net farm income rose by more than 6 percent to $1,700 million. For 1964 a large gain in cash income is anticipated, mainly from receipts from the 1963/64 wheat crop, and this should be greater than the increase in farm expenses.

In the United States there was a decline in net farm income in 1963. Both crop and livestock production increased (the former making its first significant gain since 1960), and cash receipts from farm marketings were 2.2 percent more than in 1962. With both government payments and non-money income unchanged, gross farm income rose by almost 2 percent to $41,700 million. Farm production expenses, however, rose by more than 3 percent, so that net income fell by 1.5 percent to only slightly above the level of 1961. For 1964 cash receipts from marketings are expected to be slightly less than in 1963, but gross farm income should equal or exceed the 1963 level because of an increase of about 25 percent in government payments.

The long-term decline in the number of farms and in the farm population in the United States continued in 1963. Net income per farm and per head of the farm population therefore showed little change. The number of farms and the farm popu-

[13] For a more detailed analysis of the data in Table II-21, and for similar data concerning other commodities, reference should be made to *Developments in agricultural price stabilization and support prices 1959-63* (document CCP 64/2 prepared for the 37th Session of the FAO Committee on Commodity Problems, Rome, September 1964).

TABLE II-22. - COMPARISON OF PER CAPUT INCOMES IN AGRICULTURE WITH INCOMES IN THE REST OF THE ECONOMY

	Per caput GDP average 1959-61	Share of agriculture [1] in GDP		Agricultural population [2] as percentage of total population		Ratio of per caput incomes in agriculture/per caput incomes in rest of economy	
		Average 1950-52	Average 1959-61	Average 1950-52	Average 1959-61	Average 1950-52	Average 1959-61
	U.S. $ [3]	Percent				Ratio	
United States	2 281	6	4	15	8	0.4	0.5
Canada	1 817	14	7	20	12	0.7	0.5
Sweden	1 637	14	9	23	16	0.5	0.5
New Zealand	[4] 1 627	16	11	19	16	0.8	0.6
Australia	[4] 1 389	23	13	(17)	(14)	1.4	0.9
Switzerland	[5] 1 386	6	5	16	11	0.3	0.4
Denmark	1 293	21	14	23	19	0.9	0.7
Germany, Fed. Rep.	1 280	11	6	14	9	0.7	0.6
France	1 268	[6] 16	10	23	19	0.7	0.5
United Kingdom	1 182	6	4	(6)	(6)	0.9	0.7
Belgium	[7] 1 158	8	7	12	11	0.6	0.6
Norway	1 133	[8] 15	11	19	19	0.7	0.5
Venezuela	1 068	8	7	38	29	0.1	0.2
Israel	956	[6] 12	12	(20)	(18)	0.5	0.6
Netherlands	899	13	10	14	10	0.9	1.0
Finland	884	26	21	34	32	0.7	0.6
Austria	763	15	12	22	16	0.6	0.7
Puerto Rico	[4] 693	23	12	(45)	(32)	0.4	0.3
Trinidad and Tobago	598	[8] 17	12	(28)	(19)	0.5	0.6
Italy	566	27	18	43	30	0.5	0.5
Ireland	543	33	26	49	43	0.5	0.4
Chile	[9] 497	18	14	(37)	(34)	0.4	0.3
South Africa	[4] 414	16	11	(38)	(35)	0.3	0.2
Argentina	413	16	16	(27)	(23)	0.5	0.6
Panama	[10] 407	[8] 24	23	49	44	0.4	0.4
Cyprus	381	28	22	(34)	(27)	0.8	0.8
Japan	347	25	15	45	37	0.4	0.3
Greece	342	34	30	52	57	0.5	0.5
Spain	[9] 299	[8] 39	26	48	47	0.7	0.4
Mexico	249	19	20	(63)	(59)	0.1	0.2
Portugal	249	[6] 30	25	42	42	0.6	0.5
Malaysia: Malaya	[11] 243	[12] 46	45	(52)	(46)	0.8	1.0
Colombia	[9,13] 242	40	35	53	46	0.6	0 6
El Salvador	[10,14] 208	41	37	(73)	(72)	0.2	0.2
Philippines	197	43	34	(71)	(68)	0.3	0.2
Honduras	[9] 188	51	47	(82)	(75)	0.2	0.3
Turkey	187	50	41	(66)	(61)	0.5	0.4
Guatemala	180	[15] 37	32	(72)	(68)	0.2	0.2
Ecuador	[10] 159	37	36	(62)	(62)	0.4	0.4
United Arab Republic	138	[6] 32	31	(61)	(58)	0.3	0.3
China: Taiwan	120	[8] 34	32	53	51	0.5	0.5
Thailand	95	54	38	(84)	(78)	0.2	0.2
India	[9] 69	50	48	(69)	(65)	0.4	0.5
Korea	59	[16] 47	39	67	58	0.4	0.4

[1] In nearly all countries the term "agriculture" includes forestry and fishing. - [2] Agricultural population includes all persons actively engaged in agriculture and their non-working dependents. Where data were lacking on agricultural population the calculation was made on the basis of males engaged in agriculture as percentage of males in all occupations; these percentages are shown in parentheses. - [3] Converted from national currencies into U.S. dollars at official rates of exchange. - [4] July/June. - [5] National income. - [6] 1952. - [7] 1959-60. - [8] 1951-52. - [9] 1960. - [10] At 1950 prices. - [11] At 1959 factor cost. - [12] 1955. - [13] At 1958 prices. - [14] 1959. - [15] 1956. - [16] 1953.

lation are also declining in most of western Europe, where measures to rationalize the farm structure are being taken in most countries.

In many countries, however, per caput incomes in agriculture appear to be losing ground in relation to those in the rest of the economy. This is evident from Table II-22, where the ratio between per caput incomes in agriculture and those in other industries is calculated for 44 countries.[14] Where possible this ratio is calculated on the basis of the agricultural population, but in the rather numerous cases where insufficient data are available on agricultural popu-

[14] Table II-22 brings up to date a table first published in the 1959 issue of this report, to which reference should be made for fuller details (see especially p. 94-95 and Annex Table 14).

lation the number of males in agricultural occupations is used. While the ratio may differ quite substantially according to which basis is used, there is not likely to be much difference in the trend between the two periods, 1950-52 and 1959-61, shown in the table.

The data in the table confirm that in almost all countries per caput incomes in agriculture are lower, in most cases considerably lower, than those in other sectors of the economy. They appear to have been greater than in other sectors in one or other of the two periods shown in the table only in Australia and the Netherlands.

Between 1950-52 and 1959-61 the share of agriculture in both gross domestic product and total population (or the total of employed males) declined in almost every country for which data are available. Changes in the ratio between per caput incomes in agriculture and in other sectors appear in general to have been small. In a number of countries, both developed and developing, the ratio has increased and in another equally heterogeneous group it has decreased. An explanation of these differences would probably entail a detailed examination of the situation of each individual country.

Consumer prices

Consumer prices in 1963 and the early months of 1964 appear generally to have reflected the increases in farm prices and export prices discussed above, and rapidly rising prices have caused difficulties in a number of countries. Indices of consumer prices are available for considerably more countries than those of farm prices, and in no less than 74 of the 85 countries for which there are data for 1963 the cost of living averaged higher than in 1962.

A significant feature is that in rather a large number of countries the increase in retail food prices was greater than in the general cost of living, suggesting that in many cases rising food prices were a main cause of the general increase in prices. Out of the 76 countries where retail food prices or the general cost of living or both were higher in 1963 than in 1962, the increase in food prices was greater than the increase in the cost of living in 41 countries; the two indices rose by about the same amount in 17 countries, and only in 18 countries was the increase faster in the general cost of living (Table II-23).

Retail food prices remained stable or declined in only 15 countries in 1963, all of them except Australia developing countries. Some of the largest declines were in Africa, where retail food prices fell by 8 percent in Nigeria (Lagos), 6 percent in Sierra Leone, 4 percent in Tanganyika, and 3 in Kenya. There was also a decline of 4 percent in Burma.

In more than half of the countries for which data are available the rise in retail food prices in 1963 was 5 percent or less. This includes the majority of the developed countries in Europe, North America, and Oceania. However, retail food prices rose by 6 percent in Greece and the Netherlands, 9 percent in Italy and Japan, 10 percent in Spain, and 17 percent in Iceland. In each of these countries the rise in retail food prices was somewhat ahead of that in the cost of living as a whole. Especially in the southern European countries, a rapid increase in the demand for livestock products appears to have been an important factor.

Most of the countries where retail food prices

TABLE II-23. - RELATION BETWEEN CHANGES IN THE INDICES OF THE COST OF LIVING AND OF RETAIL FOOD PRICES IN 85 COUNTRIES, 1962-63

Cost-of-living index 1963 (1962 = 100)	Number of countries				
	Total	Food prices rose faster than overall cost of living	Food prices and cost of living rose at about the same rate	Food prices rose more slowly than overall cost of living	Food prices stable or declined
100 and under	11	2	—	—	9
101 - 105	51	24	14	7	6
106 - 110	14	10	3	1	—
111 - 120	2	1	—	1	—
121 - 150	4	3	—	1	—
151 - 200	2	1	—	1	—
Over 200	1	—	—	1	—
TOTAL	85	41	17	12	15

TABLE II-24. - CHANGES IN RETAIL FOOD PRICES AND IN THE COST OF LIVING, 1963 IN RELATION TO 1962, BY REGIONS

Change from 1962 to 1963	World	Europe	North America	Oceania	Latin America	Far East	Africa	Near East
	Number of countries							
RETAIL FOOD PRICES								
Decline	9	—	—	—	2	1	6	—
Constant	6	—	—	1	1	1	2	1
+ 1-5 percent	44	13	2	1	11	6	7	4
+ 6-10 percent	16	4	—	—	2	2	5	3
+ more than 10 percent	10	1	—	—	6	2	1	—
COST OF LIVING								
Decline	5	—	—	—	1	1	3	—
Constant	6	—	—	—	3	1	2	—
+ 1-5 percent	51	15	2	2	10	6	11	5
+ 6-10 percent	15	3	—	—	3	2	4	3
+ more than 10 percent	8	—	—	—	5	2	1	—

increased by more than 5 percent in 1963 were in the developing regions (Table II-24). The rapid inflation continued in a number of Latin American countries, with increases in retail food prices of 15 percent in Uruguay, 23 percent in Argentina, 49 percent in Chile, and 67 percent in Brazil. In Colombia the slower increases of the past few years (including a decline in 1962) gave place to a rise of 39 percent in 1963.

The most rapid inflation in 1963 was in Indonesia, where both the general cost of living and retail food prices more than doubled, though this represented a much slower rate of increase than the year before. Elsewhere in the Far East increases were generally more moderate, except in South Viet-Nam (8 percent) and the Republic of Korea (33 percent). In Africa the rapid inflation continued in Congo (Leopoldville), where food prices rose by a further 68 percent, but in a number of countries, as mentioned above, prices declined.

Many government measures have recently been taken in an attempt to stem the rise in prices. Some of the more general anti-inflationary measures were noted earlier in this chapter, and the present section will be confined to those more specifically concerned with retail food prices. In the Netherlands price controls were placed on coal, furniture and milk, but increases were permitted for a number of basic food items in line with rising prices on world markets. Butter and flour prices were frozen in Belgium. Maximum retail prices were set in France for a wide variety of food products and maximum profit margins for many types of retail trader. In Finland prices of food and other consumer goods, as well as building materials, were frozen for the first six months of 1964 at the level of October 1963. In Japan imports of a large number of consumer goods were freed in January 1964.

In Argentina, where prices in 1963 were five times as high as in 1958, the investigation and supervision of the production and distribution of essential goods have been authorized, and measures such as price ceilings, production quotas, and price subsidies are envisaged. Most of the basic food items in Brazil have been placed under price control, and maximum percentages set for the margins of retailers, importers, wholesalers, and consignees; more general action is also planned, as it is recognized that the basic difficulty is the comparative stagnation of the agricultural sector. Although the prices of many essential consumer goods and also wholesale prices and profit margins were frozen in Chile in early 1963, the rise in prices was not halted. Similar controls in Colombia give special attention to limiting the rapidly rising price of sugar.

The stabilization program announced in Indonesia in March 1963 virtually eliminated direct price controls, relying mainly on austerity in public expenditure and limitations on bank credit. In April 1964, however, it was announced that the prices of essential consumer goods and raw materials would be fixed. Efforts are also being made to achieve self-sufficiency in rice.

In India the main reliance in checking rising prices

has been on fair-price shops and consumer co-operatives, but it has not been possible to open a sufficient number of fair-price shops, which at present handle less than 5 percent of marketed supplies of food. State governments have been asked to invoke defense regulations against black-marketing and profiteering in food grains and sugar, and many of them have fixed profit margins for wholesalers and retailers. Price control and partial rationing (as in the case of sugar) have, however, had only limited success in preventing the rise in prices in India, and although the annual average level of retail food prices in 1963 was only about 4 percent more than in 1962, the rise between February 1963 and February 1964 was as much as 10 percent. Large releases have been made from government stocks, and it is planned, with United States assistance, to build up these stocks to 2 million tons of rice and 8 million tons of wheat over a four-year period from mid-1964.

Agricultural policies and development plans

The part of this chapter dealing with international trade in agricultural products this year contains a review of the evolution over the last decade or so of agricultural trade policies in both developing and developed countries and of international arrangements affecting trade in agricultural products. It includes a summary of the recommendations of the United Nations Conference on Trade and Development, and also details of a number of other recent developments such as the current Kennedy " round " of tariff negotiations in the General Agreement on Tariffs and Trade, the entry into force of the International Coffee Agreement in July 1963, and the failure toward the end of 1963 to negotiate an international agreement for cocoa. The following pages are therefore confined to an account of the most recent developments in domestic agricultural policies, and to some details of recent measures under the various schemes of regional economic co-operation which are not included in the longer-term review of agricultural trade policies.

In the EEC (European Economic Community) the gradual elaboration of the details of the common agricultural policy has continued during 1963/64. In December 1963 regulations were agreed for three further commodity groups (dairy products, beef and veal, and rice), as well as the general principles of the regulations for fats and oils. The main outstanding question remains the harmonization of grain prices within the Community, on which a decision has once again been deferred.

In the United States the search continues for long-term policies that will bring a better balance between supplies and requirements of surplus commodities and at the same time increase farm incomes and rural welfare. Meanwhile further temporary programs have been introduced for wheat and cotton for the 1964/65 and 1965/66 crop years.

As noted earlier, increases in prices have been particularly widespread in 1963/64 under the various systems of price support in both developed and developing countries. New measures have included the new five-year wheat stabilization plan in Australia, as well as a stabilization scheme for dried vine fruit and a proposed marketing scheme for eggs in that country. In the United Kingdom the new policy, announced in May 1963, of applying the concepts of " standard quantities " and " graduated deficiency payments " to support for domestic producers and arranging with exporters to regulate their shipments to the United Kingdom market, has begun to be implemented. In addition to the restrictions on butter imports that have already been in force for some time, arrangements have been concluded for grains and bacon.

In the U.S.S.R. measures to re-establish the former more rapid momentum of agricultural expansion have been widely discussed in 1963/64, in particular measures for the intensification of agricultural production. Attention has centered especially on the special seven-year plan for the development of the chemical industry, under which greatly increased supplies of fertilizers, insecticides and other agricultural chemicals are expected to become available. Funds for agricultural investment have been increased both in the U.S.S.R. and in the eastern European countries, and livestock prices have been raised in a number of the latter countries.

A large number of new economic development plans have been announced during 1963/64. While these are largely in the developing countries, it is of interest that several developed countries, including

TABLE II-25. - MAIN FEATURES OF CURRENT DEVELOPMENT PLANS IN DEVELOPING COUNTRIES

	Scope	Duration	Currency	Total investment	Total public investment	Share of agriculture [1] in total public investment	Planned annual increase	
							GNP	Agricultural production
			..... *Million*			..... *Percent*		
LATIN AMERICA								
Barbados	Public sector	1960-65	£	...	11.1	...	...	...
Bolivia	Comprehensive	1962-71	Bolivianos [2]	12 289 324	...	[3] 11	7	6.3
British Guiana	Public sector	1960-64	£	...	23.0	...	...	...
Chile	Comprehensive	1961-70	Escudos [4]	10 149	5,074	6	5.5	5.0
Colombia	,,	1961-70	Pesos	70 000	...	[3] 12	[5] 5.6	[5] 4.0
Ecuador	,,	1964-73	Sucres [4]	41 007	17 713	7	6.2	6.6
El Salvador	Public sector	1964-65	Colones	...	238	...	...	...
Guatemala	,,	1960-64	U.S. $	...	171	17	...	...
Honduras	Comprehensive	1962-65	Lempiras	362	143	...	[6] 3	5.3
Jamaica	,,	1963-68	£	280	91	26	5.0	3.3
Mexico	,,	1962-64	Pesos	80 000	40 000	...	5.4	5.5
Panama	Public sector	1964-66	Balboas	...	95	19	...	...
Peru	Comprehensive	1964-65	Soles [4]	48 873	11 622	18	7.0	5.7
Trinidad and Tobago	Public sector	1964-68	£	...	63	13	...	...
Venezuela	Comprehensive	1963-66	Bolivares	28 191	9 433	17	7.9	8
FAR EAST								
Cambodia	Public sector	1960-64	Riels	...	8 000	12	[6] 3.1	...
Ceylon	Comprehensive	1961/62-1963/64	C Rs	3 415	2 005	28	4.8	...
China: Taiwan	,,	1961-64	NT $	50 190	34 129	[3] 17	8.0	4.4
India	,,	1961/62-1965/66	Rs	104 000	63 000	20	5.4	5.4
Indonesia	Public sector	1961-68	Rupiahs	...	240 000	11	[6] 1.4	...
Korea, North	Centrally planned economy	1961-67	Won [4]	...	7 000	...	15.2	13.2
Korea, Rep. of	Comprehensive	1962-66	Hwan [4]	3,214 500	1 118 646	[3] 17	7.1	5.2
Malaysia								
Malaya	Comprehensive	1961-65	Mal $	5 050	2 150	25	[7] 4.1	2.8
Sabah	Public sector	1964-68	Mal $	...	200	...	...	...
Sarawak	,,	1964-68	Mal $	...	343	29	...	...
Singapore	,,	1964-68	Mal $	...	871	6	...	...
Nepal	,,	1962/63-1964/65	N Rs	...	670	14	...	...
Pakistan	Comprehensive	1960/61-1964/65	Pak Rs	23 000	14 620	24	[7] 4.4	2.7
Philippines	,,	1962/63-1966/67	Pesos [4]	12 053	2 809	24	[7] 6.0	3
Thailand	Public sector	1961/62-1966/67	Bahts	...	31 977	14	[7] 6	3
Viet-Nam, Rep. of	Comprehensive	1962-66	V Piastres	...	42 000	17	5	3.7
NEAR EAST								
Afghanistan	Public sector	1962/63-1966/67	Afghanis	...	[8] 44 500	25	7	...
Cyprus	,,	1961-65	Cyprus £	...	62	34	6.7	...
Iran	Comprehensive	1962/63-1967/68 [9]	Rials	...	200 000	22	6.2	4.1
Iraq	Public sector	1961/62-1965/66	I Dinars	...	[8] 556	20	7	...
Jordan	Comprehensive	1964/65-1970/71	J Dinars	182	75	34	5.3	2 6
Libya	Public sector	1963/64-1967/68	£ L	...	169	17	...	...
Sudan	Comprehensive	1961/62-1970/71	£ S	565	337	27	[10] 4 3	4

Continued on the following page

TABLE II-25. - MAIN FEATURES OF CURRENT DEVELOPMENT PLANS IN DEVELOPING COUNTRIES (*concluded*)

	Scope	Duration	Currency	Total investment	Total public investment	Share of agriculture [1] in total public investment	Planned annual increase	
							GNP	Agricultural production
			..... *Million*			..... *Percent*		
Syria	Comprehensive	1960/61-1964/65	£ S	2 700	1 700	52	[11] 7	5.8
Turkey	"	1963-67	T Lire	59 600	35 600	18	[11] 7	4.1
United Arab Republic	"	1960/61-1964/65	£ E	...	1 577	25	[11] 7	5.1
AFRICA								
Cameroon	"	1961-65	CFA fr	53 182	...	[3] 22	[6] 4.6	...
Dahomey	Public sector	1962-65	"	...	35 505	24	6.5	...
Ethiopia	Comprehensive	1962/63-1966/67	Eth $	1 696	...	[3] 21	4.6	2.7
Gabon	Public sector	1963-65 [12]	CFA fr	...	4 500	...	...	...
Ghana	Comprehensive	1963/64-1969/70	G £	[13] 1 016	476	14	5.5	4
Kenya	"	1964-70	£	317	129	...	...	...
Madagascar	"	1964-68	Mg fr	165 000	69 000	30	5.5	5.0
Malawi	Public sector	1962-65	£	...	12.9	22	[11] 6	...
Mali	Comprehensive	1961-65	M fr	...	64 000	20	8	7
Mauritius	Public sector [14]	1962-65	M Rs	...	212	24	...	...
Mauretania	Comprehensive	1963-65	CFA fr	27 761	13 573	[3] 9	[10] 10	...
Nigeria								
Federal Government	Public sector	1962-68	£ Nig	...	412.5	[15] 5	4	...
Eastern Region	"	1962-68	"	...	75.2	40	...	[16] 3
Northern Region	"	1962-68	"	...	93.8	22	...	...
Western Region	"	1962-68	"	...	90.3	20	4.5-5.0	...
Northern Rhodesia	"	1961/62-1964/65	£	...	[17] 30	21	...	[18] 20
Portuguese territories	"	1959-64	Contos	...	8.2	33	...	...
Senegal	Comprehensive	1961-64	CFA fr	92 067	50 561	19	8	5
Sierra Leone	"	1962/63-1971/72	£	[19] 124	[19] 99.3	[19] 8	[19] 8	...
Spanish Guinea	"	1963-66	Pesetas	2 579	1 651	...	7.6	...
Tanganyika	"	1964/65-1968/69	£	246	130	28	6.7	[20] 7.5
Tunisia	"	1962-64	Dinars	270	140	16	6	5.5
Uganda	"	1961/62-1965/66	£	94	72	19	5	...
Upper Volta	Public sector	1963-64 [12]	CFA fr	...	13 583	41	...	...
OCEANIA								
Fiji	"	1961/62-1965/66	£ F	...	12 2	19	...	...

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.

[1] Including animal production, fisheries, forestry, irrigation, land reclamation, community development, agricultural extension, etc. - [2] Of 1958. - [3] Percentage of total investment, public and private. - [4] Of 1960. - [5] 1960-64 only. - [6] Per caput. - [7] At constant prices. - [8] Including some private investment. - [9] 5½ years. - [10] Gross domestic product. - [11] Net domestic product. - [12] Interim plan. - [13] Gross investment. - [14] Government investment program. - [15] Agriculture is primarily the responsibility of the Regional Governments. - [16] Food production. - [17] Excluding £5 million government expenditure over a 16 months period for the emergency plan to combat unemployment. - [18] African marketed production. - [19] First five-year period only. - [20] Marketed production.

Ireland and Spain, have also announced new plans. Most European countries have for some time already prepared partial plans for the agricultural sector ("green plans"), generally on an annual basis. During the period under review the New Zealand Government convened an Agricultural Development Conference, to prepare guidelines for future agricultural policy and formulate production targets for the next fifteen years.

Table II-25 summarizes some of the main features

of those of the current development plans of developing countries of which details are available to FAO at the time of writing, thus bringing up to date a table first published in last year's issue of this report. Fuller details of the new plans will be found in the regional sections below. Modifications in planning organizations and machinery have continued, especially in the Latin American countries. A number of countries are also engaged in the elaboration of long-term perspective plans.

Although evaluation reports on the progress of plans are becoming more frequent, there is still far too little information on their implementation. During the period under review, however, there have been rather widespread reports of financial difficulties, caused in part by inflationary tendencies. Among measures for the implementation of agricultural plans, the improvement of land tenure conditions and of credit supplies continue to be prominent. In some Latin American countries a difficulty in the execution of land reform programs is proving to be the devising of a suitable system of compensation for expropriated land, since cash payments accentuate inflation and payment in bonds is often unacceptable because of the inflation already under way.

North America

United States

After the rejection by producers of the proposed new wheat program in the National Wheat Referendum of May 1963, the 1964/65 support price for wheat would have been reduced, under existing legislation, to 50 percent of parity, or about $1.25 per bushel, as compared with $2.00 in 1963/64. New wheat legislation was therefore imperative if steep reductions in farm incomes were to be avoided. Since sufficient legislative backing was not forthcoming for any long-term program, temporary measures were once again necessary.

Measures covering the 1964/65 and 1965/66 wheat crops were enacted in April 1964 in the Agricultural Act of 1964. They are based on the maintenance of the national wheat acreage allotment, the setting of farm marketing allocations at 90 percent of the acreage allotment, and the use of negotiable marketing certificates to supplement the support price. For the 1964/65 crop domestic marketing certificates will have a face value of 70 cents per bushel and export marketing certificates 25 cents, and each will be issued for half of the total marketing allocation. Thus each participating farmer will receive price support at a national average level of $1.30 for the entire normal production of his acreage allotment, plus certificates worth 70 cents per bushel for 45 percent of it, and certificates worth 25 cents for a further 45 percent, which works out at an average of $1.73 per bushel.

Participation in the program is voluntary, and nonparticipating farmers may grow all the wheat they wish and sell it on the commercial market. In order to qualify for price support a producer need only stay within his acreage allotment. To receive marketing certificates as well, he must also devote to conservation use acreage equivalent to 11.11 percent[15] of his 1964/65 acreage allotment (in addition to maintaining the normal acreage in conservation use), and not exceed acreage allotments for other crops. If in addition he devotes further acreage to conservation use, he will also receive an acreage diversion payment of 20 percent of the support price on the normal yield both of the 11.11 percent minimum qualifying diversion and of additional diversion up to 20 percent of the allotment.

Every buyer of wheat has to buy certificates. A wheat exporter will thus have to pay the market price, plus the cost of the export certificate, making a total of at least $1.55 per bushel at the farm gate. A domestic processor will have to pay at least $2.00 per bushel ($1.30 plus 70 cents). Wheat exporters therefore receive an implicit subsidy of 45 cents per bushel, and they will also receive additional export payments if the market price plus the cost of the certificate is above the world market level. The total price to domestic processors is likely to remain close to the level of recent years.

The Agricultural Act of 1964 also contains a new program for upland cotton for 1964/65 and 1965/66. The 16-million acre national minimum acreage allotment remains unchanged from 1963/64, and farmers who comply with their effective allotment will be eligible for price support at 30 cents per pound standard quality. In addition, a domestic allotment is established, calculated to provide the amount of cotton consumed domestically, and for 1964/65 this has been set at 67 percent of the effective allotment. Farmers who choose to plant within the smaller domestic allotment will receive an additional payment of 3.5 cents per pound on the normal yield per acre

[15] This minimum qualifying acreage diversion is in effect the amount by which wheat acreage allotments for 1964/65 had already been reduced in relation to the year before.

established for the farm, and they may also grow other crops on that part of the effective allotment not planted to cotton, provided that feed grain acreage does not exceed the farm's feed grain base. As an alternative to planting within the domestic allotment, farmers may plant, in addition to the effective allotment, on which they will receive price support, export market acreage (set at 5 percent for 1964/65), the normal yield of which must be exported at world market prices.

The new cotton program also includes a Cotton Equalization Payment-in-kind Program, under which from April 1964 domestic users of eligible raw upland cotton will receive payments to offset the difference in the cost of United States cotton to domestic and foreign users. For the 1964/65 crop year the rate of payment was set at 6.5 cents per pound, payable in CCC cotton. The export subsidy for cotton products has also been cut to 2 cents per pound. In addition, the Agricultural Act authorizes the use of up to $10 million annually for a special research program designed to reduce the cost of producing upland cotton.

Both the wheat and cotton programs contain special provisions for farms of 15 acres or less.

Canada

No changes in agricultural policy occurred in Canada during the period under review. The most important development of 1963/64 for Canadian agriculture was the conclusion of long-term wheat sales agreements for over 13.5 million tons of wheat and flour with the U.S.S.R. (7 million tons), Mainland China (3.5 million tons), and eastern European countries.

Western Europe

In western Europe the common agricultural policy of the European Economic Community has continued to take shape. In the field of national agricultural policies there is still a combination of long-term measures to improve agricultural structure with shorter-term measures to support agricultural incomes. One country, the United Kingdom, has introduced important changes in its agricultural policy in order to limit the budgetary cost of price support and at the same time ensure greater market stability. In most countries the problem of low-income farms continues to be serious. The conclusions of a special study of low-income farms carried out by OECD [16] confirm once more that the low-income farms receive the least help from general support policies.

European Economic Community

In December 1963 regulations were agreed for dairy products, beef and veal, and rice, and also the general principles of the regulations for fats and oils. The common agricultural policy is to come into force on 1 September 1964 for rice, and on 1 November 1964 for dairy products, beef and veal, and fats and oils. By the latter date the common agricultural policy would cover 85 percent of the Community's agricultural production, and sugar would be the only major commodity for which regulations had still to be established

The new regulations are basically similar to those already established for grains, pigmeat and poultry meat. Prices within the Community are gradually to be harmonized at a level that will be protected against outside competition by variable import levies and, for cattle and calves, and vegetable oils, by a common external tariff.

For dairy products each country will during the transition period annually fix a target price for milk within limits set by the Council of the Community. From 1965/66 a common target price will be fixed, toward which national prices must move during the transition period. Variable import livies will protect the international price structure and an intervention price for butter will be in force during the transition period. The present regulations do not apply to milk for liquid consumption and fresh cream, for which special regulations are to be established by July 1965.

For cattle and calves, guide prices have been fixed for 1964/65 by each country within a price range determined by the Council. From 1966/67 these prices will be fixed by the Council, and a single guide price for the Community has to be reached by the end of 1969. Imports will be controlled by a common external tariff on live animals and meat and by levies which come into effect when non-Community market prices fall below the guide price.

For rice the new regulations are closely patterned on those for grains, with modifications based on the

[16] OECD. 1964. *Low incomes in agriculture.* Paris.

concentration of the Community's rice production in France and Italy, and the fact that there are virtually no barriers to trade in rice in the other member countries.

The general principles established for the regulations for fats and oils envisage a policy of low prices for all of these products except olive oil. There will be free imports of oilseeds from outside the Community, and the Associated States will be exempt from the common external tariff on vegetable oils. For olive oil, a target price will be fixed annually and prices will be supported through a market intervention price and levies on imports from outside the Community. The Italian Government, in co-operation with the Commission, will establish a program to improve the production and marketing of olive oil and improve economic conditions in the olive-growing regions.

During the period under review, however, the main issue concerning the development of the common agricultural policy has been the harmonization of grain prices. The Community grain price level and the phasing of the steps toward it had been left open in the regulations that became effective in July 1962. Because of the wide differences in national price levels and the importance of grains in the agricultures of each of the member countries, it has not yet been possible to reach agreement. For 1962/63 upper and lower limits were set which corresponded to the highest and lowest national levels in the previous season, and for 1963/64 the only modification was a slight raising of the lower limits for barley, rye and maize. In November 1963 the Commission presented proposals (the so-called " Mansholt Plan ") for the harmonization of grain prices in one step with the establishment from the 1964/65 season of basic target prices for hard and soft wheat, rye, barley and maize, which would be within the range of existing national prices. These proposals were not accepted, however, and the price ranges for 1964/65 remain the same as for 1963/64. A new deadline of 15 December 1964 was set for the decision on the harmonization of grain prices.

Domestic agricultural policies

Agricultural price policies in western Europe were generally continued along the lines of earlier years. Temporary measures were extended, such as the Danish system of separating domestic and export prices, and the Finnish Marketing Fund. In Norway a new one-year agreement between the government and the agricultural organizations in 1963 provided for further improvements in producer prices so as to raise incomes by 3 percent. In Yugoslavia the long-term program of raising producer prices was continued in 1963. In France, where prices have been rising rapidly, the policy so far in 1964 has been to refuse further increases (e.g., for milk), or to keep them within very narrow limits (e.g., for beef).

The 1964 Price Review in the United Kingdom increased guaranteed prices for a number of products (fat cattle, wool, milk, potatoes, sugar beet), but reduced those for eggs. The guaranteed price for pigs was also reduced, but the quantity of output eligible for the guarantee was raised. In addition to the changes already introduced in 1963/64 for pigs and eggs, modifications were made in 1964/65 for some other products to regulate production more effectively and to limit the budgetary cost of support. Wheat and barley guarantees are now related to standard quantities and target indicator prices; deficiency payments will be reduced when production is near or above the standard quantity and market prices below the target indicator price, and increased when production is below the standard quantity and market prices above the target price. Graduated deficiency payments now apply to cattle, sheep and lambs, which means that producers' returns will be below the guaranteed price when market prices are low, and above the guaranteed price when market prices are high. Imports of butter have been subject to quota restrictions since April 1962, and during the period under review arrangements have also been concluded for grains and bacon. In April 1964 agreement was reached with Argentina, Australia, Canada and the United States on a scheme for sharing the market for grains and maintaining minimum import prices from July 1964. For bacon an agreement with seven major suppliers became effective in April 1964; for 1964/65 a basic total of 615,000 tons was agreed for total supplies, of which United Kingdom producers were to have 36.2 percent. For other types of meat a study group, consisting of the United Kingdom and its main suppliers, has been established to " review regularly the United Kingdom market situation with reference to levels of imports."

Public funds devoted to agriculture have increased considerably in many countries. In the United Kingdom, where a main aim of the new policies described above is to limit the budgetary costs of

agricultural support, the exchequer costs for subsidies decreased by 10 percent in 1962/63 and by 3 percent (as against an expected increase of 17 percent) in 1963/64, but in 1964/65 they are expected to rise by 6 percent. Price subsidies in Austria rose by 28 percent in 1963 and a further 9 percent in 1964; expenditure budgeted under the Green Plan rose from A.S. 450 million ($50.4 million) in 1963 to A.S. 550 million ($61.6 million) in 1964, while credits for agriculture from former Marshall Plan funds have also increased. In France the agricultural budget for 1964 is almost 30 percent higher than for 1963, and in the Netherlands the increase is about a quarter. In the Federal Republic of Germany total expenditure under the Green Plan is almost the same in 1964 as in 1963, but the share of income supports has been somewhat reduced and that for structural improvements increased.

In addition to such annual Green Plans, a number of countries have embarked on longer term programs for agriculture. Norway has started discussions on a new long-term program. The United Kingdom has decided on a more intensive promotion of horticulture, and during the next 10 years £27 million ($75.6 million) will be spent, mostly on grants for capital development, in addition to the system of grants introduced in 1960. Grants up to a total of £25 million ($70.0 million) will also be made to local authorities for market schemes.

Ireland introduced a seven-year plan in 1964 as the second stage of its long-term program of economic growth. It is planned that output per person in agriculture should increase by 4½ percent per year, or faster than in the nonagricultural sectors, so as to redress income disparities. Gross agricultural output is planned to increase by 31 percent between 1960 and 1970, and sales of cattle by 43 percent. Three main aims are access to export markets on favorable terms (including membership of EEC), a more rapid increase in production efficiency, and the strengthening of farm structure.

A new comprehensive four-year plan was initiated in Spain in 1964, with total investment estimated at 900,000 million pesetas ($15,003 million). The main aims include increased productivity (to release labor for industry), the expansion of exports, improvements in agricultural structure, more rapid mechanization (tractor numbers are to be doubled between 1962 and 1967) and a steady income for agriculture. Special emphasis is placed on the redistribution of land to form efficient units, land consolidation, irrigation, reafforestation, soil conservation, the promotion of joint exploitation through co-operatives and other forms of association, and the modernization of farm enterprises.

In Italy increased assistance for mechanization and other improvements has again been provided under the Green Plan. Early in 1964 bills were approved for the gradual abolition of sharecropping, for the granting of fiscal exemptions and tax concessions to farmers, and for the establishment of special development agencies for agricultural reorganization and rationalization. The new development agencies are to provide credit and advice for the combination of small parcels of land into viable farms. Long-term credit at low rates of interest is to be provided for farmers who want to purchase the land they cultivate.

Also in the field of agricultural credit, the government-sponsored Agricultural Credit Corporation in Ireland, which provides long- and medium-term loans, was expanded with a system of unsecured loans to make credit available to small farmers. In Norway it is planned to co-ordinate three existing government credit institutions and to improve the availability of short-term credit for agriculture. Greece provided 1,400 million drachmas ($46.7 million) in 1963 to finance long- and medium-term credits through the Agricultural Bank. In Portugal the Government increased the resources of the Agricultural Improvement Fund in 1964 to provide long-term credit, and in Yugoslavia an improved system of agricultural credit began operation in 1963.

As mentioned already, measures to increase the size of farms continue. Some countries have found the use of old-age pensions and grants to help the transfer of land to the younger generation too slow a method. Under a new scheme in the Netherlands, therefore, the Development and Reorganization Fund will give a premium to farmers of 55 years and over who have earned only a certain minimum income if they give up their farms for structural improvement. A similar scheme has been proposed in Belgium.

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

Great importance is attached in the U.S.S.R. to a new plan for the development of the chemical industry, under which greatly increased supplies of fertilizers and other chemicals should become available for the intensification of agricultural production. Funds for investment in agriculture have been in-

creased both in the U.S.S.R. and the countries of eastern Europe, and in the latter countries further price incentives have been afforded especially for livestock production. In the U.S.S.R. greater autonomy has been given to the kolkhozes (collective farms) and sovkhozes (state farms) in the determination of their production plans.

Development plans

A new five-year plan for 1966-70 is in preparation in the U.S.S.R. Instead of the usual annual plan, a two-year plan has been adopted for 1964-65, the last two years of the seven-year plan for 1959-65, in an effort to make quicker progress in those sectors which are lagging behind. While priority is still given to capital goods industries, the emphasis on consumer goods is increased. Investment in agriculture, at 5,400 million rubles in 1964 and 6,100 millions in 1965, is to be, in the words of Mr. Kruschev, "the highest since the creation of the Soviet regime." The target for grain production is set at 167.1 million tons in 1964 and 173.6 million tons in 1965, as against a harvest of 148.2 million tons in 1962 and a much lower one in 1963. Thus it is hoped to achieve the targets of the seven-year plan, which called for grain production of 164-180 million tons in 1965.

The achievement of these targets depends to a great extent on a special seven-year plan (1964-70) for the development of the chemical industry, to which great prominence was given in 1963. Under this plan the production of the chemical industry is to be increased threefold. Chemical production was also supposed to be trebled under the seven-year plan for 1959-65, but by 1963 the increase was only 89 percent, while industrial production as a whole had increased faster than planned. Thus the objective of the new plan is partly to redress the balance between the different sectors, but a number of other reasons are also cited that require a rapid expansion of the chemical industry, including the need to intensify agriculture by making available abundant supplies of fertilizers and other agricultural chemicals.

Fertilizer production in 1965 is set at 35 million tons, which is slightly less than the target of the seven-year plan. Actual production in 1963 was 19.9 million tons. It is estimated that 15 to 20 percent of the present production is lost, owing to inefficient storage on the kolkhozes and sovkhozes. Up to now most of the fertilizer has been used on industrial crops, but from 1964 a larger quantity is to be devoted to grains. Fertilizers are now to be allocated chiefly to the more fertile areas where their use can make the greatest contribution to output. The production of herbicides, insecticides, etc., is to increase from about 60,000 tons (active ingredients) in 1963 to 126,000 tons in 1965, and 450,000 tons in 1970.

Side by side with the "chemicalization" of U.S.S.R. agriculture, there is a new program to expand the area under irrigation. It is intended to establish an area where 25 to 33 million tons of grain can be guaranteed, even in a drought year. A third element in raising the productivity of agriculture is mechanization, and improved supplies of spare parts are called for, and the production of improved machines, especially those needed for the use of chemical fertilizers.

Improvements are envisaged in the U.S.S.R. in the production of commodities such as milk, eggs, and vegetables, for which demand is heavy in the large towns. Specialized enterprises are to be developed near these towns, and there is a new emphasis on the hydroponic production of vegetables.

A high-level committee was appointed in April 1964 to study some proposals of Mr. Kruschev concerning chiefly agricultural education and the "industrialization" of livestock production. It is proposed to ensure a much higher level of competence among kolkhoze chairmen, sovkhoze directors and, especially, the inspector-organizers of the territorial boards that were established in 1961 to supervise the activities of the kolkhozes and sovkhozes.

In the eastern European countries there have been rather few agricultural policy changes during the period under review. Funds for agricultural investment have been increased in most countries, for example by 15 percent in Poland, 27 percent in Bulgaria, and 31 percent in Hungary. Special emphasis is being placed on mechanization, irrigation and land improvement, as well as the establishment of vineyards and orchards. As in the U.S.S.R., the chemical industry is to be considerably developed, and the use of fertilizers and other agricultural chemicals greatly increased.

Other policy measures

In recent years in the U.S.S.R. a number of difficulties have been faced by many kolkhozes, and the gulf between the stronger and weaker kolkhozes has

tended to widen. Costs are often higher than returns, and this has impeded investment and also the improvements promised in the system of payment for labor. It had been intended increasingly to replace the trudoden or conventional working day as the basis for payment by a system of guaranteed minimum wages, and at a later stage a fixed monthly wage. Many kolkhozes, however, have been unable to accumulate the working capital needed to make such changes and have therefore decided to revert to the trudoden, and only 20 percent of kolkhozes guarantee minimum wages and pay advances to their members. The purchase, replacement and maintenance of agricultural machinery after the abolition of the machinery and tractor stations in 1958 had also caused difficulties for many of the weaker kolhkozes.

There has also been some conflict between the interests of the kolkhoze and those of the territorial boards. While the kolkhozes wish to increase the production of the products bringing the greatest returns, and since 1955 have been permitted to do so, the territorial boards are mainly interested in ensuring the fulfillment of state purchasing plans.

A decree of March 1964 prescribes that the territorial boards can only enforce the quantities of the different products to be sold to the state, and that the kolkhozes and sovkhozes can themselves determine their production programs. While this only reiterates the provisions of the law of March 1955, a new provision is that, in case of disagreement between the territorial board and the kolkhoze or sovkhoze concerning the production program, the last word is with the latter.

A number of recent measures in the U.S.S.R. are designed to improve the situation of the farming population. The price paid by the state to producers of sugar beet has been raised by 18 percent. A law has been proposed under which a uniform state system would be established for the payment of pensions to aged or invalid kolkhoze members. This would replace the present system, where each kolkhoze has its own arrangements for pensions and some have none at all.

Except in Poland, the strengthening of state and co-operative enterprises has continued in the eastern European countries. Between mid-1962 and mid-1963 the average size of collective farms in Hungary increased from 1,247 to 1,510 hectares of agricultural land, and that of state farms from 4,240 to 4,890 hectares. At the same time in some countries, e.g., Czechoslovakia, production on private plots is being encouraged, especially for livestock products. In Poland a decree was adopted to prevent the further subdivision of holdings and halt the serious fragmentation that is occurring.

In Czechoslovakia errors in planning were blamed for the slow progress of agricultural production, and incentives were increased. Throughout eastern Europe the encouragement of livestock production through price incentives continued. Prices for young cattle were raised by 50 percent in Romania. Milk prices were increased by about 10 percent in Hungary and Poland, and in Hungary the prices of eggs and poultry were also raised. Special incentives for livestock breeding under contract were offered in Hungary and Romania. Prices of tobacco and vegetables were raised in Bulgaria, and those of grains tand sugar beet in Eastern Germany.

Australia and New Zealand

There have been a number of important developments in agricultural policy in Australia and New Zealand during 1963/64. In addition, the intergovernmental standing committee of officials, set up in 1963 to investigate the possibilities of a limited two-country free-trade area, has submitted its report and is understood to see no reason why there should not be a gradual lowering of trade barriers in important sectors of the economy.

Australia

A new five-year wheat stabilization scheme for 1963/64-1967/68 has been adopted. As in the scheme that ended in 1962/63, farmers will receive a fixed price for all wheat consumed locally, but the quantity of exports covered by the guarantee has been raised from 100 to 150 million bushels, reflecting the increased productive capacity of the industry. As before, the guaranteed price will be determined annually and will vary with changes in costs of production. The new formula takes account of the lower costs resulting from increased yields in recent years, and the producer price for 1963/64 has therefore been set at 14s. 5d. per bushel, as against 15s. 10d. for the last year of the previous plan.

A five-year stabilization scheme for dried vine fruit has been accepted by growers. A plan for the marketing of eggs, under which returns from domestic and export sales will be equalized, has received the

support of producers and the necessary legislation will soon be introduced. Plans are also being discussed for the stabilization of the tobacco industry. The Australian Wool Board has set up a committee to make a thorough investigation of the wool marketing system, with particular attention to the possibility of introducing a reserve price in the auction system. A bill that is before the Federal Parliament determines the shares of the producers and the government in Australia's annual contribution of £10.4 million ($23.3 million) to the wool promotion scheme of the International Wool Secretariat.

A new subsidy of £A3 ($6.7) per ton on superphosphate is expected to cost £A9 million ($20.2 million) annually. A Committee of Enquiry into the Australian Sugar Industry, set up by the Queensland Government, has recommended that the industry should aim to produce 2.5 million tons by 1971. The establishment of a development authority for Australia's northern regions is under discussion.

New Zealand

An Agricultural Development Conference is to study the best methods of increasing agricultural production and to prepare guidelines for policy makers. Particular attention is to be given to the formulation of production targets for the next 5, 10 and 15 years.

With the improvement in wool prices growers' incomes have increased considerably, and in order to ease taxation burdens and increase the stability of the economy a voluntary scheme has been introduced under which growers can freeze part of their income from wool. The money can be paid into special retention accounts for up to three years, and farmers can make withdrawals from these accounts either for inclusion with subsequent income or for development purposes.

LATIN AMERICA

A number of new development plans have been prepared in Latin America, including in several countries more detailed short-term operational plans within the framework of longer-term plans already announced. Some evaluation reports have been issued on the progress of current plans, and the reorganization of national planning machinery continues. New land reform laws have been passed in several countries. Progress continues in the Central American Integration Scheme, while the Latin American Free Trade Association has reached the crucial point at which the first common list for tariff reductions must be drawn up.

Development plans

At the November 1963 meeting of the Inter-American Economic and Social Council, an Inter-American Committee for the Alliance for Progress was established, which is to make annual estimates of the aid required for Latin American development, examine all national and regional development plans, and submit proposals on each country's contribution to the Alliance for Progress and on the distribution of Alliance funds.

The rate of disbursement of loans from the Inter-American Development Bank has increased substantially; there has also been a rise in the share of agriculture, which by 31 January 1964 had received $243.9 million, or 48 percent of the funds committed by the Bank excluding the Social Progress Trust Fund. During the year ending 31 January 1964 about $106 million of the $249 million authorized were for agriculture, including $25 million for farm mechanization in Argentina, $30.5 million for a development program in the State of Tabasco (Mexico), $20 million for irrigation in northeast Mexico, and numerous smaller projects in other countries. Other large loans for agricultural development include $21.7 million from the United States for grain elevators and silos in Argentina, $22.7 million from the United States for livestock development and agricultural credit in the Dominican Republic, and $24 million from the International Bank for Reconstruction and Development for two projects in Chile.

New development plans have been submitted to the Committee of Nine of the Organization of American States by Ecuador, Honduras and Peru. Ecuador's ten-year plan (1964-73) provides for an annual increase of more than 3 percent in gross domestic product per caput. Of total investment of 41,000 million sucres of 1960 ($2,343 million), 43 percent would be in the public sector. Agriculture, including forestry and fisheries and also settlement projects, would receive 7 percent of total public investment. Agricultural production is planned to increase by 6.6 percent a year and agricultural exports by 3.6 percent.

Honduras has submitted a two-year plan for

1963-64. Of 362 million lempiras ($181 million) of total investment, 143 million lempiras ($71.5 million) would be in the public sector. In Peru a two-year plan for 1964-65 has been presented to the Committee of Nine. An annual rate of increase of 7 percent until 1970 is envisaged in the gross domestic product, and of 5.7 percent in agricultural production. Agriculture is to receive 18 percent of the total public investment of 11,622 million soles of 1960 ($425 million).

Panama's plan, after examination by the Committee of Nine, has been revised and is now ready for submission to the Alliance for Progress. Total public expenditure for the three-year period 1964-66 is $95.0 million, of which $18.3 million, or 19 percent, is for agriculture.

Jamaica's five-year plan for 1963/64-1967/68 involves a total investment of £280 million ($784 million), of which £91 million ($254.8 million) in the public sector. An annual rate of growth of 5 percent is expected. Agriculture (including land reform) is to receive 26 percent of public investment, including £12.5 million ($35 million) for the Farmers' Production Program, which mainly emphasizes the dairy industry and also a program of land distribution.

The five-year plan of Trinidad and Tobago for 1964-68 envisages public investment totaling WI $303 million (US $176 million) of which agriculture is allocated 13 percent. A mission from the International Bank for Reconstruction and Development has reviewed the plan, but the government has announced that it has to be altered in view of recent hurricane damage.

In Bolivia a two-year plan for 1963-64 has been drawn up within the framework of the comprehensive ten-year plan for 1962-71. Of the total investment of $212.6 million, 13 percent is allocated to agriculture. In Colombia, within the framework of the ten-year plan for 1961-70, a five-year public investment plan (1964-68) has been presented to the Credit Consulting Group for Colombia, and provides for the investment of 9,631 million pesos ($964 million) and $1,461 million.

Cuba's four-year plan for 1962-65 is reported to allot 20 percent of total investment to agriculture. The rate of growth planned for the next few years is 8 to 10 percent annually.

In the Dominican Republic a development plan is being drawn up with international assistance. In the meantime, a livestock program is to be financed from improved sugar earnings and United States loans. In Paraguay a five-year program for the development of agriculture and forestry has been approved by the National Council for Economic Co-ordination.

Little information is available on the progress of implementation of the plans that have been drawn up. A progress report on the first two years (1961-62) of the ten-year plan of Chile indicates that, while total investment reached 94 percent of the planned level, for agriculture the figure was only 76 percent, mainly because of delay in the execution of the livestock program. In Colombia the execution of the ten-year plan is reported to have been delayed by a variety of factors, including the shortage of local investment funds, inflation, and the lack of effective machinery to implement the plan and of suitable projects.

The planning machinery has been modified in a number of countries. In Bolivia the National Planning Commission has been reorganized to secure better co-ordination of activities under the two-year plan. In Brazil a new two-year plan is being prepared in place of the previous three-year plan. A draft law on planning is under consideration in Mexico, which would establish a Federal Planning Commission attached to the Presidency of the Republic. In Uruguay the Commission for Investments and Development has been reconstituted to include a number of additional ministers, including the Minister of Agriculture and Livestock, and is to prepare a ten-year development plan for 1964-73. A National Committee for Agricultural Planning has been set up in Venezuela, with the aim of encouraging a more active participation of the private sector in agricultural development.

Land tenure

A principal problem hindering adequate action under the many land reform laws that have recently been enacted is how to provide suitable compensation for expropriated landowners. Most constitutions provide for expropriation against cash payment, which greatly limits the scope for action because of the danger of accentuating inflation or causing too great a drain on government resources. On the other hand, payment in bonds or on an installment basis is often unacceptable because of the inflation that is already under way.

During the period under review a number of new land reform laws have been passed. In Chile 26 executive laws have been established within the

framework of the basic land reform law of 1962. The constitution has been amended to provide for compensation for the expropriation of badly managed land on the basis of a cash payment of 10 percent and the rest in installments over a period of up to 15 years, the installments being adjusted to maintain their value.

In Cuba the nationalization of all rural properties over 67.1 hectares was decreed in October 1963. Exemptions are granted for properties that have been maintained at a high level of productivity since the promulgation of the Agrarian Reform Law and whose owners are collaborating fully in government production and marketing plans. Compensation is payable on a monthly basis for 10 years to both the owners and occupiers of expropriated land, but there is no compensation for land that is not being exploited.

A draft land reform law in Ecuador covers public domain and uncultivated or inefficiently cultivated private property. In Guatemala a plan has been announced for the redistribution of 2 million hectares of public domain to some 100,000 families. An agrarian reform law passed in Nicaragua in April 1963 affects national lands, communal lands and unexploited or inefficiently exploited private lands. Taxes are imposed on unexploited farm lands to induce owners to cultivate or sell them.

The Agrarian Reform Commission in Panama aims during the next three years to distribute land to 4,000 farmers and legalize the title and ownership rights of 8,000 occupiers. In Paraguay properties of more than 10,000 hectares in the Eastern Region and 20,000 hectares in the Western Region are subject to a special tax. A minimum size has also been prescribed for farms, and minifundia will be expropriated and redistributed in larger lots by auction among the former owners; those left landless will have priority in neighboring settlement projects.

In Peru the Agrarian Reform Law was enacted in May 1964. Limits are fixed for different types of holding, ranging from 150 hectares of permanently irrigated land to 1,500 hectares of natural pasture. Expropriated land will be paid for in negotiable bonds bearing interest at 4 to 6 percent.

Other domestic policies

There have been few changes in agricultural price and marketing policies during the period under review. In Argentina, as a stimulus to increased production and to counterbalance the loss in purchasing power because of inflation, support prices for grains and oilseeds were increased by 19 to 48 percent for 1963/64. Fertilizer imports have been exempted from surcharges and sales tax until the end of 1965. The 5 percent sales tax on steers has been removed in order to increase supplies for slaughter, but cows and heifers are still subject to the tax. In Jamaica an Agricultural Marketing Corporation has been established. In an attempt to control inflationary tendencies, retail prices of essential articles have been fixed in a number of countries, including Chile, Cuba and Paraguay.

Several countries have announced plans for the expansion of sugar production. In Brazil the Executive Group for the Rationalization of Coffee Cultivation has approved a plan for financing up to 70 percent of the cost of building sugar mills for companies and co-operatives in which there are large numbers of coffee growers; if the plan is approved by the government, 3,600 million cruzeiros ($5.8 million) will be allocated from the Coffee Defense Fund. Four new sugar mills are to be established in Colombia, under the sugar development plan, which aims to double production in five years and increase exports fourfold. In Ecuador also it is planned that sugar should become a major source of foreign exchange. In Guatemala the installation of a new sugar mill will eliminate the need for imports. Three new sugar mills are to be established in Mexico.

In Colombia the large-scale cultivation of oil palm is planned on some 100,000 hectares, in order to replace oilseed imports. A banana development program is also to be started. In Ecuador the production of cotton and oilseeds is to be developed in order to replace imports, and it is hoped to increase banana yields so as to be able to reduce the area from 150,000 hectares to 120,000 hectares. A program to expand wheat production in Paraguay is to be financed partly through a new tax on millers, and a minimum price to producers was established in 1963.

The organization of agricultural production has been decentralized in Cuba. The country has been divided into 44 agricultural regions, each consisting of 2 to 3 groupings of government farms or *granjas*. The aim is that first the groupings, and later the granjas themselves, should be self-sufficient for investment purposes.

Improvements in agricultural credit facilities include the establishment of an independent Institute

for Development and Co-operative Credit in the Dominican Republic. In Peru the Agricultural Development Bank has been reorganized and its capital increased. A National Agricultural and Livestock Insurance Company has been established in Mexico with the aim of making all farmers eligible for credit if they are insured. Part of the premium will be paid by the government, and it is hoped that the scheme will cover three million farmers in the near future.

Regional economic co-ordination

United States aid of $200 million is to be made available through the Central American Bank for Economic Integration to finance regional projects, following the Declaration of Central America, signed in March 1963 by the United States, the five countries (Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua) of the Central American Integration Scheme (CAIS) and Panama. The Bank has therefore prepared a development plan involving the expenditure of $160 million in the public sectors of the Central American economies. Recent developments in CAIS have included the establishment of a Co-ordinating Committee for Markets and Price Stabilization.

In the Latin American Free Trade Association (LAFTA) it has been agreed to give special treatment to Chile, Colombia, Peru and Uruguay as "medium-developed" countries, paralleling the concessions granted earlier to Ecuador and Paraguay as "less-developed" members of the group. The possibilities of establishing a common external tariff are to be studied, and also the co-ordination of agricultural development. It has also been decided to establish machinery to facilitate union with CAIS after 1966. The Dominican Republic and Venezuela are studying the possibility of participating in LAFTA.

FAR EAST

In a number of countries of the Far East the implementation of development plans has been delayed. Producer prices have been raised in many cases, but in several countries measures have been necessary to stem the rise in retail food prices. Further measures to improve land tenure conditions and agricultural credit facilities have been announced. In Mainland China no major agricultural policy changes have been reported during the period under review.

Development plans

In several countries of the Far East the implementation of development plans has run into difficulties during 1963/64. Many projects under Indonesia's eight-year development plan (1961-69) have been delayed or stopped because of economic difficulties. Inflation has continued, production for export has failed to increase or has declined, and the ban on trade with Malaysia from September 1963 has added to these difficulties. Top priority is being given to food production. In Cambodia the five-year plan launched in 1960 appears to have made little progress, mainly as a result of budgetary problems. In the Republic of Korea the implementation of the five-year plan begun in 1962 has been hampered by inflation, shortage of foreign exchange, and poor rice crops. The plan has therefore been scaled down and a number of projects canceled or delayed.

The midplan appraisal report of India's third five-year plan, which aims at self-sufficiency in food grains by 1966, stresses the disappointing level of agricultural production in the first two years of the plan. Some shifts in investment have therefore been made in order to increase the emphasis on agriculture, with priority for quick-yielding projects. An Agricultural Production Board has been established to improve the co-ordination and implementation of agricultural programs.

While fairly rapid progress has been made under Thailand's six-year plan for 1961-66, unexpected delays have occurred in executing some programs. The second half of the plan has therefore been revised, and a Ministry of National Development has been set up to program and implement important infrastructure projects and generally speed up economic growth.

Following the establishment of Malaysia in September 1963, Sabah has started a five-year plan for 1964-68 involving public investment of Mal $200 million (U.S. $65 million). The main objectives are to develop a road system, expand timber and cocoa production, and establish agricultural processing industries. Sarawak has also begun a new five-year plan (1964-68), under which 29 percent of

the total public expenditure of Mal $343 million (U.S. $112 million) is to be for agriculture.

Total investment under Pakistan's third five-year plan (1965-69) has been tentatively set at Pak Rs 4,950 crores ($10,500 million). Major objectives would be to increase the national income by 30 percent and the value of exports by 43 percent. A twenty-year perspective plan for 1965-84 has also been announced, which aims to double per caput income, achieve full employment, and initiate economic " take-off."

Mongolia is formulating a twenty-year plan designed to accelerate the country's economic development, and co-ordinate it with that of the U.S.S.R. and the eastern European countries.

Price and marketing policies

In Burma groundnuts were added in 1963/64 to the list of commodities subject to monopoly government purchase and price control, which already included rice, wheat, fruit, vegetables, pulses, and tobacco. The new Crop Purchase Law requires the use of prescribed weights and measures. The Agriculture and Agricultural Produce Marketing Committee announced in July 1963 that trade in 11 commodities would be handled directly by the Agricultural Marketing Board, the Agricultural and Rural Development Co-operation, and the Ministry of Supplies and Co-operatives, while for 13 commodities private traders could participate in domestic but not in export trade. At the beginning of 1964 the government prohibited private purchases from farmers of 13 " essential " crops, and in April 1964 all trading enterprises were nationalized.

The cost of the rice subsidies in Ceylon is reported to have risen to Rs 436.5 million ($91 million) in 1963/64, compared with Rs 162 million ($33 million) in 1955/56. It has therefore been decided that only members of co-operatives may sell paddy under the guaranteed price scheme.

The Indian Government announced that the price support policy for wheat and rice which began in 1962 would be continued during the period of the third plan. Price support has been extended to lemongrass oil. Because of the drop in domestic sugar production and the favorable market for exports, a production target of 3.3 million tons was set for 1963/64, as against 2.8 million tons the year before. In addition to twice raising sugarcane prices, the government granted excise duty rebates to sugar mills on their production above the previous season's level.

In Japan official purchase prices for grains were raised in 1963/64 but selling prices were unchanged, so that the deficit in the Food Control Special Account amounted to nearly 120,000 million yen ($333 million). Price support for sugar beet lapsed with the 1962/63 season, since when the purchase price has been set by agreement between the factories and farmers.

In Pakistan the Agricultural Produce Market Regulation Bill, which regulates the buying and selling of all agricultural products in order to improve the farmers' bargaining power, was passed by the East Pakistan Assembly in January 1964. The fertilizer subsidy, which had been lowered to 25 percent of the cost, has been restored to 50 percent. In the Republic of Viet-Nam it is proposed to guarantee minimum prices for rice.

As noted earlier in this chapter, it has been necessary to take steps to limit the rise in consumer prices in many countries, including India, Indonesia, Japan, the Republic of Korea and the Philippines.

Other domestic policies

Measures to improve land tenure conditions have continued in a number of countries. In Burma the land of absentee landlords has been nationalized and is being distributed to tenants. The guarantee given in 1955 that rubber plantations would not be nationalized for 30 years has been withdrawn, because of the new policy to redistribute all agricultural land. All agricultural rents are now to be paid in cash only, and farmers' property may no longer be seized by private persons in recovery of debts.

The Agricultural Land Reform Code became law in the Philippines in August 1963. It declares that owner-cultivators on economic family-size farms should be the basis of Philippine agriculture, and that landlords' capital should be channeled into industrial development. While the abolition of tenancy is expected to take many years, it is envisaged that all farmers will eventually be owner-cultivators with holdings of 30 to 144 hectares. The code provides for a leasehold system to replace share tenancy, the fixing of maximum rents based on average production, and minimum wages for agricultural workers. To assist the tenant to acquire his land after a transition period as leaseholder, a

number of new agencies have been set up for the provision of technical, financial, and legal assistance.

In Nepal an Agrarian Act has been proclaimed, under which no person or family may own more than 16 hectares of land. The excess is to be distributed among the landless, and uncultivated land is also to be expropriated.

Agricultural credit facilities have been increased in several countries. In Burma the Government advanced 700 million kyats ($147 million) to help farmers meet cultivation expenses in 1963/64, as against only 183 million kyats ($38 million) in 1961/62. A new co-operative credit scheme has been started in Ceylon in order to boost rice production. The agricultural credit system, including loans under the Coconut Financing Fund, has been reorganized in the Philippines.

In India, although short and medium-term credit through co-operatives has expanded rapidly, the facilities for long-term agricultural loans have remained limited. The Agricultural Refinance Corporation, with an authorized capital of Rs 250 million ($52 million), was therefore established in July 1963 to refinance the loans and advances of eligible institutions (co-operatives, land mortgage banks, etc.) and also supply long-term credit for agriculture. A development fund of Rs 40 million ($8.4 million) for loans to jute growers has also been established.

An Agricultural Implement Board has been set up in India to recommend measures to encourage the manufacture of improved implements and popularize their use. Domestic production of farm tractors is envisaged under the current plan. In Burma mechanization is a major aim, and the government has imported tractors and established maintenance centers, mobile repair units, and mechanized farming schools. The Government of West Pakistan has a seven-year plan costing Rs 270 million ($57 million) to promote mechanized farming. In Japan the complete mechanization of farming is to be promoted in order to meet the labor shortage, in view of the recent annual reduction of about 2.7 percent in the farm population.

Regional economic co-ordination

At the Ministerial Conference on Asian Economic Co-operation, held at Manila in December 1963, a resolution called for the promotion of intra-regional trade on a basis of nondiscrimination and mutual advantage, through the examination of measures such as the removal of quantitative restrictions, the reduction of tariffs, and the promotion of free-trade areas or customs unions on a sub-regional basis. It also pledged concerted measures to improve productivity and to expand the export of primary commodities outside the region, and the co-ordination of efforts in the planning and execution of agreed industrial, mineral, agricultural and fisheries projects. The implementation of these and other measures is to be examined at future meetings.

The first five-year program of investigations of the international Mekong river development project has been virtually completed in four years, and a second five-year program, expected to cost about $23 million, has been drawn up.

A Joint Indonesian-Philippine Coconut Commission was established in Manila at the end of 1963 to co-ordinate the production and sale of coconut products.

Mainland China

Official sources in Mainland China no longer refer to the third five-year plan (1963-67). Mention is made of annual plans, though no details are available. Directives continually stress the importance of growing more cash crops "without neglecting food grains," which suggests that some resistance may have been encountered in persuading production teams to devote more land to industrial crops before the availability of food has improved.

Government loans to agriculture totaled 1,000 million yuan ($419 million) in 1963. They were used by the communes mainly to purchase draft animals, farm tools, irrigation and drainage pumps, fertilizers, and insecticides. The China Agricultural Bank was inaugurated in late 1963, with the object of controlling the management of loans and grants to communes and production teams, and avoiding duplication among the various government departments issuing loans.

A project recalling the "package plan" approach used in India was announced in early 1964. It is intended to concentrate substantial resources on certain key agricultural areas with better conditions, where irrigation and drainage projects are to be developed in order to extend the area where dependable harvests can be obtained irrespective of weather conditions.

NEAR EAST

There have been relatively few agricultural policy developments in the Near East during the period under review. Some new development plans have been announced, and there have been further measures of agrarian reform. In the field of regional economic co-ordination, the recent joint communiqué of the heads of state of Iran, Pakistan and Turkey envisages increased economic co-operation. The lending activities of the Kuwait Fund for Arab Economic Development have been considerably stepped up.

Development plans

The five-year plan of Jordan (1962/63-1966/67) has been replaced by a comprehensive seven-year plan for 1964/65-1970/71. The objectives of the new plan are to reduce support from abroad and narrow the trade gap, to raise per caput income, and to reduce unemployment. Total investment is set at J.D. 182 million ($510 million), of which J.D. 75 million ($210 million) is in the public sector. Agriculture is to receive 34 percent of public investment, mainly for irrigation. In the East Ghor, 14,000 hectares of irrigated land will be brought into full production, but much of the 30,000 hectares to be irrigated in the Yarmouk Project will not be ready until 1975. Agricultural production is expected to increase by 2.6 percent annually during the plan period. Agricultural exports are to be doubled.

In Israel a new five-year plan for 1965/66-1969/70 provides for a 40 percent increase in agricultural production. The production of citrus fruit is expected to rise by 60 percent, of vegetables and potatoes by 35 percent, of deciduous fruit and milk by 30 percent, and of eggs and meat by 25 percent. A substantial increase in exports, expecially to the EEC, is hoped for.

In Iran expenditure under the third plan, which began in 1962/63, has been raised again to 200,000 million rials ($2,640 million), having previously been cut from 190,000 million rials ($2,508 million) to 140,000 million rials ($1,848 million). Investment in agriculture, which had been reduced to 35,000 million rials ($462 million), is to receive an additional 10,000 million rials ($132 million), but its share in total public expenditure declines from 25 to 22 percent.

New development plans are in preparation in a number of countries. In Iraq an Economic Planning Board has been set up under the chairmanship of the Prime Minister, and work has begun on the preparation of a new five-year plan. In Lebanon a comprehensive plan is being formulated on the basis of the studies prepared by the consultant firm of IRFED. In Saudi Arabia the Supreme Planning Board is engaged in the preparation of a five-year plan.

A Supreme Planning Council has been set up in Syria, in addition to the Ministry of Planning and Major Projects Administration, to draw up the second five-year plan, which will be based on an annual growth rate of 7.2 percent. The main agricultural project will be the development of the Euphrates, which after 8 to 10 years will add 200,000 hectares to the irrigated area.

The second five-year plan which is in preparation in the United Arab Republic involves a much higher rate of investment than the first plan. The U.S.S.R. has agreed to lend £E100 million ($230 million) toward the plan, and will also undertake the reclamation of 4,200 hectares of desert land. The plan will stress the production of commodities such as vegetables, fruit, rice and cotton textiles, for which the country has comparative advantage. An integrated development project is in preparation for the Aswan Governorate.

Good progress is being made in the various large-scale agricultural projects under way in the region. In the United Arab Republic the first phase of the Aswan dam, namely the construction of the diversion channel, was completed on time in May 1964. The first phase of the Khashm El Girba settlement in Sudan was due to be completed in June 1964, but work has been somewhat delayed owing to shortage of funds. The settlement involves the transfer of 50,000 people from Wadi Halfa, which will be flooded as a result of the construction of the Aswan dam. Initially 66,000 hectares of irrigated land are to be developed, including 16,000 hectares of sugar cane, but this will be raised later to 200,000 hectares, so as to utilize the full capacity of the dam.

The U.S.S.R. has recently signed agreements with its southern neighbors, Afghanistan and Iran, concerning the development of rivers on their borders. Under the agreement with Afghanistan, substantial irrigation and hydro-electric development is to be carred out with U.S.S.R. assistance on both sides of the Panj river. The agreement between the

U.S.S.R. and Iran envisages the construction of a dam on the River Aras to irrigate 60,000 hectares on both sides of the border.

Land tenure

Land redistribution in Iran, which had started at a rapid pace, has slowed down owing to the shortage of administrative personnel, slow progress in the establishment of co-operatives, and the shortage of funds for the payment of compensation. It has therefore been announced that where the land reform has not yet been implemented the crop nevertheless belongs to the farmer, and the landlord is entitled only to the value of the seed, fertilizers and plowing.

The implementation of agrarian reform was also running into difficulties in Iraq, and a number of measures are being taken to remedy the situation. In 1964, 200 co-operatives are to be established, in addition to the 100 already in existence; they are to be assisted by the Agricultural Bank, whose capital has been doubled, and the building of new villages is to coincide with the establishment of the co-operatives. Investment in irrigation is to be closely co-ordinated with the various phases of the implementation of agrarian reform, and the Directorate of Irrigation has therefore been transferred from the Ministry of Agriculture to the Ministry of Agrarian Reform. Improvements are to be made in the administration of the expropriated land, and the process of redistribution accelerated.

In Jordan 5,000 hectares are to be redistributed in the East Ghor Canal project area.

In Syria the Agrarian Reform Law has again been modified. The revised law provides for maximum individual ownership of 15 to 55 hectares of irrigated land or 80 to 200 hectares of unirrigated land, depending on soil fertility, as compared with limits of 50 and 200 hectares under the 1958 law, which were revised to 100 and 400 hectares in 1962. Expropriated owners will be compensated over a period of 40 instead of 15 years, and farmers receiving land will pay only a quarter of the assessed value in installments over 20 years. The farmers are to receive loans for the purchase of seeds, implements, and livestock, and are required to maintain a certain minimum level of production, otherwise they will lose their land. Some large farms are to be operated directly under the supervision of the Ministry of Agrarian Reform.

Other policy measures

Efforts to expand agricultural credit facilities are being made in several countries. In Jordan the capital of the Agricultural Credit Corporation was raised, partly as a result of a loan from the International Development Association. In Libya a new agricultural bank is being formed to provide loans for the purchase of farm machinery.

The co-operative marketing system is to be extended to all cotton-producing areas in the United Arab Republic, primarily in order to keep prices low for domestic users. All flour and rice mills have been nationalized. The Minister of Agriculture has been empowered to fix the acreage for particular crops in specific areas, with the aim of increasing productivity and stimulating the production of export crops, especially vegetables.

The economic situation of tenant farmers in Sudan has deteriorated in recent years because of the fall in the world price of cotton and rising production costs. The government has therefore announced an increase in the tenant's share on privately owned agricultural schemes from 42 to 44 percent of the net profit from the sale of cotton, while plowing costs will be charged to the joint account instead of the tenant's account. On the government-owned Gezira scheme the tenants will receive 50 instead of 44 percent of the net income. Efforts are being made to reduce the costs of production, especially through the provision of supervised credit.

AFRICA

New or revised development plans have been announced in a number of African countries, while some countries are facing financial difficulties in the implementation of their current plans. There have been widespread new measures in respect of land tenure, price and marketing policies, and credit facilities. Concerning regional economic co-ordination, the charter of the African Development Bank has been signed and studies are under way of the necessary measures for the establishment of an African Common Market and African Payments Union.

Development plans

Among the new development plans, in Ghana the final version of the seven-year plan for 1963/64-1969/70 that has gone into operation is somewhat

revised from the preliminary draft described in last year's issue of this report. Total investment is raised from £G 841 million ($2,355 million) to £G 1,016 million ($2,844 million), chiefly as a result of an increase in the estimated contribution of the private sector from 42 percent to 53 percent of total investment. The target rate of growth of the gross domestic product remains 5.5 percent per year. Public investment in agriculture is unchanged at £G 68 million ($190 million), or 14 percent of total public investment, but production targets for some commodities have been scaled down and now stand at over 50 percent for grains, 100 percent for both livestock and vegetables, 40 percent for cocoa, and more than 250 percent for fish. Sugar production is expected to reach 1 million tons.

In Guinea, following the previous three-year plan, a new seven-year plan has been approved. No details are available, except that it is reported to stress industrialization as well as agricultural production.

Kenya's first comprehensive plan for 1964-70 envisages a total investment of £317 million ($888 million), of which £129 million ($361 million) is in the public sector. An important aim in the agricultural sector is to introduce greater numbers of Africans into the monetary economy, through such measures as co-operative development, the completion of the current settlement schemes, continuing land consolidation, and programs of assistance to smallholders.

In Madagascar a five-year plan for 1964-68, formulated within a ten-year perspective plan, has been adopted by the Council of Ministers and is awaiting parliamentary approval. It is hoped to increase gross national product by 5.5 percent a year. Total investment is set at Mg Fr 165,000 million ($668 million), of which Mg Fr 69,000 million ($279 million) is in the public sector. Agriculture is to receive 30 percent of public investment, and agricultural production is expected to increase by 27 percent over the average of 1960-62. A principal objective is to double exports by the end of the ten-year perspective period. There is much emphasis on regional plans that have been formulated in consultation with local development committees in each of the 17 prefectures.

Mauritania's first comprehensive plan for 1963-66 envisages total investment of CFA Fr 27,761 million ($112 million), of which CFA Fr 13,573 million ($55 million) is in the public sector. Agriculture is to receive 9 percent of total investment, with the main aims of expanding the arable area along the Senegal river, the development of date palm plantations, and livestock development, particularly for export.

In Morocco a new three-year plan is to replace the five-year plan that was suspended in 1963. The targets under the new plan are reported to be much less ambitious than those of the previous plan.

A five-year plan for South West Africa, proposed by the Odendaal Commission, has been put into operation. It involves investment of £78 million ($218 million), of which £11.5 million ($32 million) would be for irrigation and dams. A four-year plan for 1963/66 has been announced for Spanish Guinea, under which total investment would reach pesetas 2,579 million ($43 million) and public investment pesetas 1,651 million ($27 million). An annual growth rate of 7.6 percent is projected.

Tanganyika's comprehensive five-year plan involves a total investment of £246 million ($689 million), of which £130 million ($364 million) is in the public sector. It is hoped to increase the gross national product by 6.7 percent a year, compared with 4.5 percent over the last eight years. Special emphasis is laid on increasing agricultural production, and the annual growth rate for marketed production is set at 7.5 percent and for subsistence production at 2 percent.

In Togo it has been announced that a five-year plan will be started in 1964, but no details are available. Uganda's plan for 1961/62-1965/66 has been revised, and now involves public investment of £72 million ($207 million) instead of £54.2 million ($159 million), while private investment is estimated at £22 million ($62 million). Agriculture is to receive 19 percent of public investment.

Interim plans include that of Chad for 1964-65, which aims to increase production, improve the social infrastructure, and make socioeconomic studies in preparation for a medium-term plan that is expected to be formulated by the end of 1965. The interim plan of Upper Volta for 1963-64 calls for public expenditure of CFA Fr 13,583 million ($55 million), of which 41 percent is allocated to agriculture.

New plans are in preparation in many countries. In Algeria a two-year transitional plan for 1964-65 is being studied, and this is to be followed by a medium-term plan within a long-range perspective. A Planning Commission has been established in the Comores to formulate a five-year plan for 1964-68. In Gabon a five-year plan for 1966-71 is to be prepared

within a 10 or 15-year perspective. Ten-year plans are in preparation in Ivory Coast and Niger. A five-year plan in preparation in Liberia is expected to emphasize the development of small-scale industries and import substitution. A United Nations mission to Northern Rhodesia has recommended a six-year plan calling for total investment of £450 million ($1,240 million) for the period 1965-70, in order to obtain an annual increase of more than 6 percent in gross domestic product; in the meantime an emergency plan has been announced involving the expenditure of £5 million ($14 million) over a 16-month period in order to combat unemployment. The second four-year plan is in preparation in Senegal; it is intended to present detailed local projects to rural groups. In Tunisia several administrative bodies have been set up to prepare the second four-year plan for 1965-68, which is expected to stress industrialization.

Some countries are having difficulty in raising the overseas finance needed for the execution of their development plans. During the first year of Nigeria's plan, although both local and foreign private investment exceeded expectations, there were difficulties in securing the foreign public finance needed for the large-scale projects in the federal government's plan. It is reported that it may not be possible to implement more than 60 to 70 percent of Sierra Leone's plan because of the shortage of foreign investment.

Land tenure

In northwest Africa there have been further measures for the nationalization of foreign-owned land. In Algeria, following the self-management system applied to farms abandoned by their French owners, the Government has nationalized the remaining French-owned land. In Morocco a category of French-owned land that was originally obtained largely through expropriation (*lots de colonisation*) is to be nationalized in three stages over the next three years; this land covers about 272,000 hectares and constitutes about 30 percent of the total French-owned land in Morocco. The Tunisian Government has nationalized all foreign-owned agricultural land, amounting to some 450,000 hectares, of which 270,000 hectares were owned by French nationals.

The nationalization of all land was announced in Zanzibar.

In Ghana the 14,000 acres of land farmed by the State Farms Corporation are to be increased to about 21,000 acres by the end of 1964. The Corporation has acquired a total of 34,500 acres, which it is hoped to cultivate before the end of the seven-year plan.

The million-acre five-year settlement scheme in Kenya is making good progress. During the first year 500,000 acres (including 270,000 acres purchased from previous owners) were settled by 6,000 African families, and development loans of more than £750,000 ($2.1 million) were issued. It has been announced that a settlement scheme for a further million acres may be required on completion of the present one.

Other domestic policies

Measures to increase the supply of agricultural credit have been taken in a number of countries. The Banque nationale de développement agricole in Guinea is to provide long-term credit for agriculture. In Gabon a Fonds de développement rural has been established for the provision of agricultural credit. A Development Bank has been established in Mauritius. In Northern Rhodesia it is planned to establish a countrywide organization through which credit can be made available to farmers.

New marketing organizations include the Food Marketing Board established in Ghana. The Board is to formulate policy regarding food marketing, fix maximum prices, and advise producers, as well as buying and storing essential foodstuffs for distribution to areas where there is a shortage. It has been provided with a loan of £G 2 million ($5.6 million) by the Cocoa Marketing Board in order to construct silos and cold stores in each of the eight regions of the country. A Food Advisory Committee has also been set up to keep watch on food prices and supplies.

In Congo (Brazzaville) an Office national de commercialisation des produits agricoles has been established. In Cameroon a Comité de coordination is to take charge of banana export policy, and to co-ordinate and improve production. An Agricultural Marketing Board has been established in Mauritius. A commission has been appointed to investigate groundnut marketing in Northern Nigeria.

A unified marketing system for sisal, similar to those already in force for cotton and coffee, is to be established in Tanganyika. In Togo the establishment of an Office des produits agricoles is under consideration. It would transform and extend the functions

of the Caisse de stabilisation des produits, stabilizing producer prices and developing and improving the processing of the main export crops.

Import substitution and the diversification of production are major aims in many countries, and the development of sugar production is receiving much attention in this regard. Ethiopia exported sugar for the first time in 1963. Production in Ghana is expected to satisfy most of the country's domestic needs by 1967. Kenya, at present a sugar-importing country, is planning to produce some 300,000 tons to meet internal demand and provide for some exports. Nigeria expects to supply 40 percent of its domestic needs by 1966. Tanganyika expects to reach self-sufficiency in sugar during 1964. Pilot projects for large-scale sugar production have been started in Northern Rhodesia and Senegal.

Because of the world shortage of sugar and the high prices on world markets, restrictions on sugar production have been lifted in South Africa, and production is likely to increase by 20 percent by 1966. In Southern Rhodesia, on the other hand, it is planned to control the sugar industry, in view of the recent doubling of production and the expansion programs still envisaged. A newly established Sugar Sales Corporation is seeking long-term bilateral arrangements with importing countries.

A coffee production program in South Africa is expected to supply half of domestic needs within three years. Sisal plantations have been increased from 13,000 to 30,000 acres during 1960. In Kenya all new planting of coffee is prohibited, and compensation is being paid to owners of nurseries for the destruction of seedlings. Tea production is to be especially encouraged, and is likely to replace coffee as Kenya's major export.

Regional economic co-ordination

The charter establishing the African Development Bank was signed in Khartoum in August 1963. The bank is to have an authorized capital of $250 million from African sources, which will be supplemented by loans and grants from outside Africa. It is intended to finance economic, educational and social projects, primarily of a multinational nature, and is expected to begin operation during 1964.

The necessary measures for the establishment of an African Common Market and an African Payments Union are being studied by the United Nations Economic Commission for Africa and the Economic Commission of the Organization of African Unity.

In March 1964 the Union africaine et malgache decided to renounce its collective political activities to the Organization of African Unity. It will concentrate in future on economic and cultural co-operation, and a new charter has been signed for a Union africaine et malgache de coopération économique, which will replace the former Organisation africaine et malgache de coopération économique (OAMCE).

The new Convention of Association between the EEC and 18 African states, which was fully discussed in last year's issue of this report, came into force on 1 June 1964. Nigeria has formally requested negotiations to establish an agreement of association with the EEC. Algeria, Kenya, Morocco, Tanganyika, Tunisia and Uganda are also taking steps to regulate their trade with the EEC.

In May 1964 Cameroon, Chad, Niger and Nigeria signed a convention and statute regarding the Lake Chad basin, which is to be treated as an economic entity. They undertook not to carry out any project which could deviate the flow of water without consulting the other states concerned. Cameroon, Chad, Dahomey, Guinea, Ivory Coast, Mali, Niger, Nigeria, and Upper Volta have agreed to establish an intergovernmental body for the development of the Niger basin. A group of United Nations experts, appointed to report on the alternatives for association between Gambia and Senegal, has suggested a number of steps, including the removal of customs barriers and the harmonization of fiscal policies.

FISHERY POLICIES

Because of diminishing yields of certain traditional fishing grounds some of the more advanced fishery nations have intensified their search for new or relatively unexploited resources. Many of these resources are located off the coast of developing countries, some of which have therefore expressed fears that the resources, whose size is unknown, might be depleted by the fast growing fleets of modern fishing vessels and factory ships of developed countries.

National fishery policy measures in 1963/64 have reflected, in consequence, the anxiety of both traditional and emerging fishery nations to protect their fishery resources. A new group of developing countries extended, or announced the intention to extend, their fishery limits, some of them up to 200 miles. The United Kingdom convened a fishery conference

of 16 countries, including the members of the EEC, to discuss the harmonization of European fishery policies. A proposal providing for a 12-mile limit, with permanent permission for countries which have traditionally fished the waters concerned to fish up to a 6-mile limit, has been approved by all of the 16 countries except Iceland and Norway. Denmark agreed to these limits for its own waters, but refused on behalf of Greenland and the Faroe islands.

A further conference of western European countries is expected to be convened in the near future, to deal with problems of fishery trade. Those countries which did not sign the Fishery Limit Agreement maintain that the problems of fishing rights and trade concessions should not be linked, but treated as separate issues.

In respect of the general problem of fishery resources protection, it has been pointed out that some of the more important commercial fish species pass the greater part of their life cycles in international waters, and that the mere extension of national fishery limits from 3 to 12 or more miles will therefore have little or no effect on the rate of exploitation of such stocks, especially in view of the vastly increased mobility and efficiency of modern fishing vessels and improved fish detection devices and catching techniques. The need has therefore been stressed for the expansion and better co-ordination of research on the assessment of fish stocks and on measures to prevent overfishing and secure the optimum utilization of fishery resources.

The depleted state of antarctic whale stocks and its impact on the whaling industry has been cited as an example of what may happen in the absence of adequate international measures for the conservation and rational utilization of resources. At its annual meeting in June 1964 the International Whaling Commission failed to reach an agreement on the blue whale unit limit for 1964/65. However, the antarctic whaling countries conferred separately and decided to recommend to their governments a quota of 8,000 blue whale units for the 1964/65 season. This compares with a quota of 10,000 units for 1963/64 and an actual catch of only 8,429 units in that season.

Fears of overfishing have also been expressed in respect of tuna stocks, which have been subjected to increasingly intense exploitation in recent years as a result of strong demand. The total catch from Atlantic tuna fisheries is estimated to have more than doubled since 1956, and already there are signs that certain of the Atlantic tuna resources may be overfished. The Working Party on the Rational Utilization of Tuna Resources in the Atlantic Ocean has therefore stressed the need to carry out more comprehensive studies of the Atlantic tuna resources as a whole.

Agreement has not yet been announced on fishery policy within EEC. A spokesman for the German Fishing Industry Federation has recently proposed the establishment of a free international market in fish for the entire North Sea area. Because of the different structure and interests of North Sea and Mediterranean fisheries it was suggested that such an arrangement would be more effective than a joint EEC fishery policy. There would be equal rights for all members, including the right to fish within territorial limits and to land catches in any harbor within the area. Close co-operation between EEC and EFTA would be entailed.

The rising costs of fishing vessel construction and fishing operations have not always been reflected in correspondingly higher prices for fish. This has caused governments of many countries to expand their financial assistance to the fishing industry. Low-cost loans and in some cases outright grants are being offered in some countries to enable fishermen to scrap old tonnage and to acquire new fishing vessels, gear and equipment. The cost of operations is being subsidized in a number of different ways, in addition to direct price subsidies.

In Norway a new scheme for financial assistance and support was agreed between the Government and the Norwegian Fishermen's Association following a general strike of fishermen (the first in the history of the country). It aims on the one hand to raise the annual average income of full-time fishermen to a level comparable to that in other industries, and on the other hand to obviate the need for direct subsidies through improvements in the efficiency of the fishing fleet.

In the Federal Republic of Germany subsidies are paid as a fixed percentage of the gross proceeds of catches. Since all fish is sold at auction, where high quality fish receives a better price, this system encourages the production of high quality fish.

Increased recognition of the role of fisheries has led many governments in both developed and developing regions to initiate long-term fishery development programs. In some instances funds made available for fishery development plans have been augmented by as much as ten times compared with earlier program periods. In many cases the implementation of these plans necessitates considerable

strengthening of the fisheries administration and better co-ordination among the various government agencies concerned. Many countries are therefore paying more attention to these aspects, including the education and training of qualified personnel.

A number of new joint fishery ventures have been undertaken between developing and more advanced fishery nations, some of which involve considerable investments of capital, equipment and technical know-how, and which are expected to speed up the rate of development significantly in those sectors in which they operate.

In many advanced fishery nations the rapid progress of the frozen fish industry has continued to cause important changes in the structure, ownership and operation of fishing vessels, and processing and marketing facilities. The trend is toward larger completely integrated concerns in order to achieve the fullest measure of control and economies of scale.

Forest policies

In developed countries, forest policy must frequently be reshaped in order to face increasing needs for timber, recreation and conservation. While the prospects for a rise in the demand for timber are now fully accepted, and solutions have been found in better management, better exploitation, integration between forests and forest industry, and the development of plantations of quick-growing species, the demand for recreation and water has frequently been underestimated. Such adjustments in forest policy involve not only measures at the national level, but also changes in the plans or programs at the level of the working unit. In developing countries the requirements of economic development frequently entail changes in the land-use pattern, and forest authorities are becoming increasingly concerned with the delimitation of forest reserves. In many instances, forest land has been turned over to agriculture without the necessary preliminary survey or without provision for the necessary improvements. There is an urgent need to strengthen the forest administrations in developing countries, which in many cases are responsible for all land not under permanent agriculture, and in this connection forestry training and education is one of the main needs.

The European countries are now confronted with the need to undertake a fundamental reappraisal of their forest policies. The most recent study of European timber trends and prospects [17] draws attention to the changing pattern of European wood consumption and the rapid rise in Europe's total wood requirements. A comparison of prospective increases in requirements and forest production plans shows that European production of industrial wood is rising rapidly, but that the rate is not sufficient to keep pace with growing consumption. Europe will have to rely increasingly on supplies from other regions, since it may prove impossible to make available from the existing forest the qualities and species needed.

Efforts to raise productivity in existing forests and to undertake more ambitious planting programs both inside and outside the forest area can help to narrow the gap foreseen for the coming decades, but it is essential that the increased output thus obtained should not entail a substantial rise in the cost of timber to the consumer. Given the rising trend of forest wages it is the degree of success in rationalization and mechanization of forest operations and forest products processing that will determine the extent to which wood consumption in Europe is met from European sources. It should also be mentioned that forests are increasingly being used for tourism and recreation, and this development, while increasing their indirect value, could limit the allowable out.

The European countries are already applying many measures aimed at increasing timber production and decreasing costs. In addition to the promotion of plantations of quick-growing species and of more productive silvicultural systems, attention is now focused on the problems of logging and forest industries. Better training of supervisory staff and of workers, and improvements in their levels of living, are reported in almost all countries. There is a growing trend toward mechanization of logging operations in order to offset the shortage of man power and the decrease in net returns, while the rationalization and development of industries is bringing substantial increases in their capacity. Some European governments are also considering forest management plans on a regional basis, with the object of serving the needs of integrated industries in the region and facilitating the adjustment of supply to demand. Such integrated units make it possible to increase the final yield and improve the quality of the manufactured product.

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[17] FAO/ECE, 1963. *European timber trends and prospects: A new appraisal, 1960-1975.*

As far as private forestry is concerned, rationalization and management of small woodlands is increasingly carried out on a co-operative basis. A good example in this respect is Sweden, where 128,000 forest owners are grouped in co-operative associations under a national federation. In 1963 the industrial enterprises under the federation processed and marketed the production of nearly 6.5 million hectares of well-managed forests.

In the United States and Canada, forest authorities are becoming increasingly concerned with implementing at the forest unit level forest policies which are based on the recognition of the growing needs for timber, recreation and conservation. In this connection the broad concept of multiple use as already practiced in some national forests continues to appear the only solution to the problem of meeting the increasing requirements.

A new interest is being taken in Canada in farm woodlots, which represent more than 20 million hectares. Various economic studies are being carried out concerning accounting procedures for farm woodlots, the assessment of the potential role of forestry in rural development under the Agricultural Rehabilitation and Development Act, recommendations for tax changes which would modify the taxing of income from timber growth, and the economics of privately owned plantations.

In both the United States and Canada, in spite of their wealth in natural forests, the necessity for plantations of quick-growing species is increasing. Such plantations, closely integrated with forest industries, are often considered to be the best means of satisfying the growing needs for timber. In the United States, a Land and Water Conservation Fund Bill is under consideration, which would initiate a vigorous program in outdoor recreation planning, land acquisition and development. Mention should also be made of the 1963 Cropland Conversion Program, the purpose of which is to improve family income by promoting the conservation and better economic use of farm and ranch land through agreements with owners providing for changes in cropping systems and land use and for practices or measures needed to conserve and develop soil, water, forest, wildlife and recreation resources.

In the developing countries the increasing appreciation of the value of forests and forest products to the economy is beginning to exert a major influence on national forest policies. It is becoming recognized that the processing of forestry raw materials can often be the starting point for industrialization, while the aim of achieving self-sufficiency in forest products and of increasing exports is causing growing appreciation of the role of the forests in economic development, and is also proving an indirect means of ensuring that the noncrop values of the forests are not neglected.

Because of the important readjustments which are now beginning to take place in the world forest and timber economy, the technical and economic conditions for establishing new forest industries in the developing countries are maturing fast. As yet, few of these countries have been able to establish the necessary planning structure and to find or train the required qualified administrative and professional personnel to take advantage of this situation. However, in some of the countries which possess the necessary resources endowment, there are indications of progress. Policies for forest industry development are being more clearly defined in the context of overall development policy, administrative structures and processes are being strengthened, and programs for gathering and interpreting relevant information as a basis for policy are being more effectively carried out. Thus, essential resources data are being assembled and analyzed, present and potential markets are being investigated, the needed cadres are being trained, and pilot plans for administration and training are being established. Steps are being taken to secure the forest estate and bring key areas under effective management. Feasibility studies are being conducted and medium- and long-term development plans formulated.

The increasing impact of the forestry and forest industries sector of the economy in the process of economic and social development is particularly felt in several countries of the Far East, and also in Australia and New Zealand. In the Republic of Korea forestry is to play an important role through increased production and utilization of forest products, expansion of employment, and reforestation of the denuded forest areas. To improve the management of private forests of less than 5 hectares which account for one third of the forest area, a profit-sharing forestry contract system between private owners and village forest associations has been established. Forestry extension work is helping to stimulate initiative in forestry activities and to demonstrate forestry techniques among the rural population. In Malaysia a forest resources survey, intended to secure for reservation the necessary productive forest estate to meet future timber requirements, is playing a major role in the country's

plans for agricultural diversification. In Indonesia the management of profitable national forests is entrusted to the State Forest Enterprise, which receives capital from the government and has the right to use the revenue to cover expenses and finance projects under the national development plan. A joint venture between this enterprise and some firms from the Federal Republic of Germany was established in 1963 for the sale of processed forest products in the Federal Republic. Indonesia plans to have eight pulp and paper mills by 1968, with a total production of over 40,000 tons of paper, using wood, bamboo and rice straw as raw materials.

In Viet-Nam a national forest fund has been established and is intended to finance forestry development operations such as reforestation work, forest fire control and forest road construction. The new forest policy favors the participation of the rural population in the reforestation of sand dunes with quick-growing species. In Ceylon, the long-term 20-year development plan for forestry is being put into practice through three-year implementation plans aiming at increased output of timber and more rapid afforestation in order to compensate for the loss of forest land to agricultural development schemes. Modern sawmills have recently been established and a plywood factory run by a government co-operation has significantly improved its efficiency. In Thailand the development plan includes a large-scale reforestation scheme to increase the rate of production of plantations and finance conservation and protection measures. In Burma the whole forest economy, including logging, wood-processing and export marketing, has been nationalized. In Japan timber demand continues to expand and reached 64 million cubic meters in 1963. In order to meet this situation, a complete revision of the forestry production pattern is needed and a new forestry bill has been submitted to the Diet. Other regulations aim at encouraging afforestation on private land, improving the forest road network and providing credit to forest owners, guaranteed by future production.

The New Zealand Forest Service is revising the projections of the nation's long-term wood requirements up to the year 2000. Consideration is being given to whether the export target of 4.3 million cubic meters in roundwood equivalent for the year 2000 can be increased. The country's second newsprint machine should allow total newsprint production to reach 200,000 tons a year. A new plant for the manufacture of printing and writing papers with a capacity of 15,000 tons has also been established. The basis of the newsprint and other paper manufacture is the privately owned exotic forest totaling over 400,000 hectares. More than half this area is in blocks of 20 hectares or more. Planting programs are encouraged by the farm forestry associations, which have increased their number to 34, and by the government through the farm forestry incentive loan scheme.

In Australia the attempt to integrate forest policy and planning with overall national development is reflected by the transfer of the Commonwealth Forestry and Timber Bureau from the Department of the Interior to the Department of National Development. The increasing concern for proper watershed management is shown by the establishment of the Australian Water Resources Council. It is now considered both desirable and practical to aim to guarantee Australian future self-sufficiency in forest products. There has therefore been an expansion of forestry programs, while forest industries have continued to expand their capacity and were operating by the end of 1963 at satisfactory levels.

In the Near East, a most promising development is the widespread interest in forestry education and research, which, in the long run, will further the present general trend toward improved methods of silviculture, plantations of quick-growing trees, and land and water conservation. In some countries the field of activity of forest administrations is widening and their budgetary situation is improving. The forest services in Cyprus, Iraq, Libya and Sudan are financially supported by development funds. In Iran returns from forest utilization under management plans will be devoted to a forestry fund.

In Lebanon forestry is to play an important role in the green plan prepared by the Ministry of Agriculture to determine the best possible land use for vast areas of the depleted mountains. In Iran, Sudan and Turkey, modern forest inventory methods, improvements in logging operations and road construction, together with new forest industries and improved market conditions, are bringing about increased wood consumption from local plantations for industrial purposes, such as plywood and parquet manufacture. In Cyprus there are good prospects of expansion in the local timber trade: a new parquet floor factory started work, and the government is establishing a timber utilization center for sawing, seasoning and research facilities. In Syria the sawmills continue to use mainly poplar

timber, 70 percent of which is provided locally, but new plans are under consideration for the development of natural forests in the Lattakia area. In Sudan the output of railway sleepers and of poles is now sufficient to meet the demand.

In the United Arab Republic, which has until now been the major importer of forest products particularly paper products in the Near East, a pulp and paper industry based on domestic non-wood materials such as bagasse and rice straw and on imported wood pulp is growing very quickly. The output still meets less than half of the country's requirements, but with the completion of the Aswan dam, the likely development of an integrated system of sugar plantations and processing plants for bagasse will help to increase the output of non-wood fiber pulp to 53,000 metric tons by 1967. The capacity of the printing and writing-paper plants is also increasing very rapidly. These developments should make the United Arab Republic a net exporter of pulp and paperboard products, other than newsprint, by 1967.

In Latin America forestry teams are implementing forestry plans within the framework of general colonization and agrarian reform work, thus opening up new prospects for forestry activity. The inclusion of forestry development plans within overall economic plans in various countries of the region also opens the door to new possibilities. Examples are the regional development bodies of the Rio San Francisco in Brazil, and the Magdalena and Cali valleys in Colombia and Venezuelan Guiana. In many countries an important role is played by semi-autonomous government development bodies in promoting reforestation, the development of forest industries, watershed management works, or forest inventories.

In Peru a new forest law has been promulgated which is concerned with the delimitation of state forests, the creation of a state forest board and of a forestry fund, the protection of forest lands and the management of private forests. Measures for the prevention of forest fires have been intensified in several countries; attention is concentrated primarily on the highly productive, man-made plantations.

In many countries the forest authorities are becoming increasingly inclined to change from exploiting forest stands by means of concessions for wide areas to selective utilization through the implementation of technically detailed management plans.

Forest industrialization is progressing rapidly, with special impetus in zones where stands of quick-growing species have been planted: for example, the pulp and board factories utilizing *Pinus insignis* in Chile, or the pulp and sawlog factories in the Paraná delta and Misiones in Argentina.

The pressure on forests in the hinterlands shows no signs of diminishing and the practice of shifting cultivation and grazing continues to destroy forest areas. The implementation of land reform measures and improvements in land use will eventually relieve this pressure, but not for a considerable time. One aspect of this pressure, the grazing of forest stands and the consequent endemic fires, has been an important factor in the spread of *Dendroctonus endemica* in the Honduras pine stands, which in 1963 acquired extreme virulence and drastically reduced the area covered by pines in this country.

In Africa recent developments refer mainly to research and measures to increase the yields from the existing natural forests by increasing the number of species to be harvested and utilized; improving forest operation techniques to lower per unit costs of extraction; improving the co-ordination of forest operations with marketing operations to increase returns per unit on wood extracted and processed; and the establishment of plantations of quick-growing species, mainly in savanna areas.

However, the lack of forest technicians and proper forestry planning is hampering these developments. Special attention is therefore being given to education and training on the one hand and forestry planning on the other. As regards education some efforts have been made to develop training at university level, but these are not matched by similar efforts at medium-level training. Forestry planning has two main aspects: the demarcation of forest reserves and allocation of suitable land for afforestation, and the integration of forests or new plantations with the timber industry. This integration involves the improvement of the transport system by road construction, railway development and harbor facilities.

In the Central African Republic and in Guinea areas have been selected for forestry development, including forest management, the improvement of logging techniques and the establishment of processing industries. In Tanganyika an attempt is being made to define a national forest policy with the aid of input/output models. In Gabon forestry production continues to be a mainstay of economic development and the forest policy continues to be framed through periodic review of the tropical timber market. In Ghana the marketing system

of the Timber Marketing Board and its successor, the Timber Section of the Agricultural Marketing Board, has been discontinued, and the hardwood logs export market returned to private hands.

As regards hunting and the protection of nature, basic laws were adopted in 1963 in Chad, Mali and Nigeria, and are under consideration in Algeria, Burundi and Somalia. In the field of forestry, numerous laws have been promulgated, in particular in the French-speaking African countries, for the purpose of fixing the rights and responsibilities of the forest administrations and clarifying the situation regarding reserves. Laws of this type have been passed in the Central African Republic, Congo (Brazzaville), Gabon, Madagascar, Mali and Tanganyika, and are in preparation in Burundi, Ethiopia and Somalia. Generally the forestry services are responsible not only for the forests but also for hunting and fishing, national parks, soil conservation and rural development.

A convention has been drawn up between the governments of Gabon and Congo (Brazzaville) for the creation of the Timber Bureau for Equatorial Africa. This bureau has a monopoly over the buying and selling of okoumé wood, and is to organize and regulate its marketing.

Chapter III. - PROTEIN NUTRITION: NEEDS AND PROSPECTS

Introduction

The enormous problem facing mankind in providing even enough food to maintain the world's rapidly increasing population at present levels of health and working efficiency is well known. In many of the economically more developed countries the diets of most of the population are sufficient both in quantity and quality. In the developing countries, and particularly where population density is high, hunger and malnutrition are widespread.

Within the pattern of hunger and malnutrition in the developing countries the greatest problem is that which results from inadequate protein in the diets of a large proportion of the population. This problem concerns the health and efficiency of future generations more specifically than an overall shortage of food, for it particularly affects young children and expectant and nursing mothers.

It is not easy, however, even to assess the nature and extent of the world's protein problem, quite apart from proposing how it can be overcome. Protein is essential for both the growth and the maintenance of the human body. Protein deficiency results in various clinical and subclinical conditions such as reduced growth rates and poor physical and possibly also mental development in children and adolescents, and impaired health, resistance to disease, and lowered working efficiency in adults. The most severe clinical forms of protein deficiency in young children are kwashiorkor and marasmus, which cause many deaths in developing countries. However, even the incidence of these clinical conditions can be estimated only very roughly. There is no direct method of estimating how widespread are the subclinical effects; some idea can be obtained indirectly from comparisons of requirements and intakes on an individual or household basis, but few such data exist.

The determination of protein requirements is a complex question, though a good deal of progress has been made in recent years. But even when it has been decided how to calculate the requirements of a given population it is very difficult to determine whether they are satisfied in practice. Food balance sheets provide only average consumption levels, since they are derived from estimates of the amount of food available for human consumption divided by the estimated number of the population, and the distribution of the food among the different socio-economic groups of the population cannot be determined from them. There is therefore no inconsistency in the frequent finding that a country may have a more than adequate total supply of protein, according to a food balance sheet, while at the same time there are many children suffering from the results of dietary protein deficiency. It is also true that in those parts of the world where supplies of protein are only just adequate or even deficient on a per caput basis, the prevalence of protein malnutrition is alarmingly high. There is a need for more dietary or food consumption surveys, of the type which can provide detailed information on the consumption of the different population groups.

An important factor in connection with protein requirements is the quality of the protein. Up to a point a greater quantity of lower quality protein is equivalent to a smaller quantity of higher quality, especially in a mixed diet. However, there are limits to the quantity of a given food that a person can or is willing to consume, especially in the case of young children.

Although the emphasis on the importance of animal protein per se has tended to be reduced in recent years, its high nutritional quality is still generally recognized. It is most striking that in almost all of those countries where total protein intakes are highest, intakes of animal protein are also at a high level, which probably indicates a general preference for animal protein where it can be afforded. Whether or not animal protein can always be adequately

replaced by suitable mixtures of vegetable proteins is still uncertain. Some mixtures of vegetable proteins have been shown to have high nutritional value, but it is still possible that animal protein may be associated with substances, not yet identified, that are nutritionally essential, at least in small amounts.

For all these reasons, it is very difficult to arrive at a precise estimate of the world's "protein gap." There is no doubt, however, that the gap is so large that any interim targets established for the next few decades are in no danger of overfilling it.

A study of the present levels of protein consumption indicates clearly that the world's protein problem is located primarily in the poorer countries, and within them in the poorer groups of the population. Economic development, bringing higher incomes, is therefore the ultimate answer to protein malnutrition. This is even more crucial than the problem of producing sufficient protein for a rapidly increasing population, though animal protein in particular makes heavy demands on agricultural resources.

At the same time there is much that governments can do to improve the situation in the shorter run. While, at least in the present state of knowledge, there is no one food that can by itself solve the world's protein problem, there are wide variations in the potentialities of different products, especially in the conditions of an individual country, and government measures should be based on a careful study of these varying potentialities. The potentialities do not concern only production. In the developing countries especially there are serious impediments to the full use of what is produced, through inadequacies in facilities for storage, processing, and marketing.

Many sources of protein that have not been used in the past or are used only to a limited extent in human diets are now being investigated. These include oilseed presscakes, which could be made available in large quantity in many developing countries. Much research has shown that with proper care in manufacturing they can be of great nutritional value, particularly in the treatment of protein malnutrition in children. "Unconventional" sources of protein that are being developed and tested include various forms of algae, plankton from the oceans, and yeasts which can be cultured on certain petroleum products. Especially in such cases the question of consumer acceptance looms at least as large as that of costs of production.

The subjects briefly touched on above are reviewed in more detail in the rest of this chapter. The present knowledge of protein nutrition is first outlined, including the prevalence of protein malnutrition and the estimation of protein requirements. Current levels of protein consumption are then examined and reference is made to the main factors influencing protein consumption, in particular, income. The prospects and limitations for expanding the production and consumption of protein foods are reviewed, and a final section discusses the steps that can be taken by governments to improve protein nutrition.

Present knowledge of protein nutrition

Proteins are essential to life, and every cell in animals and plants is composed in part of these large molecules compounded in differing proportions from more simple units called amino acids, of which more than 20 have been identified. Food proteins are used as a source of energy through conversion to carbohydrate and fat, but their main role is in the growth and maintenance of the human body, for which they are essential. They are the body's source of nitrogen, of which they contain an average of 16 percent.

Animals and man can exist, for short periods at least, on the eight so-called essential amino acids through their ability to convert certain amino acids into others and thus selectively synthesize the proteins needed for growth and maintenance. But those short-term trials which have been conducted do not indicate that man could survive on mixtures of synthetic amino acids as food, or that their use would help much to reduce protein malnutrition. Plants, on the other hand, can synthesize all the amino acids and proteins they need from simple inorganic chemical compounds. Thus animals and man ultimately rely on plant proteins for life. In fact, by far the greater part of man's food proteins is derived directly from plant sources, though a varying proportion, greatest in the richer countries, comes only indirectly from plants after conversion through animals.

The vegetable proteins, at least those of indi-

vidual plants, are not in general used as efficiently by man for growth and maintenance as are proteins of animal origin, the amino acid composition of such foods as milk, eggs, fish, and meat being more suited to his needs, and more efficiently digested. The digestibility of a protein measures the proportion of the nitrogen in the food consumed that is absorbed from the intestine. The biological value (BV) of a protein, which depends on its amino acid composition, measures the proportion of the absorbed nitrogen that is retained by the body. The product of these two factors, or the proportion of the nitrogen in the food consumed that is retained in the body, is known as the net protein utilization (NPU), and is the most useful indicator of the nutritional value of a protein. These values are determined by feeding a balanced diet containing just sufficient protein for adequate nutrition.

Animal proteins have high NPU values. Certain vegetable foods, however, particularly pulses, oilseeds, certain grains (rice, millets), and certain leafy vegetables (amaranth, spinach, etc.) are sources of proteins which compare favorably in quality with animal foodstuffs. Others, such as maize and wheat, require considerable supplementation with proteins of animal origin, or with vegetable proteins of higher nutritional value, in order to be nutritionally adequate.

Although proteins are one of the most important components of a diet, they cannot be considered in isolation. The nutritive value of proteins is usually determined under conditions ensuring their maximal utilization, but such studies do not necessarily apply to the utilization of protein in natural diets, in which not only are the absorbed amino acids derived from several foods, but the nutritive value of the mixture is affected by the amounts of other dietary constituents, such as the energy-yielding nutrients, minerals, and vitamins.[1] The assessment of protein utilization under such practical conditions has recently been studied by many investigators, particularly by Platt and his colleagues, who have recently devised methods of predicting the nutritive values of the protein in human diets that are actually consumed.[2]

Thus a comprehensive view of the nutrient composition of the diet must be taken when considering protein requirements. Recent laboratory work on young animals has indicated that lack of protein or amino acids per se may reduce appetite, even if the diet provides adequate energy and nutrients for satisfactory growth.[3] However, where the food consumption of infants and young children suffering from kwashiorkor or marasmus has been measured, deficiencies of both calories and protein have been found, the differences in clinical features being the result of the balance between the dietary energy supply and the nutritional value and quantity of the protein.

In infants and young children the protein requirements per unit of body weight fall sharply from birth to five years of age. Their calorie requirements, on the other hand, rise steeply, as does their physical capacity to consume food, which in developing countries is often bulky owing to the lack of the processing used in the developed countries. Thus a two-year-old child weighing 12 kg can consume enough of a diet composed of maize, rice, pulses, and vegetables to provide its energy needs, but in many cases only about 75 percent of protein requirements, whereas a child of five years of age, weighing 18 kg, whose protein requirements are identical in quantity and quality with those of the two-year-old, can eat enough to meet its needs for both protein and calories.

Certain recent research has suggested that the intellectual development of infants and young children is impaired by inadequacy of dietary protein.[4] This is now being actively investigated, and if it is confirmed the problem of satisfying man's requirements for protein becomes even more important than it has been considered in the past.

As discussed in more detail later, protein requirements are determined not only by physiological needs for growth and maintenance but also by certain environmental factors which have a direct bearing upon protein utilization. Protein utilization is adversely affected by fevers and by parasitic infestations,[5] particularly in the young child because of its higher requirements for protein and lesser reserves in terms of body mass and acquired immunity to disease. When a child is weaned, at whatever age, or when a sick child or adult is in need of a nourishing diet containing ample protein to replenish the

[1] Munro, H. N. 1964. *Proc. Nutr. Soc.* 23 (1).

[2] Platt, B. S., Miller, D. S., and Payne, P. R. 1961. *In* Brock, J.F. *Recent advances in human nutrition*, Churchill, London. p. 351-374.

[3] *Nutrition Review*, 1964, 23 (172).

[4] Cravioto, J., Robles, B., and Ramos-Galván, 1962. *Symposium, Swedish Nutrition Foundation, Bastad, 29-31 Aug. 1962.*

[5] Scrimshaw, N.S. 1961. *In* Brock, J.F. *Recent advances in human nutrition.* Churchill, London. p. 375-388.

tissue depletion caused by disease or parasitic infestation, it is desirable that the diet should contain ample protein and calories in comparatively small bulk and in easily assimilable form. Such foods are seldom readily available in developing countries, where the need for them is greatest.

A more accurate knowledge than we have at present of the nutrient requirements of weanlings, toddlers, adults, and sick people under widely differing environmental circumstances is needed if their requirements for protein and other nutrients are to be met. Such knowledge is too often lacking in developed and developing countries alike, and can only be acquired and applied through research, training, and education.

Prevalence of protein malnutrition

It is not possible to assess accurately the extent of the problem caused by lack of food proteins of good quality in the developing regions of the world, though there is ample evidence that protein malnutrition is very widespread.

The nature of the problem of protein malnutrition in infants and young children, its association with deprivation of breast milk and lack of suitable foods to supplement or substitute it, and its ubiquity in these age groups in developing countries, has only comparatively recently been realized. This is in spite of the fact that kwashiorkor and marasmus had been observed in all regions of the world many years ago. The realization has been even more recent that reduced growth rates from around six months to adolescence, and poor general physical and possibly mental development in the absence of frank clinical manifestations of kwashiorkor or marasmus, can also be attributed in large part to diets containing inadequate amounts of protein of good quality.

In general marasmus results from the consumption of diets markedly deficient in both protein and calories, whereas kwashiorkor results when the deficiency of protein is severe in relation to that of calories. In both conditions the wasting of tissues, particularly of muscle, is marked, but in kwashiorkor it is masked to a considerable degree by excessive retention of body fluids, particularly in the legs and abdominal cavity.

The importance of these conditions and intermediate clinical forms is well known to doctors working in hospitals in developing countries. A large percentage of their patients under the age of five years, and many older children too, are afflicted, and if suitable protein-rich foods are not available and correctly administered the mortality rate is very high. However, not enough comprehensive surveys of nutritional status have been carried out on satisfactory samples of populations in the developing regions to estimate accurately the total number of children in the world who are affected by these two allied forms of malnutrition.[6] Those surveys which have been conducted in developing countries indicate that the clinical manifestations of kwashiorkor and marasmus occur in children from one to nine years of age with a frequency of between 2 and 10 percent, the major incidence being between the ages of six months and three years.[7] "From the public health point of view, these children are the greatest problem of the world today. Control of the communicable diseases, the installation of safe water supplies and sanitary sewage disposal would probably save many lives, but without adequate food, and especially adequate protein, these malnourished children will never attain their full potential growth."[8]

The number of children found to be underweight for their age compared with well-fed healthy children living in the same community would indicate that an even higher prevalence of lesser degrees of protein malnutrition is extremely frequent. However, there is not enough clinically acquired evidence, which can be analyzed statistically, upon which to base an estimate of the prevalence of these milder cases in different countries and, within them, among different socioeconomic groups.

The high mortality rate in infants and young children resulting from kwashiorkor and marasmus, the lack of suitable foods containing protein of high quality with which to prevent these conditions and treat established cases, and the impaired health and growth rates which are associated, indicate the gravity of the problem of protein deficiency in the developing regions. Many observations have been made of the improvement in school children's capacity to learn when their diets are supplemented with protein-rich foods. Although the needs of adults for proteins of high nutritional value are less

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[6] WHO, 1963. *Malnutrition and disease.* FFHC Basic Studies No. 12. Geneva.

[7] Bengoa, J., Jelliffe, D. B. and Peres, C. 1959, *Amer. J. Clin. Nutr.* 7: 714; Nicol, B. M., 1959. *Brit. J. Nutr.* 13: 307; Jelliffe, D.B. and Jelliffe, E. F. P., 1961. *Amer. J. Pub. Health,* 50: 1355; Jelliffe D. B. and Jelliffe, E. F. P., 1961. *Acta Tropica,* 18: 1.

[8] WHO, 1963. *Op. cit.* p. 25.

than those of children in relation to body weight, their health, ability to resist disease and working efficiency are seriously impaired if their diets do not provide enough of the proteins they need.

Estimation of protein requirements

It is clearly of the greatest importance to have a satisfactory basis for the definition of protein requirements, but this poses many difficulties. A major step forward was the report of the FAO Committee which met in 1955.[9] The Joint FAO/WHO Expert Committee on Nutrition[10] recommended in 1961 that this report should be revised in the light of advances in knowledge that had been made in the meantime. Accordingly a Joint FAO/WHO Expert Group on Protein Requirements[11] met in October 1963. The following account of the calculation of protein requirements is based essentially on the findings of this expert group.

There are quantitative requirements for the essential amino acids, and the nutritional quality of a protein is to a large extent determined by its content and the proportion of amino acids. All of the amino acids, however, are interrelated in protein synthesis and turnover in the body, and in other metabolic processes, and there must be a sufficient supply of all to support these processes. The expert group therefore concluded that the pattern of amino acids in a protein is a more important determinant of its nutritional quality than its content of essential amino acids, which had previously been stressed. An ideal dietary protein may be defined as one with an amino acid pattern that will allow complete utilization of the absorbed products for the synthesis and maintenance of body protein, which is their principal physiological function, and adequately support the other metabolic processes in which they are involved. Such a hypothetical protein may be defined as a reference protein.

The reference protein of the FAO/WHO expert group was for working purposes considered to have an NPU value (as defined on page 100) of 100. The NPU values of the proteins in human milk, in whole hen's eggs, and in cow's milk are the closest to this value of any dietary proteins.

The soft tissues of the body are about 20 percent protein, and the amount of it in the body of a normal adult depends upon the body size. There is a constant turnover of the body protein, that which is replaced being broken down, yielding energy (calories) and simpler nitrogen compounds which are excreted, mainly in the urine. This imposes the need for dietary protein. These metabolic processes will operate normally, with the individual in apparent health and the nitrogen excretion equal to the intake (nitrogen equilibrium), over a wide range of protein intakes. There is, however, a level of intake below which this adjustment does not occur, when there is a constant loss of nitrogen from the body (negative nitrogen balance). This level supplies an important indication of the protein requirement. In a large number of mammals, including man, it is related to the basal energy metabolism, that is, the metabolic energy (calorie) expenditure in the resting state, and since there are many more data on basal energy metabolism than on levels of nitrogen excretion, the FAO/WHO expert group used the relationship to basal calorie expenditure to compute this level of nitrogen intake for adults and children. This method could not be used for young infants, however, because of differences in the basal caloric output.

Based on urinary excretion, the nitrogen requirement of a normal adult, for just sufficient to prevent depletion, may be estimated as 45 mg per kg of body weight per day. Nitrogen is also lost from the body in the feces as a result of gastro-intestinal secretions and desquamation, through and from the skin, including sweating, and in the menses, and there is also evidence that the stresses of ordinary life (minor states of disease, traumata, pain, anxiety) increase the urinary excretion of nitrogen. Taking these losses also into account the requirement may be estimated as 94 mg of nitrogen per kg of body weight per day. Assuming that proteins contain an average of 16 percent nitrogen, this represents about 0.6 g of protein per kg of body weight per day. It refers to a normal adult, and represents an average for application to a large group. It also refers to the protein of the body, which is regarded as equivalent in value to the reference protein.

The requirement for protein is high during growth. The excretion of nitrogen during growth is less than the intake (positive nitrogen balance) because tissue is being added. An average figure for the propor-

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[9] FAO, 1957. *Protein requirements. Report of the FAO Committee, Rome, Italy, 24-31 October 1955.* FAO Nutritional Studies No. 16.

[10] FAO/WHO, 1962. *Sixth report of the Joint FAO/WHO Expert Committee on Nutrition.* FAO Nutrition Meetings Report Series No. 32, WHO Technical Report Series No. 245.

[11] Report in press.

tion of nitrogen in the tissue laid down during growth is 2.9 percent. The FAO/WHO expert group used this figure for calculating the requirements of children above one year of age, including adolescents, but it cannot be used for infants because there is a more marked increase in nitrogen in the tissues during growth in the first year. For infants in the first year protein requirements are estimated on the basis of intakes that have been found to support health and normal growth.

During pregnancy additional protein is required for the growth and maintenance of the fetus and for the formation of associated new tissue in the pregnant woman. The FAO/WHO expert group considered that 6 g per day should be recommended as an extra intake during the last two trimesters. An extra 15 g of protein per day were recommended for lactating women.

It has been demonstrated that in extreme cold there is an increase in the excretion of nitrogen, which of course may affect the protein requirement, but this is not an important consideration because protective clothing is worn. In hot climates, however, the increased loss of nitrogen in sweat may impose a need for extra dietary protein. It is not known whether heavy work per se increases the protein requirement, and the FAO/WHO expert group considered that the present state of knowledge is not sufficient to justify statements on requirements that heavy work might impose. The group recognized a similar situation concerning requirements related to possible body protein stores and to stress situations generally, trauma, disease, and convalescence.

Ordinarily the protein in mixed diets is never utilized with 100 percent efficiency, and if the diet is otherwise adequate the degree of utilization of the protein is primarily a reflection of its quality. Within limits two proteins of different inherent nutritional value will have the same practical nutritional value if more of the lower quality protein is eaten, and the necessary quantitative adjustment can be calculated from the NPU values. If, however, the quality of the dietary protein is below a certain level this cannot be done, because the quantity necessary would be beyond the intake capacity. This is an important consideration with young children, whose protein requirements are particularly high. In such cases improvement of the quality of the protein is necessary.

Table III-1 shows the approximate requirements for the reference protein estimated as described above. The figures are better approximations than it was possible to make when the FAO committee met in 1955, because of the availability of more scientific information allowing a closer estimation of protein requirements. Not only average figures are given (column II), but also figures 20 percent below (column I) and 20 percent above the average (column III), in order to allow for observed variations in individual requirements. These requirements, which are in terms of reference protein with a theoretical NPU value of 100, must be adjusted for the NPU value of the dietary protein. Thus if this value is 70, the figures in the table should be multiplied by 100/70 to obtain the requirements of dietary protein.

When, as is usually the case, detailed information on the NPU value of the dietary protein is not available, rough estimates can be used. In general the dietary proteins in developed countries and those consumed by people in the upper income groups of developing countries have an NPU value of 70 to 80.

TABLE III-1. - PROTEIN REQUIREMENTS, BY AGE AND STAGE OF DEVELOPMENT

Age and stage of development		Protein requirements *		
		I	II	III
	Months	*Grams per kilogram of body weight per day*		
Infants [1]	0 - 3			2.3
	3 - 6			1.8
	6 - 9			1.5
	9 - 12			1.2
	Years			
Children	1 - 3	0.7	0.9	1.6
	4 - 6	0.6	0.8	1.0
	7 - 9	0.6	0.8	0.9
	10 - 12	0.6	0.7	0.9
Adolescents	13 - 15	0.6	0.7	0.8
	16 - 19	0.5	0.6	0.8
Adults		0.5	0.6	0.7

NOTE: Protein requirements are shown in terms of reference protein with a theoretical NPU value of 100. To adjust for the NPU value of the dietary protein they should be multiplied by 100/NPU.

*I: Protein intakes considered inadequate for all but a small fraction (2.5 percent) of a population.

II: Estimated average protein requirements of a population.

III: Protein intakes considered adequate for all but a small fraction (2.5 percent) of a population.

[1] The protein requirements of infants are not calculated but are based on observed intakes of breast milk by thriving infants. They are therefore placed in column III.

For developing countries generally a value of 60 to 70 is appropriate, though there may be some situations, particularly when the diet is based predominantly on such foods as cassava, in which the NPU value of the dietary protein is as low as 50 to 60.

The figures for protein requirements that have been discussed so far have referred to actual protein intakes. Information on food consumption derived from national food balance sheets and from consumption surveys relates to food at the so-called retail level, i.e., before it is prepared for consumption. During preparation and also during a meal there is usually some wastage. Losses of edible material are difficult to estimate, and when a more exact estimate is not possible a figure of 10 percent has been suggested. [12]

When intakes of protein must be recommended to cover the needs of practically all of a population, estimates 20 percent above the average requirements of the population (column III of Table III-1) should be used. It is not implied that this represents the requirement of everyone, or that everyone who does not obtain it will be malnourished, but this level is preferable for the setting of a target for food supplies. For comparison with food balance sheets estimates of average protein supplies, column II of Table III-1 should be used.

Annex Table 17 is a hypothetical example of the calculation of the amount of protein to be used as a target for the supply of a country, using the appropriate figures from column III of Table III-1, adjusted for the NPU value of the dietary protein, and estimating the numbers of pregnant and lactating women on the basis of the number of children under one year of age. The figures used for average body weight are those of healthy people in each group, and are therefore in effect target weights rather than the existing average. Similarly, if changes in the quality of the dietary protein are anticipated, this should be taken into consideration in the calculation.

Maldistribution is a further factor that should enter into the calculation of a target supply. It varies so greatly from country to country, however, that its numerical evaluation is possible only if there is detailed information on consumption among the different population groups of the country concerned. Allowances are therefore not made for this factor in Annex Table 17.

[12] FAO, 1957. *Calorie requirements. Report of the Second FAO Committee on Calorie Requirements.* FAO Nutrional Studies No. 15. Rome.

PROTEIN VALUE OF FOODS

The nutritive value of a food, in terms of protein, is dependent both on the quantity of protein contained in it and on its quality. Table III-2 shows the protein content of some of the main foods, together with various measures of its quality.

Figures on the protein content of specific foods can be obtained readily from food composition tables compiled for national use, where these are available, or from tables for international use such as those published by FAO. [13]

The protein content of different foods varies considerably. Starchy foods such as cassava, potatoes, and sweet potatoes contain only about 1 to 2 percent protein, or 2 to 9 percent on a moisture-free basis. The protein content of most fruits is also low. Grains contain much more protein, varying from 6 to about 14 percent, with only slight variations because of moisture content. Many leafy vegetables contain around 30 percent protein on a moisture-free basis. Pulses, oilseeds and nuts have a high content of protein; almonds and cashew nuts contain 20 percent protein, peas about 24 percent, defatted soybean flour 43 percent, and defatted groundnut flour 51 percent. Animal products such as cheese, meat, and fish contain about 15 to 25 percent protein, and much more on a moisture-free basis.

Foods with a high content of protein, such as animal products, pulses, oilseeds and nuts, are often described as protein-rich foods. Foods which have been processed in such a way as to concentrate their protein, such as oilseed presscakes and fish flour, may be described as protein concentrates. Protein-enriched foods are foods like maize meal that have had their protein content and quality enhanced by the addition of such products as groundnut flour or dried skim milk.

The quality of protein has been discussed earlier in this chapter (page 100). Table III-2 includes, where possible, figures for the digestibility, biological value (BV) and net protein utilization (NPU) of different foods. The table shows in addition the protein efficiency ratio (PER), which is the ratio of the gain in body weight to the amount of protein consumed over a specific period and at a level of intake just sufficient to support adequate protein nutrition. The estimates of protein quality shown in the table

[13] FAO. 1949. *Food composition tables for international use.* FAO Nutritional Studies No. 3. Rome.

TABLE III-2. - PROTEIN VALUES OF SELECTED FOODS (EDIBLE PORTION)

	Moisture percentage	Protein percentage	Protein percentage on moisture-free basis	Digestibility	Biological value (BV)	Net protein utilization (NPU)	Protein efficiency ratio (PER)
STARCHY FOODS							
Cassava (fresh)	63	0.9	2.4	...	...	...	...
Cassava flour	14	1.5	1.7	...	...	...	...
Plantain	67	1.0	3.0	...	...	...	...
Potato	78	2.0	9.1	...	68	71	1.8
Sweet potato	70	1.8	6.0	...	72	72	1.5
Yams	72	2.4	8.6	...	...	...	...
GRAINS							
Barley, pearled light or dark	12	9.2	10.2	...	...	...	...
Maize (whole)	12	9.2	10.5	93	54	54	0.9
Millet (Ragi)	11	6.2	7.0	91	62	...	1.9
Oats	10	14.2	15.8	92	66	66	2.1
Rice (milled)	13	7.6	8.7	96	70	...	2.1
Rye	12	12.1	13.8	90	66	...	1.8
Sorghum	11	10.1	11.3	...	...	...	1.6
Wheat flour (whole)	12	13.3	15.1	91	64	...	1.6
Wheat flour (white)	12	10.5	11.9	93	61	...	1.3
VEGETABLES AND FRUIT							
Amaranth leaves (*Amaranthus gangeticus*)	87	3.5	26.9	76	82	...	...
Apples	84	0.4	2.5	...	...	...	...
Broccoli	86	4.3	30.7	...	...	...	...
Cassava leaves	81	6.8	35.8	...	...	...	...
Kale	86	4.0	28.6	85	64	...	...
Oranges	87	0.8	6.2	...	...	...	...
Mustard greens	92	2.2	27.5	...	...	...	...
Peaches	87	0.8	6.2	...	...	...	...
Spinach	92	2.3	29.1	...	...	...	...
PULSES, OILSEEDS AND NUTS							
Almond	5	20.0	21.1	...	...	...	1.6
Bean, common (*Phaseolus vulgaris*)	11	22.1	25.0	75	60	...	...
Brazil nut	5	14.5	15.3	...	54	...	...
Cashew nut	5	20.0	21.1	...	73	...	...
Cottonseed meal (fat content 16.1 percent)	8	32.9	35.8	87	65	64	2.4
Groundnut flour (fat content 2 percent)	5	51.2	53.9	93	59	54	1.7
Peas	11	23.8	26.7	83	64	...	1.6
Sesame seed (fat content 52.2 percent)	4	17.6	18.4	90	70	71	1.8
Soybean flour (fat content 3.3 percent)	9	42.8	47.2	85	82	75	2.4
Sunflowerseed (fat content 51.4 percent)	6	22.4	23.7	89	69	65	...
Walnut, English	3	15.0	15.5	84	56	...	1.6
ANIMAL PRODUCTS							
Beef, medium fat	62	18.5	48.7	97	74	76	2.4
Cheese, cheddar	37	25.0	39.7	98	75	69	2.5
Chicken meat	66	20.2	59.4	93	75	...	...
Eggs (hen's)	74	12.8	49.2	97	99	95	4.2
Fish (whole)	74	18.8	72.6	95	85	75	3.1
Lamb	56	15.7	35.7	...	...	...	...
Milk (cow's)	87	3.5	27.6	96	85	90	3.2
Pork (medium fat)	67	15.5	46.8	88	80	79	2.9
Skim milk, dried	4	36	37.5	97	85	...	...

have been obtained from a variety of sources, and not all under the same experimental conditions, which explains certain discrepancies in the figures. They are probably sufficient, however, for an approximate ranking of the main food groups according to the quality of their protein.

While there are a number of exceptions, the quality of proteins according to both the NPU and PER is generally in the ascending order: starchy foods, grains, pulses, oilseeds, and animal products. Good quality proteins are widely present in animal products such as milk, meat, fish, cheese, and eggs, and in the seeds of many legumes and pulses. Starchy foods such as cassava and plantains, and to a large extent maize and wheat, contain protein of relatively poor quality. The proteins of some grains, such as rice, oats, and certain millets, are superior in quality to those of most starchy foods.

Protein consumption levels

Data on the protein supplies of 43 countries, based on FAO food balance sheets for the period 1957-59, are summarized in Annex Table 18. These data bring out clearly the wide variations not only in the average protein intake of different countries but also in the relative contributions of the different food groups.

Protein supplies are estimated to range from 105 g per caput per day in New Zealand to 45 g in Ceylon among the countries for which food balance sheets are available. In the maps in Figure III-1 the countries of the world are divided into three broad classes as regards protein supplies, using rough estimates for those countries for which it has not been possible to calculate food balance sheets. The situation is summarized for the main regions in Table III-3.

Protein supplies average 70 g or more per caput per day in all of Europe, the U.S.S.R., North America, Oceania, the River Plate countries and a few other countries of Latin America, and some countries of the Near East and Africa. Supplies average from 50 to 69 g in most of Latin America, the Near East, and Africa, and much of the Far East. The lowest supplies of all, less than 50 g, are in southeast Asia, though they are also found in a few countries in the other developing regions.

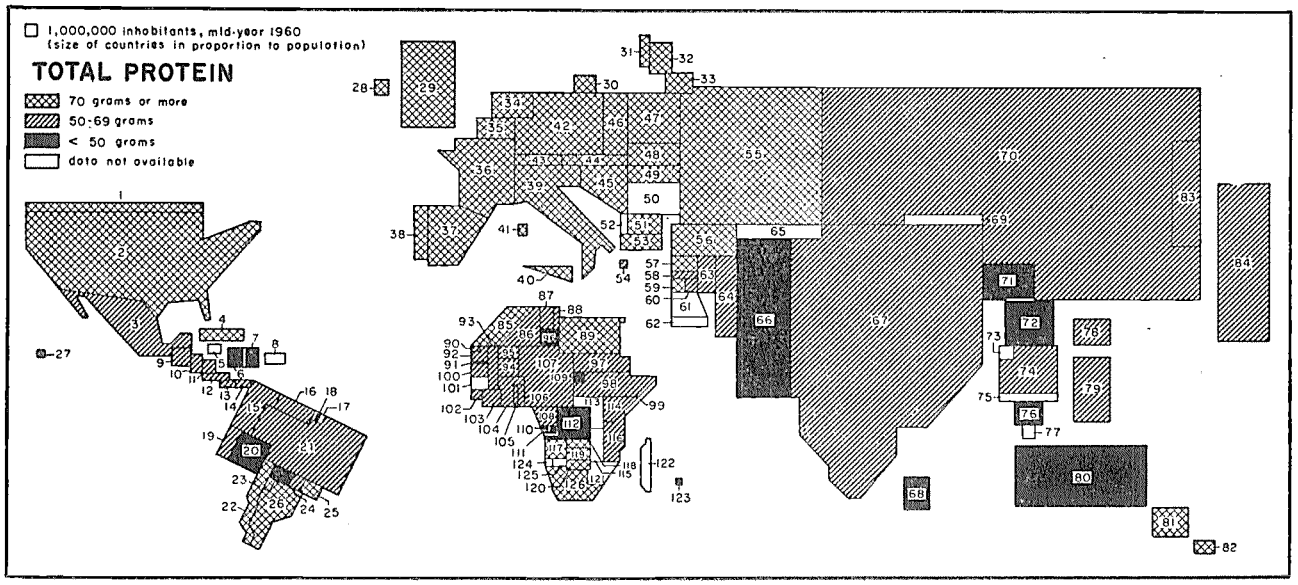
For animal protein alone, which gives a rough indication of the quality of the protein supply, the variations are even wider, ranging from 72 g per caput per day in New Zealand to as little as 6 g in India. Animal protein supplies average 30 g or more only in northern Europe, the U.S.S.R., North America, Oceania, the River Plate countries, Israel, and South Africa. Figures of 15 to 29 g are characteristic of southern Europe, most of Latin America, Japan, and a few other countries. Supplies are less than 15 g in almost all of the Far East, most of the Near East and Africa, and much of Central America. The average for the Far East as a whole is only 8 g.

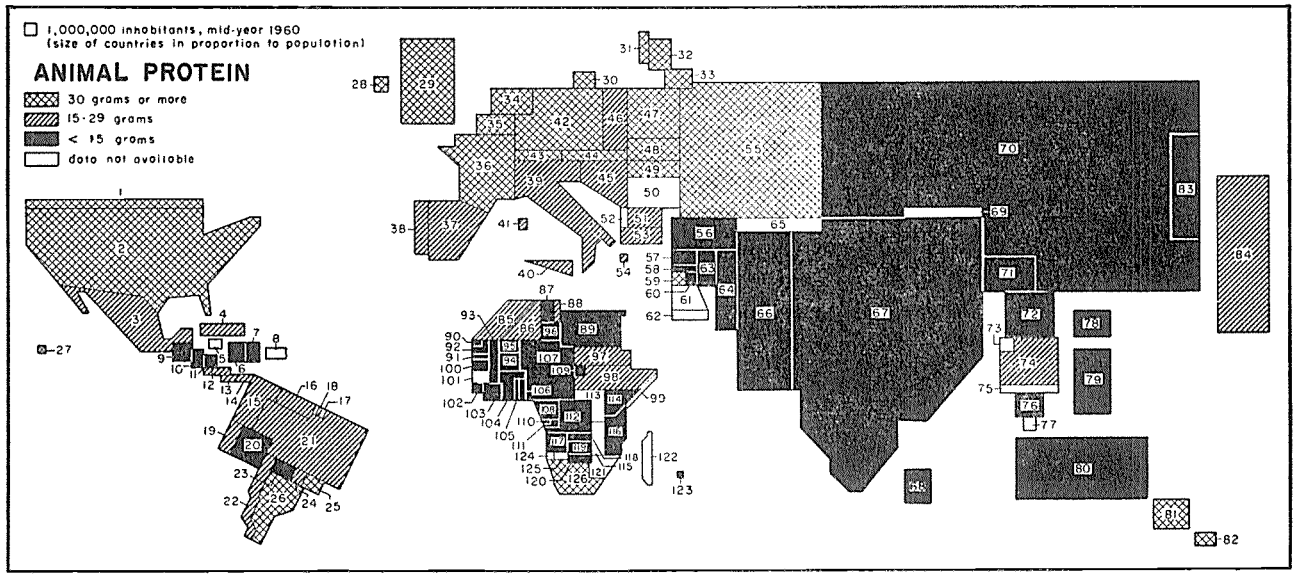
The proportion of total protein obtained from animal foods, which is a further indication of the quality of the protein supply, varies from 70 percent in the United States to 12 percent in India. Generally there is a positive correlation between the total protein intake and the percentage of animal protein. However, in several Latin American countries a high percentage of animal protein is associated with a low total intake, particularly in Colombia where, although 48 percent of the protein is from animal sources, the total intake is only 48 g. Conversely, in a number of countries, including Greece, Spain, Syria, Turkey, the United Arab Republic, and Yugoslavia, in most of which pulse crops are of some importance, total protein intakes are fairly high even though the proportion from animal sources is small.

Table III-3 also indicates the trends that have taken place in protein consumption in the main regions of the world. In all regions except North America there was a decline in protein supplies, as in food supplies as a whole, during the war years. While in most regions the wartime setback has since been made good, in western Europe, Oceania, and the Far East protein supplies are estimated to remain less than before the war. In the former regions this means a slight decline from comparatively high levels, but in the Far East the reduction in the already very low level is a serious matter.

It is most striking that in the economically more developed countries ("high-calorie" countries), where protein intakes are also the highest, there has been an increase of about 6 percent in protein intakes since before the war, whereas in the devel-

FIGURE III-1. - DISTRIBUTION OF THE POPULATION OF THE WORLD ACCORDING TO DAILY INTAKE OF TOTAL PROTEIN AND ANIMAL PROTEIN





1. Canada
2. United States
3. Mexico
4. Cuba
5. Jamaica
6. Haiti
7. Dominican Republic
8. Puerto Rico
9. Guatemala
10. El Salvador
11. Honduras
12. Nicaragua
13. Costa Rica
14. Panama
15. Colombia
16. Venezuela
17. Guianas
18. Surinam
19. Ecuador
20. Peru
21. Brazil
22. Chile
23. Bolivia
24. Paraguay
25. Uruguay
26. Argentina
27. Hawaii
28. Ireland
29. United Kingdom
30. Denmark
31. Norway
32. Sweden
33. Finland
34. Netherlands
35. Belgium
36. France
37. Spain
38. Portugal
39. Italy
40. Sicily
41. Sardinia
42. Germany, Fed. Rep.
43. Switzerland
44. Austria
45. Yugoslavia
46. Germany, Eastern
47. Poland
48. Czechoslovakia
49. Hungary
50. Romania
51. Bulgaria
52. Albania
53. Greece
54. Cyprus
55. U.S.S.R.
56. Turkey
57. Syria
58. Lebanon
59. Israel
60. Jordan
61. Saudi Arabia
62. Yemen
63. Iraq
64. Iran
65. Afghanistan
66. Pakistan
67. India
68. Ceylon
69. Nepal
70. China: Mainland
71. Burma
72. Thailand
73. Laos
74. Viet-Nam
75. Cambodia
76. Malaysia: Malaya
77. Malaysia: Singapore
78. China: Taiwan
79. Philippines
80. Indonesia
81. Australia
82. New Zealand
83. Korea
84. Japan
85. Morocco
86. Algeria
87. Tunisia
88. Libya
89. United Arab Rep.
90. Mauritania
91. Gambia
92. Senegal
93. Mali
94. Upper Volta
95. Niger
96. Chad
97. Sudan
98. Ethiopia
99. Somalia
100. Guinea
101. Sierra Leone
102. Liberia
103. Ivory Coast
104. Ghana
105. Togo
106. Dahomey
107. Nigeria
108. Cameroon
109. Central African Rep.
110. Gabon
111. Congo (Brazzaville)
112. Congo (Leopoldville)
113. Uganda
114. Kenya
115. Rwanda and Burundi
116. Tanganyika
117. Angola
118. Northern Rhodesia
119. Southern Rhodesia
120. Malawi
121. Mozambique
122. Madagascar
123. Mauritius
124. South West Africa
125. Bechuanaland - Basutoland - Swaziland
126. South Africa

TABLE III-3. - PER CAPUT PROTEIN SUPPLIES BY REGION (RETAIL LEVEL)

	Period	Total protein	Animal protein	Animal as proportion of total
		Grams per caput per day		*Percent*
Western Europe....	Prewar	85	36	42
	Postwar	82	33	40
	Recent	83	39	47
Eastern Europe and U.S.S.R.	Prewar	84	20	24
	Postwar	82	24	29
	Recent	94	33	35
North America	Prewar	86	51	59
	Postwar	91	61	67
	Recent	93	66	71
Oceania	Prewar	103	66	65
	Postwar	98	66	67
	Recent	94	62	66
Latin America	Prewar	64	28	44
	Postwar	62	22	35
	Recent	67	24	36
Far East [1]	Prewar	61	7	11
	Postwar	54	6	11
	Recent	56	8	14
Near East	Prewar	72	12	17
	Postwar	69	12	17
	Recent	76	14	18
Africa	Recent	61	11	18
High-calorie countries [2]	Prewar	85	34	40
	Postwar	85	37	44
	Recent	90	44	49
Low-calorie countries [3]	Prewar	62	10	16
	Postwar	56	8	14
	Recent	58	9	16
WORLD [1]	Prewar	69	18	26
	Postwar	64	18	28
	Recent	68	20	29

[1] Including Mainland China. - [2] Europe, North America, Oceania, River Plate countries. - [3] Latin America (excluding River Plate countries), Far East, Near East, Africa.

oping countries ("low-calorie" countries), where greater supplies of protein are most needed, they are estimated to have declined by about the same percentage.

Trends in animal protein supplies have been somewhat diverse. In both western Europe and the Far East there has been a slight increase in animal protein supplies, in contrast to the decrease in total protein. In eastern Europe and the U.S.S.R., North America and the Near East the supply of animal protein has increased more rapidly than total protein. In Oceania animal protein has decreased in line with total protein, and in Latin America animal protein has decreased while total protein has increased.

For the high-calorie countries as a whole, animal protein intakes are estimated to have increased by almost 30 percent over the prewar period. For the low-calorie countries a slight decline is estimated, and intakes of animal protein are now only about a fifth of those in the high-calorie countries.

MAIN SOURCES OF PROTEIN

About 70 percent of the world's supply of protein is estimated to come from vegetable sources and about 30 percent from animal sources. Table III-4 shows in more detail the breakdown by main food groups for the different regions of the world, and the same data for the most recent period are shown graphically in Figure III-2.

Grains, which are the staple food in most countries, are also by far the major source of protein, furnishing almost half of the world's total supply. The proportion ranges from 72 percent in Pakistan to 16 percent in the United States. Grains are the main source of protein in all but seven of the 43 countries for which data are included in Annex Table 18. In Argentina, Australia, Canada, New Zealand, and the United States meat is the main source and in Ireland and Sweden dairy products. In addition meat ranks equal with grains in Colombia, and in a number of European countries meat or dairy products are almost as important as grains as sources of protein.

Pulses, oilseeds and nuts provide almost 13 percent of the world's protein supplies. Their contribution is as high as 27 percent in India and is probably of the same order in Mainland China. They also contribute 23 percent of the protein in Brazil and 19 percent in Japan and Mexico, but in most countries the proportion is much less.

Starchy roots account for about 5 percent of protein supplies. They provide as much as 12 percent in Peru, and probably even more in those African countries where the staple food is cassava or yams. In fact in Africa it has been found that the nature of the staple food is an important influence on the level of protein intake, which is generally much higher where the staple foods are grains than

TABLE III-4. - PER CAPUT PROTEIN SUPPLIES FROM MAJOR FOOD GROUPS, BY REGION (RETAIL LEVEL)

	Period	Grains	Vegetable protein			Animal protein			
			Starchy roots	Pulses, oilseeds and nuts	Vegetables and fruit	Meat and poultry	Eggs	Fish	Milk and milk products
		Grams per day							
Western Europe	Prewar	35.6	4.7	5.6	3.2	16.3	2.5	2.5	14.7
	Postwar	35.1	5.3	5.1	3.5	12.5	2.2	2.6	15.7
	Recent	30.5	4.4	5.0	4.1	16.2	3.1	2.4	17.3
Eastern Europe and U.S.S.R.	Prewar	48.7	7.1	5.8	2.4	8.1	1.1	1.1	9.6
	Postwar	42.5	8.2	5.0	2.3	9.5	1.2	1.3	12.0
	Recent	48.3	8.2	2.0	2.5	12.9	2.2	1.9	16.1
North America	Prewar	22.3	3.1	4.7	4.9	24.4	4.6	2.6	19.4
	Postwar	17.5	2.5	5.3	5.0	28.2	6.3	2.7	23.5
	Recent	15.7	2.3	4.7	4.6	31.9	6.0	2.5	25.3
Oceania	Prewar	29.2	2.5	1.0	3.3	41.6	4.0	2.9	17.9
	Postwar	24.5	2.1	2.4	3.2	37.8	4.0	2.9	20.9
	Recent	24.3	2.4	2.1	3.1	36.8	3.5	2.2	19.5
Latin America	Prewar	22.7	2.5	8.9	2.0	17.9	1.2	0.9	8.1
	Postwar	25.7	3.0	8.8	2.3	13.2	0.9	1.5	6.1
	Recent	26.5	2.7	10.7	2.8	13.8	1.2	1.5	7.4
Far East [1]	Prewar	35.8	0.9	14.9	2.0	2.8	0.5	1.5	2.6
	Postwar	32.0	1.0	13.1	1.6	2.3	0.2	1.5	2.1
	Recent	32.6	1.8	12.0	1.7	3.0	0.4	2.2	2.2
Near East	Prewar	51.0	0.2	7.1	2.2	3.5	0.4	0.4	7.4
	Postwar	48.4	0.4	5.5	2.8	3.6	0.4	0.8	7.2
	Recent	48.5	0.7	9.5	3.6	4.6	0.5	1.1	7.4
Africa	Recent	32.2	7.1	9.0	1.7	5.8	0.4	1.3	3.5
High-calorie countries [2]	Prewar	37.4	5.2	5.0	3.1	15.9	2.8	1.8	13.8
	Postwar	34.0	5.8	4.9	3.3	16.1	2.9	2.0	16.0
	Recent	33.4	5.2	3.8	3.6	19.8	3.3	2.4	18.5
Low-calorie countries [3]	Prewar	35.7	1.6	13.4	1.2	4.2	0.4	1.4	3.7
	Postwar	32.7	1.8	12.0	1.5	3.2	0.4	1.4	2.9
	Recent	33.2	2.3	11.6	1.8	3.8	0.4	1.9	2.9
WORLD [1]	Prewar	35.3	2.6	10.9	2.2	8.6	0.9	1.3	7.2
	Postwar	31.8	2.8	9.4	2.0	7.6	1.3	1.8	7.3
	Recent	33.4	3.2	9.0	2.4	8.8	1.2	2.3	7.7

[1] Including Mainland China. - [2] Europe, North America, Oceania, River Plate countries. - [3] Latin America (excluding River Plate countries), Far East, Near East, Africa.

where they are starchy roots, because of the lower protein content of the latter.[14]

Vegetables and fruits provide only about 3 percent of the world's protein, but their contribution rises to 9 percent in Spain and 8 percent in Libya, Peru, the Philippines, and Portugal.

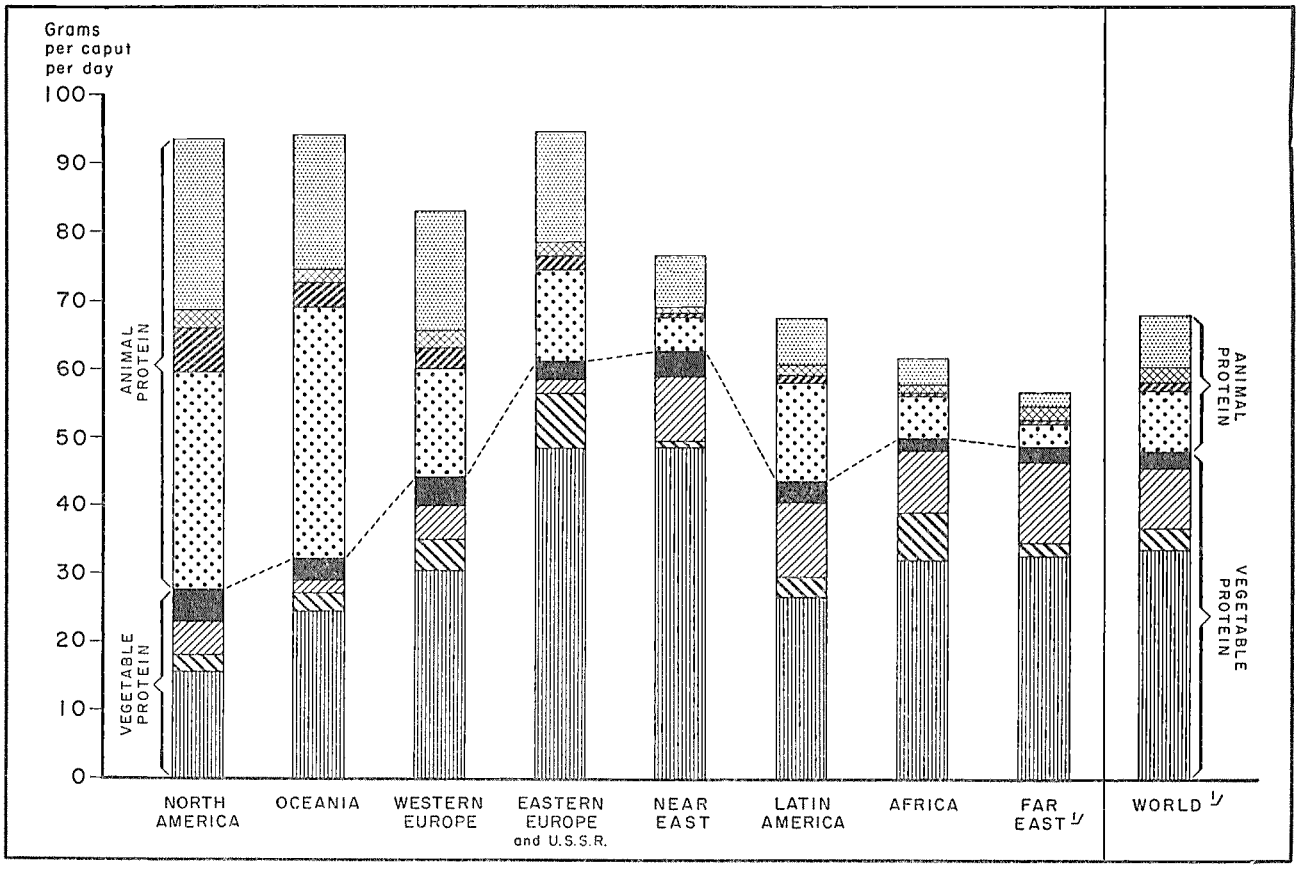
Among animal products, meat and dairy products differ very little in importance in the world's protein supply, the former contributing about 13 percent and the latter about 11 percent. Meat ranges from 44 percent in Argentina to 2 percent in Ceylon, India, and Pakistan, and dairy products from 35 percent in Finland to 1 percent in Japan.

Although eggs provide only about 2 percent of the world's protein, their contribution is as much as 7 percent in Israel and the United States.

Fish too accounts for only about 3 percent on a world basis, but it is 9 percent of the world's animal protein and is the main source of animal pro-

[14] FAO. 1958. *The state of food and agriculture 1958.* Rome, p. 121.

FIGURE III-2. - PER CAPUT PROTEIN SUPPLIES FROM MAJOR FOOD GROUPS, BY REGION



1/ Including Mainland China.

tein in a number of countries, including Ceylon, Japan, the Philippines, Portugal, Surinam, and China (Taiwan). In Portugal fish supplies 23 percent of the total protein and in Japan, 18 percent.

From a comparison of the composition of the protein supplies of the high- and low-calorie countries considered as a whole, it appears that there is rather little difference in their intakes of vegetable protein. Each of the two groups obtains about the same quantity of protein per caput from grains, while slightly higher quantities from starchy roots and vegetables and fruit in the high-calorie countries are more than offset by larger quantities from pulses, nuts, and oilseed in the low-calorie countries. However, intakes of animal protein are almost five times as large in the former group as in the latter.

The main change in the composition of protein supplies since before the war has been a reduction in the high-calorie countries in the protein derived from grains, and a large increase in their animal protein intakes. Otherwise changes appear to have been rather small.

PROTEIN CONSUMPTION COMPARED WITH REQUIREMENTS

For the 43 countries for which there are food balance sheets, Table III-5 compares the average protein supplies available for human consumption with provisional estimates of the average protein requirements calculated on the basis recommended by the FAO/WHO expert group (column II of Table

TABLE III-5. - COMPARISON OF PER CAPUT PROTEIN SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION AND AVERAGE PROTEIN REQUIREMENTS, SELECTED COUNTRIES (RETAIL LEVEL)

	Supplies	Requirements [1]
	.. *Grams per caput per day* ..	
WESTERN EUROPE		
Austria	87	47
Belgium	88	47
Denmark	92	47
Finland	94	43
France	96	47
Germany, Fed. Rep.	79	44
Greece	95	49
Ireland	96	45
Italy	77	46
Netherlands	77	42
Norway	84	49
Portugal	71	48
Spain	71	49
Sweden	81	48
Switzerland	90	44
United Kingdom	86	44
Yugoslavia	96	52
NORTH AMERICA		
Canada	95	42
United States	92	40
OCEANIA		
Australia	92	45
New Zealand	105	44
LATIN AMERICA		
Argentina	98	42
Brazil	61	45
Chile	77	46
Colombia	48	48
Mexico	68	44
Paraguay	68	43
Peru	49	48
Surinam	48	45
Venezuela	61	44
FAR EAST		
Ceylon	45	47
China (Taiwan)	57	42
India	51	48
Japan	67	43
Pakistan	46	46
Philippines	47	46
NEAR EAST		
Israel	83	44
Libya	53	47
Syria	78	45
Turkey	90	45
United Arab Republic	76	45
AFRICA		
Mauritius	46	42
South Africa	73	41

[1] Provisional calculation on the basis of column II of Table III-1.

III-1). Requirements vary from 40 g per caput per day in the United States to 52 g in Yugoslavia, reflecting partly the age and sex composition of the population and the body weights of healthy members of the different groups, but principally the NPU value of the dietary protein. The low requirement in the United States results mainly from the high quality of the dietary protein, while the higher requirements in the developing countries reflect the lower quality of their dietary protein.

It appears that the available supplies exceed average requirements on a per caput basis in all of the countries for which there are data except Ceylon, though these requirements appear to be only just covered in a number of other countries, including Colombia, Pakistan, Peru, and the Philippines. However, as noted at the beginning of the chapter, national average figures do not necessarily reveal the real situation so far as the most vulnerable sections of the population (children, and expectant and nursing mothers) are concerned, because the distribution of the available supplies for consumption by different physiological and socioeconomic groups may not be in accordance with needs.

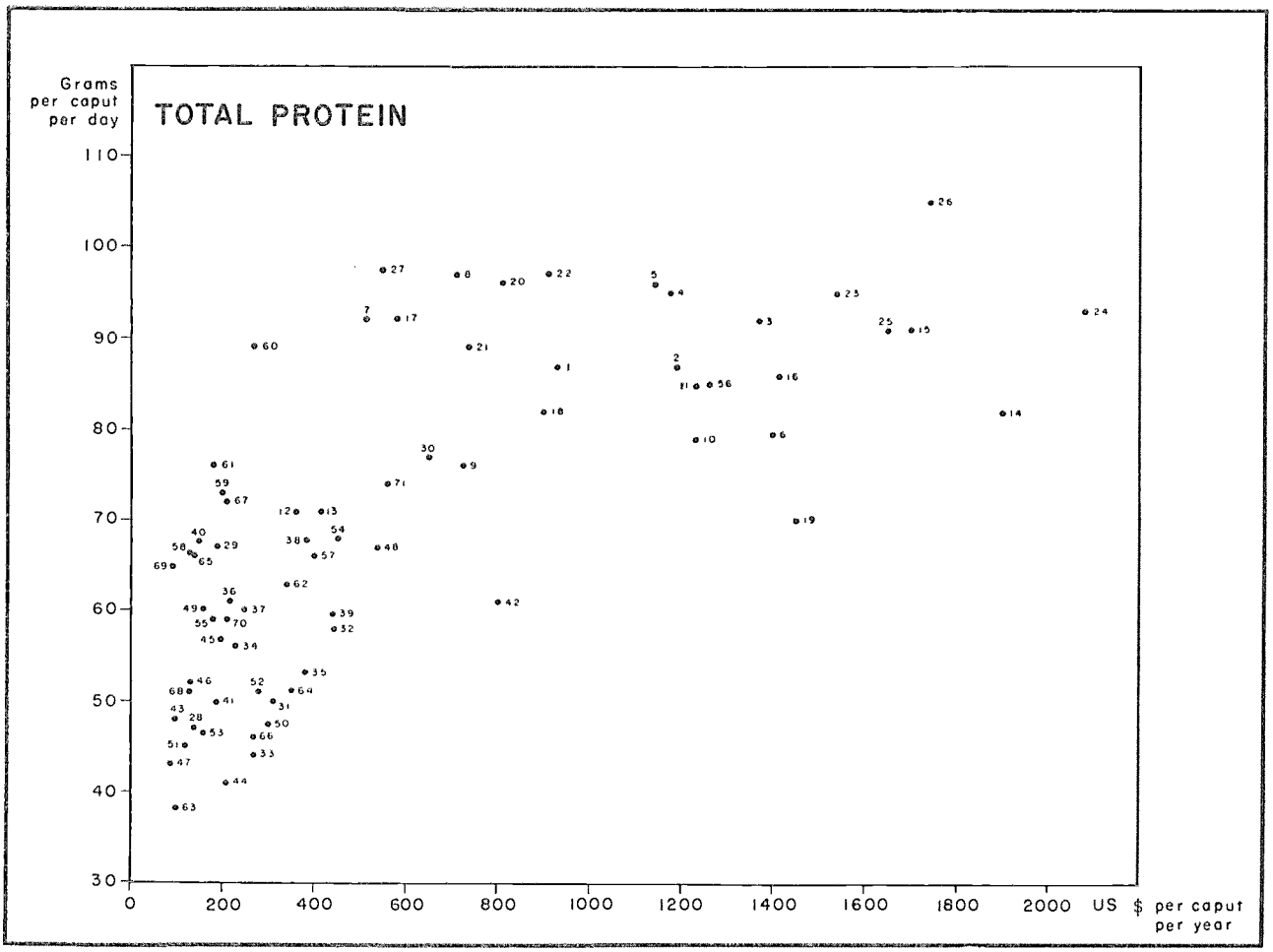
It is probable that even on a world basis the total available supplies of protein are enough to satisfy the calculated requirements of the whole population. In actual fact, however, many people consume much more protein than they need, and supplies must be sufficient to take account of this as well as to satisfy minimum requirements. Thus, for the requirements of all the population to be met, supplies considerably in excess of the calculated average requirement will be needed. The amount of the excess needed will differ from country to country, depending on such factors as the degree of income disparity.

FACTORS AFFECTING PROTEIN CONSUMPTION

The main factors affecting food consumption have been analyzed in some detail in an earlier issue of this report.[15] It is not therefore proposed to make more than a very brief examination of these factors.

The influence of income is clearly brought out in Figure III-3, where the consumption of protein from all sources and the consumption of animal protein in a large number of countries are plotted against income levels. Total protein intakes rise

[15] FAO. 1957. *The state of food and agriculture 1957.* Rome. p. 70-110.



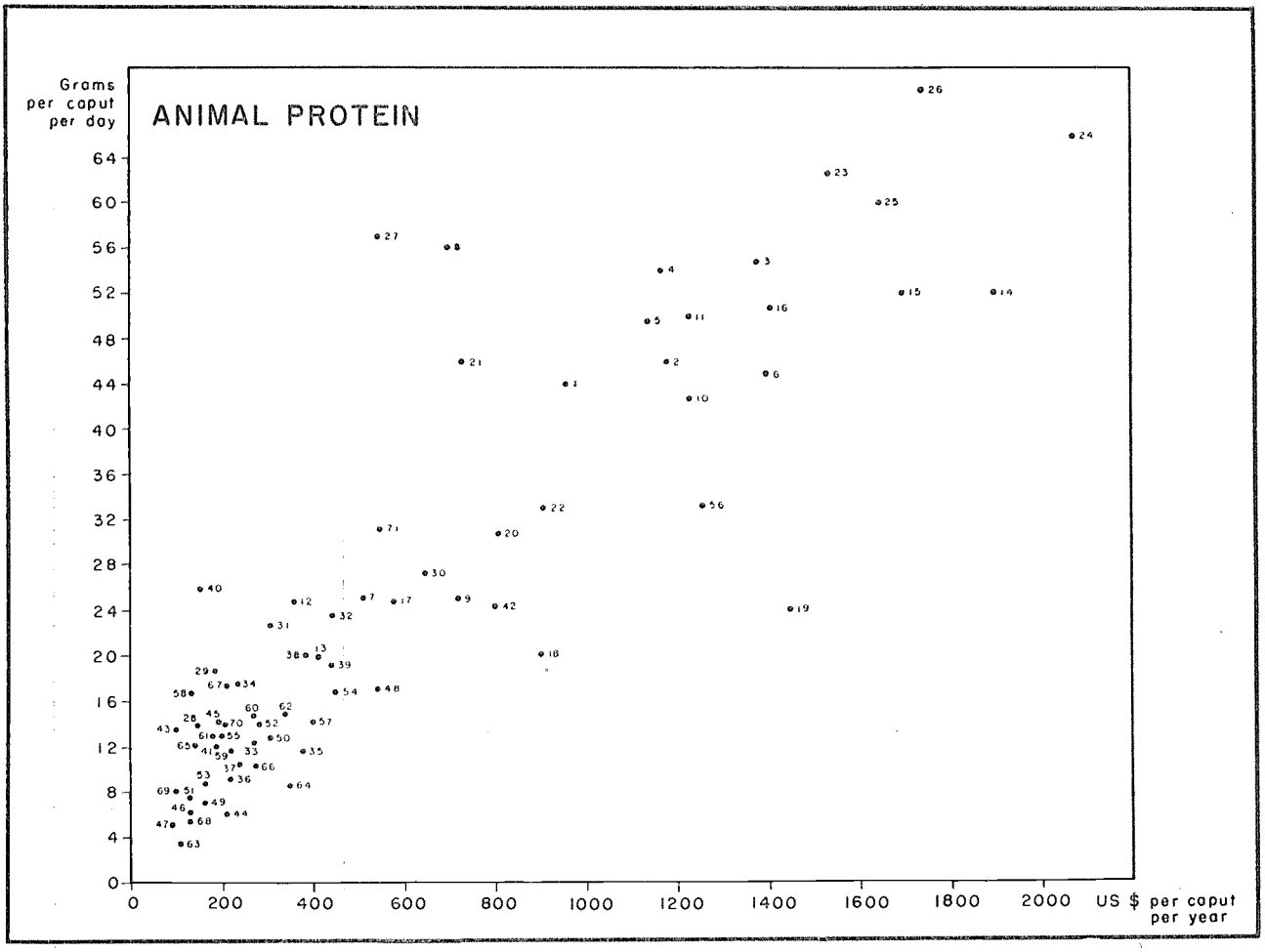
1. Austria
2. Belgium-Luxembourg
3. Denmark
4. Finland
5. France
6. Germany, Fed. Rep.
7. Greece
8. Ireland
9. Italy
10. Netherlands
11. Norway
12. Portugal
13. Spain
14. Sweden
15. Switzerland
16. United Kingdom
17. Yugoslavia
18. Bulgaria
19. Germany, Eastern
20. Hungary
21. Poland
22. U.S.S.R.
23. Canada
24. United States
25. Australia
26. New Zealand
27. Argentina
28. Bolivia
29. Brazil
30. Chile
31. Colombia
32. Costa Rica
33. Dominican Republic
34. Ecuador
35. El Salvador

sharply up to a per caput income level of about U.S.$1,000 per year, but after that they flatten out. Intakes of animal protein, on the other hand, show a close relationship with income over the whole range of incomes. The main exceptions are Argentina, Ireland, and Poland, where animal protein intakes are a good deal higher than would be expected on the basis of their income levels, and Bulgaria and Eastern Germany, where they are lower.

The same close relationship between protein intakes and income is found within a country, as is shown in Table III-6, which is based on those food consumption surveys available in FAO showing data classified according to income or expenditure. Comparisons of such data are difficult, chiefly because of differences in the coverage of the surveys, and in order to bring together data from both partial and nationwide surveys the per caput household expenditure of each group is expressed as a percentage of the national average. This indicates the position of the group in relation to national average consumption, and is used as the basis for classifying the households.[16]

[16] For further details of the method used, see: United Nations, 1963. *Compendium of social statistics.* Statistical Papers, Series K. No. 2. New York; Smit, C.P.G.J. 1962. International comparison of food consumption data. *Monthly Bulletin of Agricultural Economics and Statistics* (FAO), 11 (12): 1-7.

PROTEIN IN RELATION TO PER CAPUT INCOME, BY COUNTRY



36. Guatemala
37. Honduras
38. Mexico
39. Panama
40. Paraguay
41. Peru
42. Venezuela
43. Burma
44. Ceylon
45. China: Taiwan
46. India
47. Indonesia
48. Japan
49. Korea, Rep. of
50. Malaysia [1]
51. Pakistan
52. Philippines
53. Thailand
54. Cyprus
55. Iraq
56. Israel
57. Lebanon
58. Sudan
59. Syria
60. Turkey
61. United Arab Rep.
62. Algeria
63. Congo (Leopoldville)
64. Ghana
65. Kenya
66. Mauritius
67. Morocco
68. Nigeria
69. Tanganyika
70. Tunisia
71. South Africa

[1] Malaya and Singapore only.

The effect of income on protein consumption is particularly marked in Ceylon and India, the two developing countries for which data of this kind are available. If the figures for protein intakes given in Table III-6 are compared with the estimates of requirements in Table III-5, it is seen that in the developed countries requirements are exceeded, even in the lowest income groups. In India, however, requirements are not met in the lower income groups in the urban areas of Maharashtra, or in the lowest income group in rural areas.

On the basis of the distribution of households in Maharashtra according to protein intake in relation to requirements, it has been estimated that between a quarter and a third of the households do not receive enough protein.[17] The proportion of persons with inadequate protein supplies would be slightly higher, since the distribution of protein within households is not likely to be in accordance with requirements. Especially in households where food supplies are limited, the productive members or wage earners may take all the protein they need and even more, at the expense of the nutritionally vulnerable groups.

Again using the Maharashtra data, it can be calculated that the addition of each child (of 12 years

[17] Sukhatme, P. V. 1963. The incidence of hunger. *Statistica neerlandica*. 17 (4): 401-424.

TABLE III-6. - DAILY PROTEIN INTAKE IN RELATION TO HOUSEHOLD EXPENDITURE PER CAPUT, SELECTED COUNTRIES

		All house-holds	Households classified according to per caput household expenditure as percentage of national average										
			0-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150 and over
		Grams per caput per day												
AUSTRIA, 1954/55														
Cities of more than 10,000 inhabitants	A.P.	36.1	—	—	31.7	33.9	35.0	35.6	36.0	36.8	—	38.6	38.4	40.8
(7,019 households)	T.P.	70.4	—	—	65.7	67.6	68.7	69.6	70.9	70.4	—	74.9	73.5	76.5
FINLAND, 1956														
Urban salary and wage-earners	A.P.	44.1	—	—	—	—	—	—	44.1	44.5	38.0	—	—	46.2
(485 households)	T.P.	75.0	—	—	—	—	—	—	75.0	75.7	66.4	—	—	76.4
GERMANY, FED. REP.														
Urban 4-person households, 1950/51	A.P.	26.6	—	—	22.9	25.4	—	27.5	—	29.0	—	—	29.3	—
(409 households)	T.P.	58.5	—	—	53.0	56.6	—	59.8	—	62.6	—	—	61.0	—
Rural 4-person households, 1953	A.P.	34.4	—	20.6	26.0	—	30.6	33.7	—	37.1	39.1	—	—	45.6
(215 households)	T.P.	79.8	—	60.9	66.0	—	73.9	79.9	—	83.1	87.3	—	—	95.5
Farm laborers, 1953	A.P.	21.9	12.8	15.0	21.6	23.0	25.6	26.4	—	—	—	—	—	—
(193 households)	T.P.	56.5	43.2	48.6	54.1	59.1	63.6	63.0	—	—	—	—	—	—
IRELAND, 1951/52														
Towns and villages	A.P.	35.4	—	23.5	—	—	—	33.6	—	—	—	—	41.7	49.5
(12,300 households)	T.P.	70.8	—	57.3	—	—	—	68.7	—	—	—	—	78.9	85.2
ITALY, 1953/54														
Nationwide, wage-earners	A.P.	26.2	15.9	—	23.0	—	27.3	—	30.5	—	—	35.2	—	41.2
(3,137 households)	T.P.	73.9	62.2	—	70.3	—	74.1	—	77.5	—	—	85.2	—	94.4
NETHERLANDS, 1951														
Nonfarm population 4-person families	A.P.	30.3	—	—	26.5	29.7	—	30.4	—	31.3	—	—	—	31.1
(584 households)	T.P.	60.5	—	—	57.3	60.0	—	60.0	—	62.1	—	—	—	60.8
NORWAY,[1] 1954														
Fishermen's families	A.P.	60	60	—	—	—	—	—	—	—	—	—	—	—
(293 households)	T.P.	100	100	—	—	—	—	—	—	—	—	—	—	—
Farmers' families	A.P.	65	64	81	—	—	—	—	—	—	—	—	—	—
(585 households)	T.P.	108	107	125	—	—	—	—	—	—	—	—	—	—
SWITZERLAND, 1955														
Laborers and employees	A.P.	30.8	—	31.8	31.2	28.2	—	31.3	—	—	—	—	—	—
(329 households)	T.P.	53.6	—	56.6	53.7	50.5	—	53.9	—	—	—	—	—	—
UNITED KINGDOM, 1956														
Nationwide	A.P.	43	—	—	41	43	—	50	—	—	—	—	—	—
(9,617 households)	T.P.	76	—	—	74	76	—	78	—	—	—	—	—	—

TABLE III-6. - DAILY PROTEIN INTAKE IN RELATION TO HOUSEHOLD EXPENDITURE PER CAPUT, SELECTED COUNTRIES (*concluded*)

		All households	Households classified according to per caput household expenditure as percentage of national average											
			0-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	150 and over
		Grams per caput per day												
UNITED STATES, 1955														
Urban (2,299 households)	T.P.	103	92	—	98	103	—	107	—	110	—	—	—	111
Rural nonfarm (1,037 households)	T.P.	101	94	101	—	105	106	—	—	107	—	113	—	111
Rural farm (1,679 households)	T.P.	109	105	—	109	114	114	109	—	—	113	—	—	121
CEYLON, 1952/53														
Nationwide (5,179 households)	A.P.	8.18	4.71	4.51	—	—	8.31	—	—	9.86	—	—	—	21.21
INDIA, 1958/59														
Maharashtra, rural (599 households)	A.P.	3.75	1.62	2.21	2.79	6.96	6.20	—	7.69	—	7.22	—	—	11.03
	T.P.	64.33	47.17	80.09	68.87	68.79	78.95	—	78.99	—	88.25	—	—	98.77
Maharashtra, urban (191 households)	A.P.	6.01	1.67	3.66	4.42	4.35	5.31	—	5.75	—	7.07	—	—	12.58
	T.P.	45.57	34.29	37.16	44.45	48.76	55.18	—	46.96	—	49.12	—	—	54.01
ISRAEL, 1951														
Immigrants from North America and western Europe (759 households)	A.P.	34.27	32.23	36.63	39.17	—	37.74	—	—	—	38.50	—	—	—
	T.P.	78.13	73.96	83.36	87.11	—	82.87	—	—	—	87.53	—	—	—

NOTE: A.P. = animal protein; T.P. = total protein.
[1] Protein supplies per consumption unit.

and under) to the family is associated with an increase in animal protein consumption of only about 2 grams per day in rural areas and about 1 g per day in urban areas. While the child is not likely to receive only this marginal addition, since the parents will compensate by reducing their own consumption, their scope for doing this is limited. Although the situation in respect of total protein is less serious, it would appear that the present distribution of protein both among and within families is likely to lead to malnutrition in children rather than adults.[18] The same appears from surveys of rural households in Uttar Pradesh.[19]

TABLE III-7. - PROTEIN CONSUMPTION IN URBAN AND RURAL AREAS

	Area	Animal protein	Total protein
		Grams per caput per day	
Germany, Fed. Rep., 1951/52, 4-person households	Urban	26.6	58.5
	Rural	34.4	79.8
Yugoslavia: Croatia, 1956	Urban	27	76
1954	Rural	25	79
United States, 1955	Urban	...	103
	Rural nonfarm	...	101
	Rural farm	...	109
Costa Rica, 1950	Urban	18	59
	Suburban	10	56
	Rural town	10	47
	Rural farm	7	48
India: Maharashtra, 1958/59	Urban	6.01	45.57
	Rural	3.75	64.33
Uganda, 1956	Urban	14	46
	Rural	3	58

[18] Jones, G.T., Schulte, W. and Sukhatme, P.V. 1963. *Implications of population trends for food supplies and requirements for the Far East with special reference to India.* Paper read at Asian Population Conference, New Delhi.

[19] Roy, J. and Dhar, S.K. 1959. *A study on the pattern of consumer expenditure in rural and urban India.* Studies relating to planning for national development No. 2: Studies on consumer behavior.

Income levels influence not only total protein consumption, but also its composition. The influence of income on animal protein consumption has already been brought out in Figure III-3 and Table III-6. There are many studies indicating that as incomes rise there is a gradual shift from the cheaper foods, such as starchy roots, grains, and pulses, to more expensive ones, in particular animal products, and consequently to sources of more and better protein.

There is also evidence of differences in protein consumption between urban and rural areas (Table III-7). Per caput consumption of animal protein is generally higher in urban than in rural areas, mainly because of higher average incomes. On the other hand, the per caput consumption of protein from all sources is usually greater in rural areas.

Prospects for increasing protein supplies and consumption

Having examined the present situation of protein nutrition and of protein consumption in relation to requirements, one must look at the prospects and limitations for expanding the supplies and consumption of protein foods.

Increases in the quantity and improvements in the quality of the protein in the diet can come about by increased consumption of the protein foods commonly used, by increased consumption of foods that are readily available but not commonly used, by the introduction of new protein foods, or by the addition of protein concentrates to staple foods commonly used.

An assessment of these possibilities involves, first, an examination of the prospects of increasing supplies of each of the main food groups and also of processed protein concentrates and what may be called " unconventional " sources of food protein. A second group of problems concerns such aspects as storage, processing and preservation, packaging and handling, transport, and marketing organization. Thirdly, it is necessary to discuss the problems involved in obtaining increased consumption of protein by those groups of the population most in need of it, and the closely related question of the costs of the various sources of protein.

The following notes on the main food groups raise a number of general questions that may usefully be examined at the outset. They cover not only the prospects for increasing domestic production in the developing countries, where greater supplies of protein are most needed, but also, where appropriate, the prospects for increasing supplies in these countries by decreasing exports or by means of imports, in particular from the developed countries. There does not seem, however, to be much possibility for the developing countries to obtain greatly increased supplies of protein through imports. Their scarce foreign exchange resources are urgently needed to import the capital goods required for development, and they are usually attempting to reduce commercial food imports, which in many countries have risen sharply in recent years. Furthermore, although the grains that form the bulk of the surplus stocks of food in the developed countries are good sources of protein, the more concentrated sources of protein, except for dried skim milk, are not available as surplus on a scale which could have much impact on protein consumption in the developing countries.

Most of the existing international trade in protein-rich foods is directed toward the developed countries, either from other developed countries and " semi-developed " countries like Argentina (mainly animal products), or from the developing countries (mainly oilseeds and oilcake). It is of interest to speculate whether an increase in the use for human feeding of processed protein concentrates, many of which are manufactured from oilseeds, would greatly affect world trade in these commodities or the availability of oilcake for animal feeding. The diversion of oilseeds for use as human food in developing countries would probably, however, be so gradual as to have little effect on world trade patterns or on feed supplies in the developed countries.

One valuable protein-rich food of which imports may have an important role to play in the developing countries is dried skim milk. This is at present one of the cheapest sources of protein as a commercial import, and is also available under concessional terms. In view of the vast quantities of skim milk at present used relatively unproductively or even thrown away on farms in the developed countries, it would seem possible to expand greatly the amount of dried skim milk available for human feeding in the developing countries. The present methods of agricultural support, which tend mainly to bring

forth surpluses of grains, might conceivably be replaced by other methods leading to surpluses of products such as skim milk.

Data are presented later that enable a rough comparison of the costs of some of the main protein foods. In spite of the importance of costs, they are not, however, an overriding consideration. Obviously if a protein concentrate is sought for widespread introduction into diets in protein-deficient countries its cost is a major factor. However, the previous section has made clear the present preference all over the world, as incomes increase, for the higher priced sources of protein, and in particular for animal protein, which is also the most costly to produce in terms of agricultural resources.

If costs were the only consideration, it might in fact be difficult to make a case for the continued use of much of the world's crop production as feed for livestock, since the same agricultural resources could be used to produce a much larger output of vegetable products, including vegetable protein, for direct human consumption. However, most people accustomed to eating livestock products would be most unwilling to make the necessary radical transformation in their diets. Livestock are also an integral part of most of the more advanced agricultural systems, as well as the most efficient converters of grass and plant wastes. Such factors are likely to be decisive, even though it is probable that only small quantities of animal protein are needed in human diets provided vegetable protein of satisfactory quantity and quality is available.

Table III-8 indicates the very large proportion of the world's agricultural resources that undergo the costly conversion into livestock products. Unfortunately data are not available for the U.S.S.R., eastern Europe, and Mainland China, but this would probably not make much difference to the broad picture.

About two thirds of the world's agricultural area is grassland, but this includes land of very varying quality. Much of the total is not very productive and would not be suitable for any other use, but it also includes some highly productive land, mainly in the developed countries. In addition it is estimated that about a quarter of total food crop production is fed to livestock, and not much less than half in North America and western Europe. Most of this is grains, of which about half the world crop goes for livestock feeding. Most of the grain fed to livestock is, of course, grown specifically for this purpose. About 80 percent of the grain crop in North America is fed to livestock and about half in western Europe and Oceania. The percentage is much lower in the developing regions.

TABLE III-8. - AGRICULTURAL RESOURCES USED FOR LIVESTOCK PRODUCTION, MAIN REGIONS

	Permanent meadows and pastures as percentage of total agricultural area [1]	Percentage of total food crop production fed to livestock [2]	Percentage of total grain production fed to livestock [3]
	..... *Percent*		
Western Europe	34	43	51
North America	56	47	[4] 79
Oceania	95	11	47
Latin America	78	13	34
Far East [5]	73	2	6
Near East	70	...	...
Africa	72	...	6
ALL ABOVE REGIONS	64	26	49

[1] FAO. 1963. *Production yearbook 1962.* Rome, p. 3-7. - [2] Average 1959/60-1963/64. Based on estimates used for calculation of FAO indices of agricultural production. The figures include grains grown specifically for animal feed. - [3] Average 1958/59-1960/61. FAO. 1962. *Recent trends in grain utilization.* FAO Group on Grains, Seventh Session, 1962. CCP/Grains/62/5. - [4] Including waste. - [5] Excluding Mainland China.

Clearly the developing countries, and especially the densely populated ones, are unlikely in the foreseeable future to be able to afford to devote so large a proportion of their agricultural resources to livestock production as is done in the richer countries, and vegetable sources of protein are likely to remain of greater importance than in these countries. Increases in livestock production in the developing regions will probably have to be based primarily on raising the productivity of grassland, rather than on any great expansion in feed crop production.

The same problems do not apply to fish production, which should supply an increasing proportion of the world's animal protein. Among the main vegetable sources of protein, pulses and oilseeds appear to offer particularly good prospects in many developing countries.

MAIN FOOD GROUPS

The prospects and limitations for expanding supplies of each of the main food groups that are important sources of protein are considered in the following

paragraphs. Grains and leafy vegetables, which although yielding substantial amounts of protein are not consumed primarily for their protein content, are dealt with first, followed by the protein-rich vegetable crops, pulses, oilseeds, and nuts, and the main sources of animal protein.

Grains

Grains directly provide nearly half of man's total supply of protein. In addition, as indicated above, they are indirectly the source of much of the protein provided by livestock products. Almost half the world's grain crop, including a large part of the by-products from the processing of grains for human consumption, is fed to animals, mainly in the developed countries.

In their role as the staple foods of most of mankind, providing the bulk of the calorie supply, the various grain crops will continue to be the main sources of protein in the forseeable future. It is unlikely, however, that their proportional contribution to the world's protein supplies can be greatly increased. There is a limit to the amount of such relatively bulky foods a person can consume (especially the young children who suffer most from protein malnutrition in developing countries), while with rising incomes the consumption of grains tends to decrease.

Grains are likely to have their main importance as a source of additional supplies of protein in those tropical areas where the staple foods are now starchy roots, such as cassava, yams, and sweet potatoes, or starchy fruits such as plantains. The protein content of the grains is much greater than that of the starchy roots and plantains, and the quality of the protein also is higher (see Table III-2). Thus the partial replacement of these crops by grains brings an increase in the supply of protein and may improve its quality. This substitution tends to occur with rising incomes, and it should also be encouraged among primarily subsistence producers. However, the subsistence farmer finds that the starchy roots and plantains are generally easier than the grains to cultivate, and give higher yields in terms of calories per hectare. He believes in getting a full stomach for the least effort, and is ignorant of the nutritional value of the different crops.

Consumers in the developing countries generally show an increasing preference for wheat and rice. Wheat, however, does not usually thrive in the tropics except at considerable altitude. Large areas of tropical Africa where starchy roots are now staple crops are believed to be suitable for rice production, but progress has been slow except in certain areas, because of the arduous work involved in rice cultivation and the capital investment needed if satisfactory irrigation is to be provided.

Vegetables [20]

Leafy vegetables are generally considered good sources of vitamins and minerals rather than a food group that contributes protein. Yet many of them have a high content of protein on a moisture-free basis. Leafy vegetables such as spinach and sorrel give the highest yield of protein per unit area and per unit of time of all cultivated plants. While 1 hectare of vegetable land can produce in 3 to 4 months about 20 tons of fresh spinach containing 400 kg of protein, the same land sown as pasture will feed milking cows producing about 2,000 liters of milk, or only 100 kg of protein.[21]

As with grains, the potential contribution of vegetables to the world's protein supplies is limited by their bulky nature. They differ from grains, however, in that their consumption is at present very small in many areas. Quite considerable increases in their production and consumption are both desirable and possible in these areas, and would bring greater diversity to the diet, and supply needed vitamins and minerals as well as additional protein. Their yields and output can be raised relatively cheaply and quickly through the introduction of improved seeds, greater use of fertilizers, and control of pests and diseases, and their consumption should be encouraged through nutrition education and the establishment of family, school, and community gardens. Further studies of the nutritive value of indigenous vegetables are also needed in developing countries, together with instruction on the best methods of processing and cooking them.

Market gardening established in the vicinity of large towns in developing countries has often been economically successful, but considerable improvements are still required in the production, storage, transport and marketing of such perishable produce.

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[20] Fruit is not considered here, because of its generally low protein content.

[21] Genevois, L. *Chimie biologique*, 1: 204-205, 1963.

Pulses, oilseeds, and nuts

Pulses, oilseeds, and nuts are the main protein-rich vegetable crops. They have much to contribute to the relief of protein malnutrition in many areas where high-priced animal products cannot be afforded.

Pulses or grain legumes, such as beans, peas, and lentils, contain 20 to 40 percent protein on a dry basis, or three to four times as much as the grains. There is a very large number of species and varieties of pulses in the world, they are very adaptable, and are found in all agroecological conditions. Much can be done to increase their availability through relatively simple and low-cost measures such as the selection of suitable species and varieties, the genetic improvement of local stocks, the production and supply of high-quality seed, and the introduction of appropriate cultivation techniques and crop rotations where these are not already practiced. In addition to their nutritional importance, pulse crops can increase the productivity of the soil through chemical and structural improvements, including nitrogen fixation.

The value of nuts in human nutrition has been appreciated since the earliest times. While most are rich in fats, certain of them such as almonds, brazil nuts, butternuts, macadamia nuts, pecan nuts, pili nuts, pine nuts, pistachios, and walnuts may have as much as 20 to 30 percent protein of good quality in the kernel.

Most oilseeds are also rich in protein of good quality. Some of them, such as soybeans, contribute significant amounts of protein to the diets eaten in some countries. Protein-rich foods made from soybeans by traditional fermentation and other treatments have been used for many centuries in China, Japan, and other countries of the Far East, and commercial production of such traditional domestic products is now being carried out with some success in Japan.

Many of the main oilseeds are grown chiefly in the tropical and subtropical areas where protein deficiency is most serious. However, although part of the production of such crops as coconuts, groundnuts, soybeans, and sesameseed is consumed in the producing countries, the bulk of these potential protein supplies for human and animal use is exported in the form of whole oilseeds or oilcakes. In those few countries where a significant amount of these crops is processed locally to meet the growing domestic demand for fats and oils, the protein-rich presscake is generally used as fertilizer, animal feed, or fuel, or even wasted altogether, while it could be processed for human nutrition.

Table III-9 presents estimates of how much of the potential protein supplies from their main oil-

TABLE III-9. - POTENTIAL PROTEIN RESOURCES FROM OILSEED CROPS AND THEIR APPARENT DISAPPEARANCE IN INDIA, NIGERIA AND THE PHILIPPINES, AVERAGE 1959-61

	Total human protein intake from all sources (per caput per day)	Potential protein resources from major oilseed crops		Apparent disappearance (protein equivalent)				
				Exported as seed	Exported as cake	Apparent domestic retention		Used for human consumption (per caput per day)
		Total	Per caput			Total	Per caput per day	
INDIA	*Grams*	*1 000 metric tons*	*Grams*	..... *1 000 metric tons*			..... *Grams*	
Groundnuts		1 109	7.0	10	188	911	5.8	[1] 0.30
Cottonseed		377	2.4	—	8	369	2.3	—
Rapeseed		241	1.5	—	5	236	1.5	[1] 0.10
Linseed		104	0 7	—	14	90	0.6	—
Sesameseed		90	0.6	—	—	90	0.6	[1] 0.10
TOTAL	[1] 51	1 921	12 2	10	215	1 696	10.8	[1] 0.50
NIGERIA								
Groundnuts	...	255	20.39	136	30	89	7.13	...
PHILIPPINES								
Copra	[1] 47	121	12.02	90	[2] 29	2	0.16	...

[1] 1957-59 average. - [2] Includes desiccated coconuts.

seed crops is retained domestically in three of the major oilseed-producing countries. In India, while almost all of the protein is retained in the country, only a small fraction is used for human nutrition. In Nigeria only about a third of the protein in the groundnut crop is kept in the country. In the Philippines almost all of the potential protein supply from the coconut crop is exported as copra, copra cake and desiccated coconut, and it can be estimated that an increase of only one gram per person per day in protein intakes from this source would be at the expense of a reduction in exports of some 50,000 tons of copra cake, amounting to a loss in export earnings of about U.S.$3 million annually, or about 1½ percent of the country's annual earnings from coconut products.

The low price of protein from oilseeds and the large oilseed production in developing countries have inspired many efforts to develop suitable products that can be added to protein-deficient diets. These are discussed in a later section concerning protein concentrates.

Milk and milk products

As indicated in Table III-4 above and in Annex Table 18, the supply of milk and milk products is at present concentrated in the economically more developed countries even more than in the case of the other main sources of animal protein. Per caput consumption of milk and milk products averages about six times as much in the more developed as in the developing regions. Whereas in the more developed countries milk consumption has reached a high level and there is some tendency toward surplus production, in the developing countries production and consumption are very small.

There are many technical difficulties in increasing milk production in developing countries. In a few tropical areas climatic conditions or disease virtually preclude animal husbandry. More often, however, the main cause of the low production of milk is low yields per animal, reflecting such factors as poor management, shortage of feed, diseases, and poor quality stock, all of which require a considerable capital outlay, persistent work and a long time to overcome. The development of a modern dairy economy also entails the use of various kinds of dairy equipment, most of which has to be imported, while trained personnel are also needed to operate it. Above all, however, efficient processing, marketing, and transport are especially necessary in the case of products as perishable as milk and most of its derivatives.

Because the expansion of milk production in developing countries is likely to take a long time, imported milk products may have an important role for some time to come in many of these countries, especially in new urban centers and industrial settlements. The scarcity of foreign exchange may hamper such imports, though some milk products, in particular dried skim milk, are at present available under concessional terms.

Dried skim milk, which has a protein content of about 36 percent, is one of the main surplus commodities of the more advanced countries. Its world price is consequently low, and it plays a large part in the concessional export programs of the United States. The annual imports of skim milk powder into developing countries have been running at about 300,000 tons in recent years, of which about two thirds have been obtained under concessional terms. The average f.o.b. price for commercial imports has been about 18.5 U.S. cents per kg, or about 51 cents per kg of protein. At this price it is one of the cheapest sources of animal protein on the world market. Because of its low price, dried skim milk is the most suitable milk product for use in low-income countries until their own dairy industries have developed. Dried skim milk produced domestically in developing countries is at present more expensive than the imported product.

The liquid milk available in developing countries is frequently adulterated, and the establishment of modern milk plants acts as a nucleus for the general improvement of both hygiene and quality control. Plants for liquid milk should also be capable of manufacturing appropriate milk products, such as butter, ghee, cheese, milk powder, yoghourt, and ice cream.

The introduction of "toned milk," using imported dried skim milk to produce a standardized milk of low-fat content from the high-fat local cow or buffalo milk, has proved valuable in India and some other countries, as it is much cheaper than full-fat milk. Dried skim milk can also be used in reconstituted form with the addition of vegetable fats ("filled milk"). Such products prepared in part from imported dried skim milk are cheaper at present than those manufactured from domestic milk production, and in many countries this situation will probably continue for a considerable time. It is also likely that the surpluses of dried skim milk from

developed countries will continue to be available for some years.

In the last few years a number of dairy exporting countries have set up in large consuming centers in the Far East and elsewhere plants for recombining dried skim milk and butter oil. This recombined milk is less expensive than imported evaporated or condensed milk, while it provides an outlet for surpluses of butter fat as well as of skim milk.

Dried whole milk contains about 27.5 percent milk fat and 25 percent protein. Because of its high fat content it is much more expensive than dried skim milk and is therefore used mostly in advanced countries as reconstituted liquid milk, in baby foods, and in the manufacture of other food products. Its high fat content also means that it has a short shelf-life, especially in hot climates, and it has to be nitrogen gas-packed (usually in 10- to 20-lb cans) to prevent the development of rancidity and deterioration. Chemical additives can also be used to prolong shelf-life, but this too is expensive.

Meat and meat products [22]

Although there are large numbers of livestock, especially cattle, in the developing countries, their productivity is generally very low. In Africa, for example, only 30 to 50 calves per 100 cows survive each year. The number of animals slaughtered each year is estimated as only 8 to 10 percent of the total, as compared with over 20 percent (excluding calves) in temperate countries. Carcass weights are 100 to 150 kg, as against 200 to 250 kg in developed countries. [23] More than half of Africa south of the Sahara is infested with the tsetse fly, the carrier of trypanosomiasis, and this makes cattle raising uneconomic if not impossible.

In the Far East, where meat consumption per caput is the lowest in the world, cattle are used mainly as work animals, and the heavy population pressure tends to discourage the production of crops for feed rather than for direct use as human food. Livestock problems in Latin America are closer to those in Africa, but the industry is rather more advanced and there is no tsetse fly.

Improvements in the productivity of cattle in the developing countries depend mainly on disease control and on the provision of feed supplies in the dry season. Foot-and-mouth disease is still endemic in almost all of the developing countries, and continuous efforts are necessary to combat tick-borne diseases. The reduction of the area infested by the tsetse fly in Africa entails expensive programs of bush clearing and spraying, and progress is likely to be slow unless new methods of eradication are found. The problem of insufficient feed in the dry season requires intensified research on fodder crops, the introduction of suitable methods of producing and storing fodder, and measures that would make it profitable to move range cattle in the dry season to more intensive feeding areas.

However, the difficulties are not purely technical. In many developing countries cattle are held as a form of wealth or for reasons of social prestige. This leads to the keeping of inferior or aged animals that have little or no productive value. In India religious beliefs prevent the slaughter of unproductive animals which are economically useless except possibly as a source of dung for fuel or manure.

Because of their quicker maturity the large numbers of sheep kept in the more arid areas in the developing countries present fewer problems than do cattle. They lamb at the beginning of the rains, and during the wet season there is grass for the young animals. In the dry season they can be slaughtered, and only the breeding herd has to be maintained. Much remains to be done, however, in controlling diseases and parasites and improving grazing management.

Pigs offer certain advantages in developing countries, provided supplies of grain or other feeds are sufficient (they cannot be raised solely on pasture), and provided religious beliefs do not forbid the consumption of pigmeat. Since they do not need to range widely they can be kept in restricted areas where sanitary conditions can be controlled.

Improvements in marketing, discussed later in this chapter, are also needed if the animal wealth of the developing countries is to be better utilized. Most of the necessary measures for improvement, on both the production and marketing sides, will take time, and many of them are costly. It does not appear, therefore, that meat production in the developing countries can be increased very rapidly in the immediate future, even though there are many relatively limited areas where well-chosen measures would produce worthwhile results quite quickly.

Imports of meat are unlikely to play much part in increasing the protein supplies of the deficient

[22] Excluding poultry meat, which is discussed separately below.
[23] FAO. 1961. *Livestock and meat marketing in Africa.* Rome.

areas of the world. Some 150,000 tons of meat, partly in canned form, were imported annually in 1959-61 by the developing countries from the more developed countries, but because of its high price this meat is consumed mainly by the high-income groups of the population and contributes little to the prevention of protein malnutrition.

Eggs and poultry meat

Rapid improvements in poultry production have recently been made not only in the industrialized countries but also in many developing countries. Deep litter and cage operations have been particularly successful because they are relatively simple to manage and the control of diseases and parasites is easier than under the free-range system.

Progress in breeding, nutrition, and disease control have made it possible to produce a 1.5 kg broiler chicken in about seven weeks, using little more than 2 kg of feed per kg of meat. While egg production is still around 30 to 40 small eggs per hen per year in most tropical countries, it has been demonstrated many times that 200 and more can be produced if efficient layers are well fed and managed and if diseases are kept under control. It is possible to reduce the feed requirement per dozen normal-sized eggs to about 2 kg, whereas under primitive conditions up to 1 kg is required to produce a single egg.

As a result of these almost revolutionary developments, prices of eggs and poultry meat have been substantially reduced in many countries in recent years, so that poultry products are no longer luxury foods. However, although a rapid expansion of poultry production is technically possible in almost any country, high levels of production can be sustained only if there is a well-organized marketing system. Large-scale intensive systems of poultry production require a regular market and also supplies of balanced feed mashes. It is probable therefore that for some time to come their possibilities can be realized in the developing countries only in the vicinity of large towns.

In these circumstances the scavenging indigenous hen, which provides a few eggs and some meat at practically no cost, still has an important role. The introduction of vaccination programs, small improvements in feeding and housing, and some culling of unproductive birds could greatly increase productivity in such small-scale poultry keeping.

Fish and other aquatic products

Although seven tenths of the earth's surface are covered by oceans, fish and other aquatic products at present account for only about 3 percent of the protein consumed by human beings. The future potential of these as human food is of particular interest as they do not compete for land resources with other food and agricultural products.

The demand for fish is likely to increase considerably in the near future in the developing countries, in contrast to the more developed countries. In the latter group there will probably be some shift toward more expensive and more elaborately processed products. In the former, however, the increasing demand will mostly have to be met by low-cost products that are easily storable and transportable, and by species that cannot be more profitably disposed of in export markets in the high-income countries.

The substantial increase in the world catch since the war has been made possible mainly by the development of fisheries that hitherto had not been seriously exploited. Future supplies will depend to a large extent on the success of further efforts to locate and exploit stocks that are so far not utilized, especially in tropical and Southern Hemisphere waters.

Much remains to be learned about the resources in these waters. In tropical waters prospects could become better when techniques are developed for exploiting grounds such as those where the presence of reef corals and associated fauna precludes the operation of mechanized vessels using trawls or other bottom-nets. Substantial expansion, partly based on fish meal market opportunities, is already in progress in the waters of the Southern Hemisphere, particularly off the east and west coasts of Latin America. Inland fisheries also have considerable possibilities in many countries.

The potential world harvest of fish, using the traditional hunting-type methods of exploitation, and without endangering known stocks, has been conservatively estimated as approximately 115 million tons, or about 2½ times the present level. [24]

Many technological advances have been made in recent years in fishing methods, mostly aimed

[24] Graham, H.W. and Edwards, R.L. 1962. The world biomass of marine fishes. In *Fish in nutrition*. London, Fishery News (Books) Ltd.

at increasing the efficiency of locating and catching the fish (including the use of electronic devices) and at the extension of the fishing effort both spatially and seasonally. There have been important advances in vessel technology, and special-purpose craft have been developed to obtain more effective division of labor in the fishing fleet. Considerable technological progress has also been made in the field of processing, in particular in respect of processing at sea, the rationalization and improvement of such processes as freezing and smoking, improved methods of quality control, the introduction of new products, and the more efficient use of processing waste.

The use of new equipment and of improved methods of fish catching and processing has, however, been mainly in a few of the more developed countries. It may therefore be desirable for the exploration and exploitation of the remaining relatively unexploited sea areas to be carried out in co-operation by the developing countries bordering these areas and the advanced fishing nations which are extending their operations to the more distant seas. Especially in the context of overcoming protein malnutrition there may be scope for wider international co-operation in these efforts.

While most of the above discussion concerns possibilities in the relatively short run of one or two decades ahead, it is necessary in the case of aquatic products to make brief reference also to the longer-term possibilities. Apart from more efficient use of those stocks that are exploited at present, and exploiting and finding uses for species not used at present, it is possible to take positive action to modify the resources of the sea. Possible methods include increasing fish populations and the nutrient supplies they need by means of sea-farming techniques (the seeding of plankton, the minimization of pollution, the creation of artificial upwellings, etc.); improving the quality of the stocks through genetic manipulation, the destruction of useless predators, etc.; and the creation of new resources by transplantation and other means. It is even possible to envisage such developments as the use of underwater craft for the pursuit and capture of fish, massive engineering operations to plow the bottom of the sea, and the fertilization of the surface waters. Although the cost of such operations is at present very high, the time may not be too far distant when technological progress makes them a practicable means of obtaining a very large expansion of the world's protein supplies.

Protein concentrates for human food

Because of the vast needs for additional low-priced sources of protein, much attention has been focused in recent years on the development and production of inexpensive protein concentrates from products, up to now inadequately exploited, which could be used as human food if carefully processed. Such protein concentrates have recently been developed in a number of countries from indigenous products such as oilseed meals and presscakes, and fish flour, all of which have been little used in the past.

A number of difficulties have had to be overcome in the development of such products. It is essential that they should appeal to the consumer, that they should be nutritionally satisfactory supplements to existing dietary patterns, and also that they can be introduced into existing marketing channels in such a way as to reach consumers who are not otherwise getting enough protein. In the case of oilseed presscakes another difficulty is that commercial feed-grade oilcake is not usually suitable as a raw material from which to produce human food. Special processing equipment is often necessary and also careful selection of the raw material. Consequently edible protein concentrates from oilseeds tend to cost several times as much as commercial feed-grade oilcake, though they remain a relatively cheap source of protein.

Processed soybeans are a useful source of protein of good quality, and such products could well be developed further. In Indonesia a spray-dried extract of soybean and sesame is now commercially produced and widely used. In Brazil a new protein-rich product based on heat-processed full-fat soybeans is being introduced in the market with the support of the government. Cottonseed flour, processed either from presscake or from solvent-extracted meal has been used in food mixtures in Central and South America for some years.

Groundnut flour, processed from defatted groundnuts, is also being introduced in human feeding, though a recent setback has been the discovery that, as a result of infection by the mold, *Aspergillus flavus*, groundnut crops and products frequently contain toxic substances known as aflatoxins. How to eliminate or minimize infection during harvesting, transport, and storage is now being investigated. Such products should not be used as human food until they have satisfactorily passed certain biological tests which have been devised.

A mixture of one part of groundnut flour with three parts of millet flour has been introduced in Senegal markets, and in Nigeria the government has sponsored the commercial production of a food supplement consisting of three parts of groundnut flour and one part of dried skim milk. In India a project is under way for the manufacture of a food for weaning and for preschool-age children based on groundnut flour, dried skim milk, and wheat flour. Development work is taking place in a number of countries for the utilization of the proteins of other oilseeds, such as sesame, sunflowerseed, and coconut.

Much research has also been carried out on the development of processes for the production of low-cost fish protein concentrates suitable for human feeding. Commercial-scale plants for the production of edible fish protein concentrates have been installed in Chile, Morocco, South Africa, Sweden, and the United States, though most are not yet in full operation. Fish sausages are a good and cheap source of protein and are in commercial production in Japan and other countries in the Far East.

The protein concentrates that have been brought into use in recent years have been developed in line with a set of principles for the establishment of their safety and nutritional suitability for human feeding drawn up under the joint FAO/WHO/UNICEF program on protein-rich food which guided the early research. It was recommended that the production process should not be kept secret, and that it should be not only commercially feasible but also suitable for use in developing countries. Prior to testing on human subjects the products should be fed to more than one species of animal to establish their safety and nutritional value. They must have a high protein content and the quality of the protein must be such as to provide a useful supplement to protein-deficient diets. Finally, the nutritional value of the product must be confirmed by actual feeding to human subjects.

To guide producers of such protein concentrates and ensure the safety and nutritional suitability of these new foods, " Processing and Quality Control Guidelines " have been proposed for each type of product by the FAO/WHO/UNICEF Protein Advisory Group. These guidelines cover such questions as the quality of the raw material, processing conditions, chemical composition, protein quality and its assessment, sanitary conditions (microbiological status and insect and rodent contamination), physical form, and packaging. They have been accepted by both government and private concerns involved in the production, development, and promotion of protein concentrates.

Protein concentrates from such sources may be treated so that they are flavorless and odorless for inclusion in staple foods in order to augment the protein consumption of needy populations. In countries where major staple foods are processed on a large scale before they are marketed, government legislation could go a long way to increase protein consumption and prevent protein malnutrition by insisting on the inclusion of a suitable amount of such tasteless products. Alternatively, protein concentrates may be so processed that they retain their distinctive flavor and sometimes odor, and as such they are often attractive to the consumer who uses them as a form of " relish " to be added to his food. The experimental and applied research stage of the development of many such protein concentrates has been completed. It is now up to imaginative governments and commercial firms to make the best use of them in the fight against malnutrition.

Protein isolates

Reference must also be made to protein isolates, though they have so far been used to a very limited extent as food for man. These are proteins that have been extracted from the matrix of the foodstuff in which they developed, and as such have a high digestibility and are separated from other substances that may inhibit their use. Efforts have been made lately to manufacture textured food proteins by extruding isolated proteins in the form of fibers which are then spun and flavored to produce a foodlike texture and taste, e.g., beefsteak. Soybeans, groundnuts, and casein are mainly used as starting materials. The products appear to be entirely satisfactory nutritionally, but they tend to be expensive and there are still insufficient data to allow predictions concerning the possibility of their large-scale use in the future.

UNCONVENTIONAL SOURCES OF FOOD PROTEIN

The production of proteins from unconventional sources is also being closely studied for eventual possible utilization in human feeding. The tech-

nology in this field is still at an early stage, however, except for food yeast.

Food yeast can be produced in large quantities and at comparatively low cost, and large-scale facilities for its production are available in several countries. However, on account of difficulties in making it attractive, its use in human nutrition has so far had little success.

Green leaves are an important potential source of edible protein. A considerable amount of pioneering work has been accomplished, but a number of problems still remain to be solved before a low-cost product, acceptable to the human palate, can be produced. Some of the problems are the dark and unattractive color of the products so far obtained, their strong taste of hay, and the variability of their nutritive value. The critical age of leaves and their availability in large enough quantities to support a unit operating at economic levels of production also present difficulties. Large quantities of leaves of the proper age are needed for the production of reasonable quantities of leaf protein concentrate. So far no satisfactory and economic source of such raw material has been found. However, research is still in progress and the potential value of such products is unquestionable.

Algae, such as *Chlorella*, synthesizing proteins by the use of solar energy and cheap raw material such as sewage effluents, appear to be a promising source of edible proteins. Mass culture facilities have been developed and tested. However, economical harvesting and processing methods are still under intense investigation in the United States (where the object is to develop suitable food for space travel) and in Japan.

A recent development is the production of proteins by yeast grown on paraffinic hydrocarbon fractions obtained from refining crude petroleum. A number of oil firms are working in this field and quantities of such proteins have now been successfully tested on laboratory animals. Here again the problem is one of acceptability by man. It may well be that such sources of protein will provide large quantities of animal feed in the future.

MARKETING AND RELATED PROBLEMS

The above discussion has mainly concerned production, though it has been necessary to refer frequently to marketing and related problems. The following notes deal briefly with storage, processing and preservation, packaging and handling, transport, and marketing organization, in relation to the prospects and limitations for increasing protein supplies and consumption.

Storage

Much of the world's food grain is lost because of faulty storage. Large proportions of green vegetables, fish, etc., are either wasted or diverted to livestock feeding or other secondary uses for lack of appropriate storage. Most of this wastage occurs in countries which are short of protein foods and can least afford it. Wider access to better storage could thus considerably stretch the total quantity of protein available. In many situations it would also permit it to be sold to consumers at lower prices, since marketing margins on that part of the supply which reaches consumers must carry the loss on the remainder that does not.

Many of the agricultural products containing the most valuable protein are highly perishable, and their marketing calls for special storage arrangements, especially in tropical climates. To avoid waste and to extend the season during which consumers can be supplied, access to suitable cold storage may be essential. It is also valuable where loads must be accumulated for economical transport to distant markets, and to even out supplies to processing plants.

Many recommendations for the construction of better storage, however, are made without an objective and thorough analysis of the cost in relation to the potential benefits. There are situations where the demand for storage is so irregular, or the cost of providing it effectively so high, that it would be more economic to produce additional quantities of protein food to compensate for the quantities lost through the lack of storage. For fruit and vegetables this is often the case, and livestock are generally best "stored" on the hoof or in processed form rather than as fresh meat under refrigeration. Similarly, cold storage of eggs to even out supplies seasonally is usually worthwhile only if other produce will provide complementary seasonal employment for the plant.

Processing and preservation

Many protein products must be dried, smoked, salted or canned, if they are to reach consumers in good condition. Production areas may be too distant for the marketing of fresh produce. Some

form of preservation may also be necessary to spread the period of consumption and so help to make production profitable.

The establishment of canning plants can give livestock raisers access to valuable outside markets, as has been done in Kenya and Madagascar, for example. The cans preserve the quality of their contents until they reach the consumer and are easily transported, while in addition heat sterilization eliminates the risk of animal disease transmission. The establishment of a processing enterprise can sometimes convert meat of relatively low quality into an acceptable food product. For instance, cattle raised in the dry zones of Africa do not give meat of first quality, but it can be combined with fat from other parts of the carcass to make a good canned product, while sales of meat extract provide additional income.

Achieving an appropriate scale of operation for processing plants often presents a problem. They should not, for the sake of engineering considerations, be constructed on a scale for which local supplies do not provide an economic turnover, unless there is a real likelihood that the existence of the plant will stimulate the requisite expansion of production. In several parts of Africa, for instance, meat packing firms have found out too late (after a plant had been installed and put into operation) that the area served could not supply enough livestock for it to run at optimum capacity.

Packaging and handling

The marketing of dry protein foods, such as grains and pulses, and also of meat and fish in developing countries generally proceeds without elaborate packaging. The main requirements are rapid, clean handling and the prevention of contamination. For many products, however, careful handling and packaging is essential, especially in tropical climates.

Large quantities of protein foodstuffs such as vegetables, eggs, etc., are lost because of poor handling and marketing methods. Almost certainly it would not be economic to try to save all this produce; the cost would not be covered by the return obtainable on the markets available. Nevertheless losses due to poor packing and handling cut down the supply of such foods reaching consumers and raise the price of the remaining portion that must bear all the costs. This explains in large part the very low share of the retail price which goes to the original producer. If retail prices of these important foods are to be reduced, and the grower given an incentive to produce a large quantity and better quality, then present packing and handling methods must be greatly improved. Better instruction of growers, merchants and their employees on the correct time to pick fruit and vegetables, on the most suitable containers to use, and on the co-ordination of picking and marketing plans, would avoid much deterioration and loss. Failure to keep handling and packing equipment clean and in good condition is only too common. Often, simple precautions in handling milk, meat, and eggs would avoid contamination and deterioration losses.

There are also situations in the developing countries where the introduction of new types of packaging and containers would be practicable and bring great benefits. The use of plastic and cellophane wrappers, for example, allows more sanitary handling and appeals to consumers. In those countries where consumers' incomes are high the package has become a critical means of selling a product. In the developing countries, however, the cost of small retail packages of 100 grams, ½ kg, or even 1 kg can put a product out of reach of the mass of consumers and of those who need more protein. There are various examples where processed protein foods are offered retail in ½-kg packages at prices equivalent to double those charged for the 20-kg lots available to institutional buyers.

The cost of packaging and distributing such protein products in consumer-sized lots can in practice have a greater influence over the final price than either raw material or processing costs. It therefore seems most practicable for the distribution of protein concentrates to be effected principally in large unit quantities to food processors and institutions for incorporation in bread and other staple foods.

Transport

Transport is often a limiting factor in the distribution of food products, as is demonstrated by the rapid development which usually takes place once suitable roads are built and communications established. Transport can often be a major element in the cost of food. For example beef cost 70 U.S. cents per kg wholesale in Accra or Leopoldville in 1960, as compared with 30 cents in Fort Lamy, since it must be brought either as live animals driven on foot over more than 1,000 kilometers from the savanna regions, or as meat by air.

Many products call for the employment of special transport methods and facilities if they are to reach

the consumer in good condition. Milk, vegetables, eggs, livestock, and many other products require great care and dispatch in transport, but only too commonly do not receive it. Thus eggs and milk may be allowed to stand under a hot sun while the driver eats or rests.

The distribution of protein-rich foods such as milk and meat can be greatly facilitated by the availability of road and rail vehicles and ships equipped with ice or mechanical cooling, and the organization of an efficient "cold chain" for the assembly, transport and distribution of perishable produce. Careful analysis is needed, however, to determine the economic feasibility of the installation of such expensive equipment, for there are only too many instances where it has been installed on too large a scale, or is improperly used for lack of qualified managers and technicians.

Marketing organization

The marketing system must be able to adapt the seasonal outflow of produce from the farm to a relatively stable and continuous demand from consumers. This is done by the mobilization of transport and storage facilities, skilled handling, detailed knowledge of supply and demand conditions and sources, the provision of adequate credit, and willingness to accept risks and responsibilities. It is the task of the marketing system to ascertain consumer requirements and preferences and adapt to them either by transporting certain foods to where they are most wanted, or by inducing farmers and processors to produce the preferred types locally if they have not done so previously. Not infrequently these responsibilities are underestimated: emphasis is laid on production and processing technology without corresponding attention to the marketing enterprises and services necessary to make its application worthwhile.

The continuance of systems of marketing adapted to conditions which no longer prevail often acts as a brake on the provision of more protein at lower cost to the people who need it. In a number of Latin American cities, for example, the sale of meat from efficient slaughterhouses outside their boundaries is blocked, in order to protect established small-scale butchers and the income the municipality derives from its own slaughtering facilities. This inevitably raises the price of meat to the consumer.

In many countries there is not so much a need to eliminate middlemen, as is often claimed, as for changes in their operating methods. More specialized middlemen may be needed to provide active competition, and to give producers and buyers a wider choice of alternative methods or channels of marketing. Termination of an obligation to pass livestock through a municipal slaughterhouse in Santiago, Chile, and the development of a refrigerated meat supply channel from the south, led to the replacement of a number of traditional intermediaries by a smaller number of specialized meat buyers for larger retail outlets which handle a wider range of products.

Such methods of stimulating competition may be supplemented by more direct action on the part of the farmers, consumers, and governments. They can acquire or set up marketing enterprises to operate under their own direction, and thus be sure that there are effective alternative marketing channels. Trading enterprises may also be set up in strategic marketing channels by marketing boards, municipalities, or other public bodies to serve as a measure of the efficiency of enterprises in other ownership. By widely publicizing the prices they offer and charge, they can keep those of the existing traders in line.

Where it is still economic for food supplies to pass through central wholesale markets, improvements in layout and organization merit attention. Lack of adequate information on demand and prices and poor bargaining power are continuing problems in the developing countries. Because farmers and country dealers only receive information belatedly and indirectly, a sheep that cost U.S. $1.90 at 200 kilometers from Djibouti, for example, might be bought for as much as U.S. $3.70 to $4.70 by the retail butcher in the city.

Providing suitable staff for the services needed to remedy such deficiencies and for the improved private, co-operative, and public enterprises which are required for the effective marketing of protein foods, calls for the establishment of specialized marketing training programs adapted to the conditions of the countries concerned.

Consumption problems and nutrition education

Even when foods rich in protein of high quality are readily available at a cost which puts them within reach of the mass of the population, vulnerable groups may continue to suffer severe protein malnutrition. Most people in the developed countries and the better-off people in the developing countries

tend to consume a fairly varied diet, containing a relatively high proportion of animal products, and this usually ensures that their protein requirements are satisfied. Where incomes are low, however, the diet is much less varied and is made up largely of foods that supply energy but are low in protein. In these circumstances consumer education in nutrition is needed in order to influence food habits toward the consumption of sufficient quantities of foods which are cheap sources of good quality protein. In the case of the very large part of the world's population who grow most of their own food, such education has to go hand in hand with agricultural and home economics extension to persuade and assist them to produce such foods themselves as well as to use them.

Careful study of existing food habits is a first essential if these are to be changed by the introduction of new foods or even the greater consumption of foods hitherto used only to a limited extent. Food habits and ways of preparing foods are part of the cultural and social pattern, which is the product of many generations. Sometimes this pattern changes rapidly, but at other times it resists change to a remarkable degree.

Traditions, beliefs, and attitudes concerning certain foods, including those arising from religious beliefs, are often a major obstacle in countries where the improvement of protein nutrition is necessary. Some good sources of protein may be rejected, at least at specified times or for particular groups of the population. The most serious of these beliefs and practices are those that affect children and pregnant and nursing women. Often most or the best protein foods are reserved for the male members of the family. The weaned infants may be transferred directly to sharing those items of the family diet that are considered appropriate for them, and these are rarely good sources of protein. Among some people certain nutritious foods are considered dangerous for children as, for example, dried fish in Indonesia. There are many examples of beliefs and practices concerning foods that are considered good or harmful for pregnant and nursing women. There are also cultural factors in connection with fasts and feasts, and there are certain foods that have prestige value, either for all the population or for particular groups.

Any proposed changes in diets or food habits must also take into account domestic practices and facilities. The frequency of purchase of food, facilities for storage and for protection from contamination, and the equipment for and time allotted to the preparation of meals, must be considered. Difficulties may arise if the preparation of a food requires more than the customary time, equipment or fuel.

It was once supposed that food habits such as those described above resulted simply from ignorance and would be readily changed once people were provided with the facts about good nutrition. It is now coming to be realized, however, that the problem is far more difficult, and that although the acquisition of sound nutritional knowledge is important, it is probably not the main factor in determining changes in food habits.

One reason why people fail to use the factual information they are given about nutrition is that the scientific facts may not fit prevailing beliefs about foods and their uses, which, as indicated above, are an integral part of the cultural and social pattern. Food habits, however, are usually in a state of change within a population, and beliefs about food often vary with age and with economic, social, and educational status. To a great extent people's behavior patterns, including their food habits and preferences, are determined by the example set by other people whom they desire to emulate. For example, the rapid decline in breast-feeding associated with urbanization in many developing countries appears to come largely from the desire to imitate the behavior of women of higher financial and educational status.[25]

It is only after careful analysis of such factors that effective programs of consumer education can be developed. Much can be learned from the techniques of commercial advertising, and from educational psychology.

Generally it will probably be easier to increase the consumption of protein-rich foods already known to and used by a particular population group than to introduce an entirely new type of processed protein food. In the case of a new food, careful testing of its acceptability to consumers is essential, including testing of the appropriate channels of sale and distribution, and whether consumers are ready to buy it at the price at which it is offered or whether subsidized or free distribution would be necessary.

The introduction and promotion of a new protein-rich food, such as the processed protein concentrates discussed earlier, will often entail a specialized campaign, based on the same principles as those mentioned above in connection with more general

[25] Jelliffe, D. B. 1962. Urbanization and child nutrition in Africa. *International Child Welfare Review*, 16 (2): 67-73.

programs of nutrition education. Detailed suggestions and guidelines for the planning and conduct of such campaigns are set out in a recent FAO publication. [26]

Campaigns to promote the consumption of new protein-rich foods should always be carefully coordinated with other activities aimed at nutritional improvement in the same area. Because people are so often suspicious of and resistant to changes in food habits, great care is necessary to avoid contradictions or inconsistencies in the teaching and information that they are given.

In many cases such campaigns, as well as general programs of nutrition education, may need to be combined with programs for the direct provision of protein-rich foods to needy groups, for example through school-feeding programs and the supply of protein supplements to those attending mother and child health centers. Activities of this kind, especially those directed toward children, also have a considerable educational effect.

COST OF PROTEIN

Protein is one of the more costly elements in the diet. In the few instances where attempts have been made to construct "least cost nutritionally adequate diets," taking into account the local availability of foodstuffs and local market prices, a close relationship has been found between the cost of a diet and its protein content.

Table III-10 brings together some estimates of the relative cost of the protein in various foods, based on wholesale prices on major world markets. These prices of course reflect other attributes of the foods as well as their protein content. Furthermore, such factors as import duties and restrictions, transport costs and distribution margins can radically change the cost relationships in a particular country.

Generally speaking, animal protein costs several times as much as vegetable protein, reflecting the heavy demands its production makes on agricultural resources. Important exceptions, however, appear to be dried skim milk and certain fish products such as dried fish and fish flour. Dried skim milk has always been a low-priced source of animal protein, and its price is at present kept down as a result of the dairy surplus in North America and western Europe.

In contrast to dried skim milk, liquid milk is an

[26] FAO. 1962. *Encouraging the use of protein-rich foods*, Rome.

TABLE III-10 - COST OF PROTEIN CONTENT OF VARIOUS FOODS (WHOLESALE ON MAJOR WORLD MARKETS)

	Protein	Price of product	Price of protein
	Percent	*U.S. cents per kilogram*	
Dried skim milk [1]	36	18.5	51
Fish, dried [2]	37	30	85
Fish flour [3]	80	40	50
Beef [4]	11.5	39.3	342
Chicken [5]	15.1	55	364
Egg [6]	11	52	465
Chick peas (gram) [7]	20	12.4	62
Dry beans [8]	22	17.2	78
Wheat flour	11.7	8	68
Defatted soybean flour [9]	51	20	40
Protein isolate, soybean [10]	96.5	93.7	97
Coconut, desiccated [11]	10.4	19.9	191

[1] Commercial exports in recent years, f.o.b. - [2] Angola, 1960. - [3] Deodorized, defatted, Morocco. - [4] Australia, export sides, frozen, average 1961-63; protein percentage calculated as for Australian medium-at dressed carcass. - [5] U.S. ready-to-cook broilers; price 25 cents per lb; protein ratio from USDA, 1950, *Composition of foods*, Agricultural Handbook No. 8. - [6] Average monthly price, Danish export co-operative, 1963. - [7] Banda, Uttar Pradesh, India, Feb. 1964. - [8] Mexico City, Dec. 1963. - [9] For bakery use in Japan (information from S. Hayashi, Japanese-American Soybean Institute). - [10] Average of U.S. range (information from A.M. Altschul, Southern Utilization Branch, USDA, New Orleans, Oct. 1963). - [11] Colombo, Ceylon, 1963; protein content estimated from copra equivalent.

TABLE III-11. - RELATIONSHIP BETWEEN RETAIL MILK PRICE AND NATIONAL INCOME, SELECTED COUNTRIES, 1959 OR 1960

	Average annual national income	Retail price of liquid milk	Purchasing power of average annual income for liquid milk
	U.S.$ per caput	*U.S. cents per liter*	*Liters per year*
Denmark	1 039	11.1	9 360
Germany, Fed. Rep.	968	11.0	8 800
Yugoslavia	243	[1] 7.3	3 329
United States	2 238	27.9	8 201
Brazil	[2] 102	[3] 5.4	1 889
Colombia	[4] 192	9.8	1 959
Paraguay	106	[5] 13.1	809
Peru	108	[6] 10.0	1 080
Burma	50	[7] 26.5	189
Ceylon	120	[8] 16.6	723
India	64	[9] 23.2	276
Pakistan	51	[10] 25.5	200
Turkey	162	[11] 12.7	1 276
Kenya	87	[12] 14.8	588
Morocco	116	[13] 16.8	690
Tanganyika	56	[14] 19.7	284

[1] Belgrade. - [2] Free exchange rate (203.77 cruzeiros per U.S.$). - [3] Rio de Janeiro. - [4] Free exchange rate (7.01 pesos per U.S.$). - [5] Asunción. - [6] Bottled, not pasteurized. - [7] Rangoon. - [8] Colombo. - [9] Bombay. - [10] Karachi. - [11] Istanbul. - [12] Nairobi; milk delivered in sealed bottles. - [13] Casablanca; pasteurized, bottled. - [14] Pasteurized, bottled.

expensive source of protein. Table III-11 shows retail prices for liquid milk in selected countries and also per caput disposable incomes. Milk generally costs more in the developing countries, and a comparison of prices with incomes brings out clearly how expensive it is in relation to the purchasing power of people in these countries. If the average disposable income were entirely spent on milk, it would purchase about 22 liters daily in the United States and about 25 liters in Denmark. Corresponding figures for some developing countries are 2.2 liters per day in Paraguay, 2.0 liters in Ceylon, 0.8 liter in India and 0.5 liter in Burma.

Grains and pulses are generally fairly cheap sources of protein. The cost of the protein in the processed protein concentrates referred to earlier varies considerably. At present it is generally several times as much as the corresponding product for animal feeding, but it is to be hoped that large-scale production may bring substantial reductions in the prices of processed protein concentrates for use as human foods.

Orientation of food supplies to meet nutritional needs

Finally, it is necessary to consider the steps that can be taken by governments to improve protein nutrition.

A first essential is obviously to obtain a clear picture of the protein supplies needed to cover the nutritional needs of the population, calculated in the manner described earlier in this chapter, and including an allowance for the fact that the distribution of the available protein among the different population groups is not necessarily in accordance with needs. However, in most developing countries this can only provide a guideline of a very long-term nature, because so many of the population are far from being able to afford the quantities of protein they need.

In addition to the long-term target that will cover all nutritional needs for protein, it is therefore necessary also to set shorter term targets of what seems feasible in the light of consumer purchasing power. Furthermore, in conjunction with data on the requirements of other essential nutrients, the protein target must be translated into targets for the supply of each of the main foodstuffs, which in turn must be based on what is known of existing food habits and the changes that may be expected in them, as well as on the agricultural potential of the country. Often this may entail more information than is currently available, and further studies and research may be necessary, including especially food consumption surveys of the type providing information classified by income or expenditure groups.

FAO's *Third world food survey* [27] contains targets for total protein supplies and animal protein supplies in each of the developing regions and for the world as a whole, which provide a striking illustration of the size of the increases that are needed. These targets are summarized on a per caput basis in Table III-12. The short-term targets have for their objective the elimination of undernutrition and a reasonable improvement in the nutritional quality of the diet. In the context of the United Nations Development Decade, which calls for a rate of growth of at least 5 percent per year in the gross national product of the developing countries, the attainment of these short-term nutritional targets would become possible by about 1975. The long-term targets are intended to give an idea of the scope for improvement in diets

TABLE III-12. - PER CAPUT PROTEIN SUPPLIES UNDER SHORT-TERM AND LONG-TERM TARGETS COMPARED WITH AVAILABLE SUPPLIES, BY REGIONS (RETAIL LEVEL)

	Total protein			Animal protein		
	Available	Short-term target	Long-term target	Available	Short-term target	Long-term target
	..... *Grams per caput per day*					
Latin America [1]	62	70	[2] ...	19	25	[2] ...
Far East [3]	56	68	74	8	12	20
Near East	76	77	79	14	20	25
Africa	61	69	74	11	18	25
All above regions	58	68	73	9	15	21
WORLD [3]	68	74	78	20	23	27

[1] Excluding River Plate countries. - [2] No long-term target has been set for this region. - [3] Including Mainland China.

[27] FAO, *Third world food survey*, 1963. FFHC Basic Studies No. 11. Rome.

TABLE III-13. - INDICES OF PROTEIN SUPPLIES UNDER SHORT-TERM AND LONG-TERM TARGETS, BY REGIONS (RETAIL LEVEL)

	Total protein				Animal protein			
	Short-term target		Long-term target		Short-term target		Long-term target	
	1960 population	1975 population [1]	1960 population	2000 population [1]	1960 population	1975 population [1]	1960 population	2000 population [1]
	Indices, available supplies for 1960 population = 100							
Latin America [2]	113	170	[3] ...	[3] ...	129	195	[3] ...	[3] ...
Far East [4]	121	164	132	314	167	226	261	621
Near East	102	144	105	264	148	208	184	463
Africa	115	146	123	264	167	213	233	498
All above regions	118	161	127	307	157	215	222	538
WORLD [4]	111	145	116	250	119	156	141	304

[1] United Nations "medium-assumption" projections. - [2] Excluding River Plate countries. - [3] No long-term target has been set for this region. - [4] Including Mainland China.

as the problems of poverty and scarcity become less acute toward the end of the century.

Table III-13 translates these per caput targets into targets for the total supply of protein, using the United Nations "medium-assumption" projection of the population in 1975 and 2000. For the developing regions as a whole, an increase of more than a quarter in total protein supplies would be needed to bring current levels of per caput consumption up to those called for under the long-term target. By the turn of the century three times the present protein supplies would be needed to feed the expanded populations of the developing regions at the level of the long-term target. For animal protein the third world food survey targets call for even greater increases: more than five times the present supply by 2000 in the developing regions as a whole, and more than six times in the Far East.

For the Far East, the region where available per caput supplies of protein, and especially of animal

TABLE III-14. - PROTEIN SUPPLIES IN THE FAR EAST [1] FROM MAJOR FOOD GROUPS UNDER SHORT-TERM AND LONG-TERM TARGETS COMPARED WITH AVAILABLE SUPPLIES (RETAIL LEVEL)

	Per caput supplies			Total supplies			
	Available	Short-term target	Long-term target	Short-term target		Long-term target	
				1960 population	1975 population [2]	1960 population	2000 population [2]
	Grams per caput per day			*Indices, available supplies for 1960 population = 100*			
Grains	32.6	32.4	29.6	99	134	90	214
Starchy roots	1.8	1.8	1.6	100	136	89	211
Pulses, oilseeds and nuts	12.0	18.1	19.3	150	203	160	379
Vegetables and fruit	1.7	2.7	3.8	159	216	224	531
Meat and poultry	3.0	4.4	8.0	152	206	276	655
Eggs	0.4	0.7	0.9	175	238	225	534
Fish	2.2	3.6	5.2	171	233	248	588
Milk and milk products	2.2	3.8	5.5	181	246	262	622

[1] Including Mainland China. - [2] United Nations "medium-assumption" projections.

protein, are the lowest in the world, Table III-14 shows protein supplies under the short-term and long-term targets for each of the main food groups. On a per caput basis the targets involve considerably more than double the present protein supplies from animal products and from vegetables and fruit, a 50 percent increase in supplies from pulses, oilseeds and nuts under the short-term target, and a slight reduction in supplies from grains and starchy roots.

Even to provide the present population of the Far East with per caput protein supplies at the level of the short-term target would call for increases of 50 to 80 percent in present supplies of pulses, oilseeds and nuts, vegetables and fruit, and animal products, while to reach the levels of the long-term target would mean increases of 60 to about 175 percent for these same products. To provide the population expected in the year 2000 with the long-term target supplies would involve five to six times the present supplies of vegetables and fruit and of animal products.

For these vastly increased supplies to become available entails the application of modern science and technology to the world's agriculture on a hitherto unprecedented scale. It entails, too, as emphasized in many previous issues of this report, the removal of many institutional barriers to progress, in the shape of outmoded systems of land tenure and other institutions unsuited to modern agriculture.

Thus, although protein malnutrition can be overcome only through the higher purchasing power that may be expected to result from economic development, there is much for governments to do to ensure that the necessary supplies are available to meet the growth of purchasing power. These measures, including the careful planning of agricultural development in the context of overall economic development, agricultural research, education and training, the provision of extension services, improvements in marketing and credit facilities, the provision of incentives, land tenure improvements, etc., are the same as those required for general agricultural development, and need not be elaborated here in the specific context of improving protein supplies.

There is also much that governments can do to improve the situation in the shorter run, in particular with the aim of making better use of existing protein supplies. The improvements discussed earlier in storage, processing and preservation, packaging and handling, transport, and marketing organization are of particular importance in this regard. Consumer education in nutrition can also result in the better use not only of existing supplies but also of the consumers' limited purchasing power. Much can also be achieved through extension work aimed at the diversification of subsistence production through the growing of crops better suited to satisfying the protein needs of the producer and his family.

Governments also have a role to play in the development of new cheap sources of protein, such as the processed protein concentrates discussed earlier, and in arranging where appropriate for their incorporation in the staple food. Free or subsidized distribution of protein-rich foods, for example through school-feeding programs and mother and child health centers, is also often desirable in order to improve the protein nutrition of the most vulnerable groups of the population.

These and other similar steps to improve the immediate situation have an important part to play alongside those measures of agricultural and general economic development on which the solution of the world's protein problem must ultimately depend.

Chapter IV. - SYNTHETICS AND THEIR EFFECTS ON AGRICULTURAL TRADE *

Introduction

One of the main threats to the exchange earnings of developing countries in recent years has come from competition of synthetics with agricultural raw materials, principally cotton, wool, jute and allied fibers, hard fibers (mainly abaca), and rubber. In the period 1959-61, world exports of these products were valued at about US $5,600 million, equivalent to 24 percent of the total value of world agricultural trade. Moreover, more than half (55 percent) the total originated in developing countries, where they accounted for 30 percent of total exports of agricultural products. Developed regions accounted for 39 percent of the total and centrally planned countries for the remainder (Table IV-I).

The overwhelming items in the developed countries' exports of agricultural raw materials are wool, the bulk of the trade in which originates from Australia, New Zealand and South Africa, and United States cotton, valued at $779 million in the period mentioned. Otherwise the trade consists essentially of a flow from developing to developed countries. Rubber, jute and allied fibers, and hard fibers are almost exclusively produced in developing countries and consumed in developed countries. Cotton and wool produced in developing countries are also disposed of mainly in the developed countries.

On the other hand, the world output of synthetic materials is heavily concentrated in developed countries (the United States, western Europe and Japan) and centrally planned countries. In the latter, attention has been given mainly to synthetic rubber, but significant expansions are planned in other sectors. Rayon, which does not require a complex petrochemical industry for its raw materials, is produced much more extensively throughout the world, including a number of developing countries. Some of the latter have recently established, or are in process of establishing, synthetic fiber and rubber industries. India and Brazil, both producers of cotton and natural rubber, also produce rayon and synthetic rubber.

The location of synthetic industries in the main agricultural raw material importing countries is, of course, basically inimical to an expansion of the trade in the natural products. However, the establishment of such industries is usually inspired by technical, rather than autarchic, considerations except insofar as the synthetic products are competing among themselves. It is but one facet of the general process of technological evolution which is affecting the demand for agricultural raw materials in many different ways. New methods of production are causing economies in the use of raw materials. Remarkably rapid rates of innovation and changing consumer tastes are causing major adjustments in manufacturing output and hence in the composition of the demand for raw materials.[1] The better heating of homes and offices, the invention of the electric blanket, and competition from paper and other materials in packaging and other uses, are influencing the demand for natural fibers just as clearly as is competition from man-made fibers. Moreover, much of the research work on synthetics has been concerned not so much with duplicating the natural product as with evolving entirely new materials with enhanced capabilities in certain respects. In the United States, where synthetic fibers and synthetic detergents were first produced in volume, they were in fact competing with domestically produced, as well as with imported, natural materials.

* This chapter formed part of the documentation prepared by FAO for the United Nations Conference on Trade and Development, and has been issued as Document No. E/CONF/46/59 of that conference.

[1] Recent surveys of major United States manufacturing firms indicate that about one quarter of their 1962 sales were new commodities not in production 10 years previously. *Agricultural economics research*, October 1963, p. 114. Washington, D.C. U.S. Department of Agriculture.

TABLE IV-1. - DISTRIBUTION OF EXPORTS OF AGRICULTURAL RAW MATERIALS BY ECONOMIC GROUP OF ORIGIN AND DESTINATION, 1959-61

	Origin				Destination			
	Developed regions	Developing regions	Centrally planned countries	World total	Developed regions	Developing regions	Centrally planned countries	World total
	Million U.S. dollars, f.o.b.							
Rubber	[1] 68	1 392	–	1 460	[2] 1 061	93	306	1 460
Cotton	894	1 115	302	2 270	1 363	325	544	[3] 2 270
Wool	1 233	249	63	1 545	1 307	42	196	1 545
Jute and allied fibers	–	185	–	185	145	24	17	185
Hard fibers	–	134	–	134	124	4	5	134
Total....	2 155	3 074	365	5 594	4 001	487	1 067	5 594

SOURCE: FAO. *Trade in agricultural commodities in the United Nations Development Decade.* Rome, 1964.
[1] Re-exports. - [2] Includes imports of rubber subsequently re-exported. - [3] Includes unallocable exports valued at $38 million.

Although a great deal of research on synthetics was undertaken in the twenties and thirties, full-scale production of the now extensive range of materials had to await the war and postwar years. The only major product in volume production before the war was rayon, and this is not now regarded as a true synthetic since it is based on a natural material. The development of the first true synthetic fiber, nylon, was announced in the United States in 1938 and trial marketings of products such as fishing lines and women's stockings were undertaken in the following year. Various synthetic detergents also appeared on the market in the thirties in the form of soapless shampoos and light-duty household washing products.

The outstanding wartime development was the construction by the United States Government of a huge $700 million synthetic rubber complex large enough to meet its own essential requirements and those of its allies following the loss of Far Eastern natural rubber supplies. Had circumstances been otherwise, the development of this industry, at least on such a scale, would undoubtedly have been delayed for many more years. Production techniques were then still far from perfect and at one time it seemed unlikely that the industry would survive in the postwar period. Wartime conditions also gave a stimulus to the use of nylon in products such as parachutes and to large-scale synthetic substitution for leather. The first synthetic detergent suitable for heavy-duty laundry use was commercialized in the United States in 1946, aided by the worldwide shortage of fats and oils and the possibility of converting aviation fuel plants to the production of tetrapropylene. The extension of these industries to western Europe generally followed somewhat later and volume production of most synthetic materials has been achieved only in the last seven or eight years.

TYPES OF SYNTHETICS

The principal synthetic or, more strictly, man-made materials considered in this report are synthetic rubber, man-made fibers, and synthetic detergents. Each of these is a group of materials with different characteristics, rather than a single homogeneous product. The bulk of the synthetic rubber is of the general purpose type (SBR), but other types including neoprene, nitrile and butyl have been developed for special purposes. Very recently, commercial production has begun of the stereo-specific and stereo-regular rubbers, polybutadiene and polysoprene, which are closer to natural rubber in performance than any others previously available. The range of man-made fibers is even wider than that of synthetic rubbers, but they may be grouped into cellulosics, that is, viscose and acetate rayon, and noncellulosics, which include the polyamides (nylon), the polyesters (Terylene, Dacron, etc.), the acrylics (Orlon, Acrilan, Courtelle, etc.), and the less important polyvinyl fibers. Synthetic detergents also are of many types, as are the soap products they have been replacing, but they are marketed mainly in the form of powders for heavy-duty laundry use and liquids for dishwashing and industrial purposes.

The range of synthetic rubbers now available permits direct competition with natural rubber in all its main outlets. Synthetic rubber also competes with floor covering based on natural drying oils

(linseed, tung, etc.) and with leather in the footwear outlet, although other man-made materials, such as fibreboard and plastics, have displaced leather from other uses. Among the man-made fibers, rayon is in closest competition with cotton, and the higher-priced synthetics with wool. However, there is a great deal of interchangeability over the whole fiber field, with the natural and man-made products competing among themselves as well as with their opposite groups. Synthetic detergents are in a special position insofar as they compete with animal and vegetable fats and oils (principally tallow, coconut oil and palm-kernel oil) in only one outlet. Synthetic resins are also competing with drying oils in paints and varnishes. However, in other industrial uses, and in the large food outlets, the natural fats and oils are still free from synthetic competition.

One of the main advantages frequently claimed for the synthetic vis-à-vis the natural raw materials is that they may be " tailored " to meet the requirements of specific end-uses. Up to a point this is true. As indicated above, special synthetic rubbers have been developed for particular purposes and the formulas of basic types may be varied by the addition of carbon black, etc. Synthetic detergents are available with high sudsing capabilities for general laundry use or with low sudsing capabilities for use in the newer types of washing machines. High tenacity rayon was developed to meet the specific requirements of vehicular tire cords. In general, however, synthetic fibers were first developed and then by experiment, promotion and other means were found suitable for certain end-uses.

Another advantage common to all the synthetic products is that the factory conditions of production permit a much greater degree of quality control than is possible with growth under natural conditions. This is manifest in such characteristics as purity and uniformity which, apart from other considerations, can produce substantial savings in processing costs. Further economies accrue from the greater strength of the man-made fibers and the consequently smaller losses in processing. Thus, weight-for-weight, the man-made fibers have a greater utility poundage than the natural fibers; if all the products currently made of man-made fibers were produced from cotton or wool, greater poundages of fiber would be required. Utility poundage can also be taken to include the longer lasting attributes of the man-made fibers in some uses, which is a further factor entering into interfiber competition. The two combined partly explain why synthetic fibers have been able to make such great market gains despite their relatively high price. Another advantage is their marked price stability in contrast to the wide fluctuations experienced in prices of the natural products.

Production trends

Trends in the production of synthetic raw materials during the last decade are shown in Table IV-2. In each case, remarkable rates of growth have been achieved, unmatched by their natural counterparts even in the prosperous twenties before the advent of synthetics. In the period under review, synthetic rubber production grew more rapidly than that of man-made fibers. However, the most striking ex-

TABLE IV-2. - INDICES OF PRODUCTION OF NATURAL AND MAN-MADE RAW MATERIALS

	Apparel fibers					Rubber	
	Cotton [1]	Wool [2]	Man-made fibers			Natural	Synthetic
			Rayon	Non-cellulosics	Total		
	1952 = 100						
1953	104	101	118	123	118	97	106
1954	103	103	126	151	128	101	82
1955	109	109	142	204	147	107	124
1956	106	116	149	237	155	105	138
1957	104	113	154	314	166	106	144
1958	112	120	142	323	156	108	142
1959	118	126	157	446	179	114	186
1960	118	126	162	549	191	111	214
1961	119	128	168	648	204	117	225
1962	125	127	179	835	228	118	255

[1] Raw. - [2] Clean equivalent.

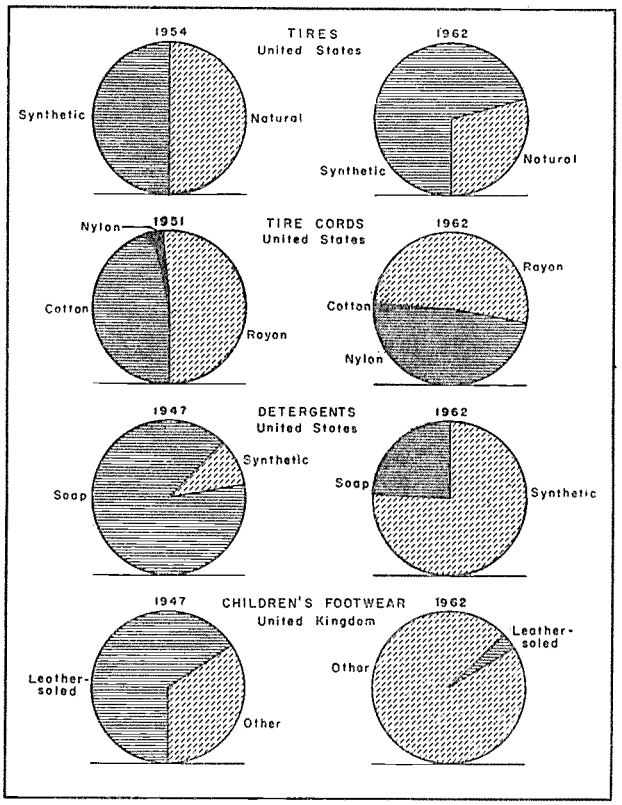
pansion occurred in the synthetic fibers, particularly nylon, which remains far more important than any of the newer noncellulosics. In 1962, man-made fibers as a group still accounted for only 21 percent of total apparel fiber output, still dominated overwhelmingly by cotton, while synthetic rubber production (even ignoring the large output of the centrally planned countries) represented more than half the total elastomer output.

All of the main producing areas have contributed to this expansion, but recently the late starters have recorded faster rates of growth than the United States, which remains, however, the largest single producer of all of the materials under consideration. Between 1958 and 1962, for example, western European synthetic rubber production increased nearly eightfold, as against a rise of only 46 percent in the United States. Rayon production in the latter country reached its peak in 1951 and all of the subsequent expansion has occurred elsewhere. Similarly, recent annual increases in United States synthetic detergent production have been proportionately much smaller than in some western European countries and Japan. This situation is, of course, partly a reflection of the already fuller exploitation of market possibilities for synthetics in the United States. In 1962, as much as 73 percent of the total elastomer consumption in that country consisted of synthetic rubber, as against 48 percent in Italy, 46 percent in France, 45 percent in the Federal Republic of Germany, 44 percent in the United Kingdom and only 35 percent in Japan. By 1962, synthetic detergents had captured some 76 percent of the United States detergent market and there were signs that the demand was approaching the saturation point. On the other hand, man-made fibers still accounted for a slightly smaller proportion of total apparel fiber consumption in the United States than in other industrialized countries, such as the United Kingdom, France, the Federal Republic of Germany, Italy and Japan. However, the differences between all these countries are very small and man-made fibers represent 30-40 percent of the total in each case.

End-uses of synthetics

The point has now been reached where many individual markets formerly held by natural products have been virtually completely lost to synthetics (Figure IV-1). One of these is the passenger car

FIGURE IV-1. - SOME MARKETS LOST TO SYNTHETICS



tire market in the United States, where normally only 2 pounds of natural rubber is now used to 10 pounds of synthetic. In many other nontire applications in the United States and elsewhere, where special qualities are required, including the smaller rubber components of motor vehicles, synthetic rubber is now used exclusively. In some countries, synthetic rubber has almost entirely replaced leather in the soles of shoes, especially children's shoes. The most decisive gains by man-made fibers have occurred in industrial or household uses, such as tire cords, ropes, carpets, curtains and upholstery. In the United States, the amount of cotton used in tire cords, once the principal industrial outlet, is now insignificant. In Japan, cotton has retained some importance in tire cords, but it has been completely superseded in fishing nets by nylon. Synthetics now dominate the United States detergent market and have been making rapid progress in western Europe and Japan, particularly in hard water areas.

There are still many market outlets where the encroachments by synthetics have assumed little importance. This is not surprising when it is considered that they are competing with some of the

finest and most versatile of nature's products. Despite the remarkable advances achieved in the technology of synthetic rubbers, none of those currently available surpasses natural rubber as a general purpose elastomer. In the fiber field, cotton and wool are equally versatile, with a wide range of end-uses. Cotton is strong, hardwearing, resistant to heat, easy to dye and agreeable to wear, particularly in warm climates. The outstanding qualities of wool are its fineness and softness to handle, together with elasticity, resilience, durability, absorptive capacity and high extensibility when wet.

In heavy duty tires, the particular properties of natural rubber, especially its resilience, have, until now, given it an advantage throughout the world. Moreover, no other country, except Canada, uses synthetic rubber in passenger car tires in such high proportions as the United States. Uses in which cotton remains in a strong position relative to rayon in the United States include woven sports shirts, dress and sports trousers, women's blouses and street dresses, and children's sportswear and playsuits. [2] The rate of substitution for leather soling is relatively slow in men's and boys' footwear, and leather remains in a strong position in luxury fancy goods. Synthetic detergents have made little progress in the toilet sector of the soap market and appear unlikely to do so in the future.

A wide new field has opened up in which the natural and man-made materials are complementing each other through their use in blends. This applies particularly to the fibers, although, as indicated above, varying proportions of natural rubber are still mixed with synthetic rubber in passenger car tires. By blending the fibers, the disadvantages of one may be counterbalanced or the final product may be given the most desirable attributes of the natural and synthetic products, e.g., the warmth and general comfort of wool coupled with the strength or crease-resistance of the polyesters. Nylon blended with wool in carpets greatly increases their durability and thus offsets the higher cost of the synthetic materials. After early disappointments, synthetics are no longer generally used in men's suitings except in admixture with natural fibers. Men's socks and women's skirts made from a blend of nylon and wool have won wide acceptance. Some blending is, however, dictated solely by cost considerations, as in the case of cotton/rayon toweling.

[2] National Cotton Council of America. *Price and today's markets for U.S. cotton*, September 1962, p. 14.

Price movements

Prices of all the main man-made materials have shown a remarkable stability over long periods of time. An extreme example of this is the quoted price for SBR rubber in the United States, which has remained unchanged at 23 cents per pound since 1953. Neoprene prices also did not vary from 1954 onward, and the same applied to butyl until 1963, when there was a small increase. Man-made fiber prices in the United States varied only slightly more frequently, most of the adjustments being downward ones. A similar situation has existed in the United Kingdom, although the relationships between the various fiber prices differ somewhat in the two countries.

This price stability is in marked contrast with the wide fluctuations experienced in the prices for competing natural materials. Between 1953 and 1963, natural rubber (No. 1 Ribbed Smoked Sheet, RSS.1) prices in New York ranged from under 20 cents per pound to 52 cents, but remained consistently higher than SBR, except in the first two years and the last. Wool prices have fluctuated more than cotton prices, owing to the stabilizing influence on the latter of the United States price support program. Over the same period, there have been two major peaks in cattle hide prices, the first occurring during the general price inflation accompanying the Korean War and the second in 1959, when the average price of Argentine ox hides at United Kingdom ports rose by almost 50 percent, while the wholesale price of native steer hides in Chicago increased by about 65 percent. The FAO index of lauric acid oil prices also rose sharply in 1959, due mainly to the effects of adverse seasonal conditions in the Philippines on copra production.

Progressively over the years, the availability of an ever-widening range of man-made substitutes has tended to discourage some of the larger fluctuations in agricultural raw material prices. However, for various reasons, including the relative scale of production and remaining qualitative differences, the possibility of quite substantial fluctuations still exists. This was illustrated by the behavior of natural rubber prices following the embargo on Indonesian shipments to Malaysia toward the end of 1963 and of wool prices during the current season, when something of a scramble developed to replenish depleted consumer stocks.

Comparing movements in the price series shown

TABLE IV-3. - PRICE INDICES OF NATURAL AND MAN-MADE RAW MATERIALS

	Apparel fibers				Rubber			Lauric acid oils [8]	Cattle hides	
	Cotton [1]	Wool [2]	Rayon [3]	Nylon [4]	Natural [5]	Synthetic			Argentine [9]	U.S. [10]
						SBR [6]	Neoprene [7]			
	1952 = 100									
1953	97	97	95	100	63	98	105	99	102	100
1954	98	80	90	91	61	98	108	89	87	79
1955	89	73	90	87	101	98	108	77	74	83
1956	74	92	90	87	89	98	108	77	73	84
1957	75	70	90	87	81	98	108	77	79	74
1958	69	59	95	87	73	98	108	90	76	77
1959	65	65	86	87	95	98	108	109	112	128
1960	71	62	85	87	99	98	108	90	88	92
1961	74	65	85	87	76	98	108	72	81	100
1962	71	71	85	81	74	98	108	71	79	102

[1] Season average for American Texas, Middling 15/16", c.i.f. Liverpool. - [2] Season average for 64's, United Kingdom and Dominion auctions, adjusted to London costs. - [3] Viscose staple, 1.5 denier, United Kingdom. - [4] Staple, 3 denier, United Kingdom. - [5] RSS.1, spot, New York. - [6] United States. - [7] United States. - [8] FAO index (original base 1952-54 = 100). - [9] Frigorifico, ox, c. and f., United Kingdom ports. - [10] Native steers, heavy, 58 lb. and upward, wholesale price, Chicago.

in Table IV-3 over the period since 1953, when the Korean boom had largely subsided, two features are immediately apparent: firstly, prices of most of the products were lower in 1962 than in 1953; secondly, reductions in prices of natural materials were generally greater than those of the synthetic products. The extent to which synthetic competition has contributed to this deterioration in agricultural raw material prices is indeterminate. If, at any time, the output of all synthetic materials had ceased, prices of their natural counterparts would certainly have risen in the short term. However, taking into account longer-term supply responses, there is no similar assurance that prices would have been higher than they are today if man-made materials had never come into existence. Prices of some major agricultural products not subject to competition from man-made materials (e.g., coffee and cocoa) have declined more rapidly in the last decade than those of agricultural raw materials.

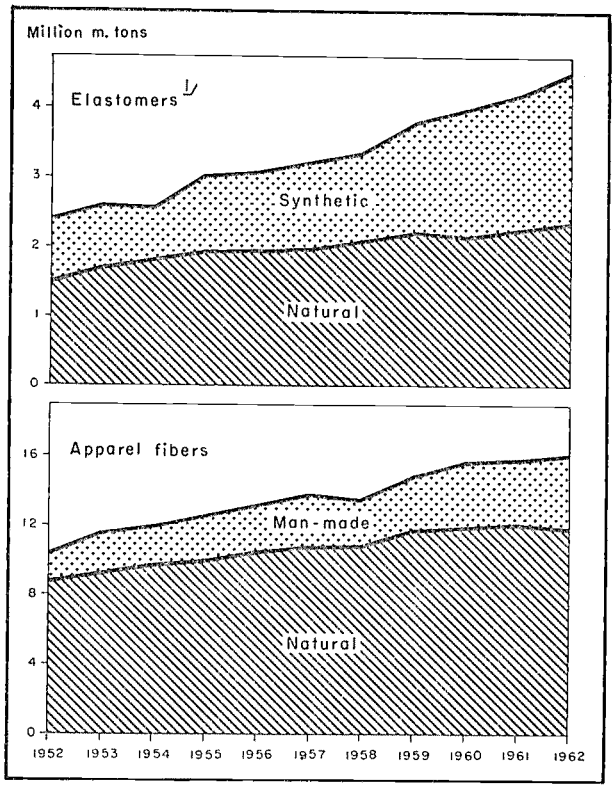
EFFECTS ON DEMAND FOR AGRICULTURAL RAW MATERIALS

When assessing the effects of these developments on the demand for agricultural raw materials it is necessary to keep in mind that the overall world market for apparel fibers and elastomers has been expanding at a rapid rate throughout the postwar period. Between 1952 and 1962, apparel fiber consumption increased by over 50 percent, while elastomer consumption nearly doubled. The markets shared by natural and synthetic products have, in fact, grown faster than those of some of the important food products.

It must be recognized too, that, to some extent at least, the man-made products have contributed to this growth through the wider range of choice they have offered the consumer. For example, the use of light-weight man-made fibers in suitings may have encouraged more extensive clothing wardrobes. Moreover, some synthetic materials are being put to uses where the natural product might not have found acceptance. Many of the uses of special purpose synthetic rubbers in industry fall into this category. Synthetic rubber has also found wider employment in footwear than the natural product was ever able to. It is true that in this case primary producers collectively have suffered a loss, since the consequent expansion of the total elastomer market has been at the expense of another natural product, leather. However, if a similar overall view is taken, some other gains by synthetic products will be seen to have been not without compensation elsewhere. For example, the expansion of synthetic rubber production has maintained the demand for conventional soap, and hence for fats and oils, higher than it would otherwise have been through its use in the emulsion process for SBR. Some synthetic detergents and synthetic fibers are based on vegetable oils. [3]

[3] It is of interest to note that in the United States tire market the availability of stronger man-made fibers for tire cords made synthetic rubber more acceptable for such purposes than it would otherwise have been.

FIGURE IV-2. - WORLD CONSUMPTION OF ELASTOMERS AND APPAREL FIBERS, 1952 TO 1962



[1] The synthetic rubber total excludes consumption of domestically produced rubber in the centrally planned countries.

The rapid rate of growth in the overall elastomer and fiber markets has been reflected in simultaneous increases in world consumption of natural, as well as synthetic, raw materials (Figure IV-2). The progress of the former has been relatively slow, with the result that the share of natural products in total consumption has fallen sharply. This is attributable partly to competition from synthetics, which has tended to place a ceiling on prices and clouded future prospects with sufficient uncertainty to exert some retarding influence on investment. However, competition from synthetics has been only one, and probably not the most important, of the many factors limiting production in developing countries in the postwar period. Others include deliberate policies of diversification, sometimes in favor of food, the shyness of foreign capital, and various noneconomic factors. Wool production in Australia, the main exporting country, has been influenced by the counter attractions of wheat growing. No significant stocks of either wool or rubber have accumulated in the postwar period, other than those built up for strategic reasons. Despite the loss of certain key markets, natural rubber has been sufficiently in demand to earn consistent price premiums over SBR.

Cotton, hides and skins, and the fats and oils used in soap-making have faced a rather different situation. In recent years, world cotton production has frequently exceeded consumption. However, this has affected mainly the United States, where stocks have accumulated which could not be disposed of either at home or abroad at prices established under government programs. In the domestic market, price supports for cotton have enabled rayon to win outlets it might otherwise not have entered. The United States has also set the general level of world cotton prices at a point corresponding to its own domestic price minus a fixed export subsidy, thereby acting in the role of a residual supplier. Thus, although the rapid expansion in man-made fiber production in western Europe and Japan has influenced the total demand for cotton, and consequently the level of United States commercial cotton exports, it has not been the major factor limiting exports from other countries. The trade of the latter has increased and market opportunities would have existed for larger quantities of cotton had supply obstacles been overcome.

PROSPECTS

Looking to the future, the prospects for exports of agricultural raw materials from the developing countries will depend upon the growth of the overall market and the share of the market held by natural and synthetic products, respectively.

As far as the overall level of demand is concerned, the position appears favorable for each of the products considered in this chapter, with the possible exception of soap-making materials. Projections made by FAO [4] for the period up to 1970 suggest that elastomer consumption in that year could be some 63-93 percent higher than in the base period 1959-61, or within a range of 7.2 million to 8.5 million tons. The rate of advance projected for apparel fibers is much lower, amounting to some 40-50 percent over a 1957-59 base. Moreover, this is thought to overestimate the likely expansion in consumption, due partly to an increasing usage of man-made fibers with greater utility poundage.

[4] FAO. *Trade in agricultural commodities in the United Nations Development Decade.* Rome, 1964.

Projections of the production of footwear with leather uppers, which are an indicator of the potential demand for leather, exceed 30 percent (1959-61 base) for all developed countries outside North America, where the demand is near the saturation point. On the other hand, soap consumption is expected to continue to fall in most developed countries, and to begin to do so in the centrally planned countries, while maintaining an upward trend in the developing regions.

The shares of these markets held by the natural materials will depend partly upon the availability of supplies, as well as upon the general competitive position of the product, including cost factors and its general acceptability on technical and quality grounds. Supply factors appear likely to assume most importance in the case of rubber. Since the rubber tree normally takes seven years to reach the tapping stage, supplies are very inelastic in the short term and it is almost certain that, for this reason alone, the share of natural rubber in total elastomer consumption in 1970 will be smaller than it is now, possibly as low as 30-40 percent. Supplies of natural fibers have a greater short-term elasticity and it is still feasible, if not realistic, to visualize their complete displacement of rayon and synthetic fibers in a relatively short period, since the latter still have a fairly small share of the total apparel market. Even so, supplies of cotton, in particular, available in a number of low-income countries may not keep pace with the rising potential demand, and this is a further reason why total fiber consumption could fail to meet the projected level referred to above. Supplies of hides and skins are expected to be adequate to meet any foreseeable demand for leather, due primarily to the growing demand for meat, but they will be increasingly concentrated in the developed countries, thereby reducing the scope for exports from developing countries.

There are a number of more general grounds for anticipating further increases in the shares of synthetics in total consumption. Research and promotion are still very active and new synthetics with enhanced capabilities are being announced frequently. By more closely meeting the requirements of specific end-uses, these may be expected to encroach further on the markets for the natural products. Moreover, despite the intense activity in this field, the outlets for existing synthetic products are by no means fully exploited. United Kingdom manufacturers, for example, expect further increases in the proportions of man-made fibers used in carpets. As indicated above, great differences still exist in the proportions of synthetic rubber used in tires and other products in various countries.[5] Although this partly reflects different conditions and requirements (e.g., different ratios of passenger cars to trucks and buses, colder temperatures and smaller cars than in the United States) there is obviously some scope for narrowing the margin, which will be all the greater with the increasing availability of stereo rubbers. Some countries, too, have not carried the transition from cotton to man-made fibers in tires to its logical conclusion. The same may be said of the proportionate usage of leather and synthetic substitutes and of soap and synthetic detergents in various countries. In the U.S.S.R. and eastern Europe, in particular, all of the industries producing synthetic products have assumed only a fraction of their potential importance, and great developments are planned in this field. The current seven-year plan of the U.S.S.R., for example, provides for a 240 percent increase in synthetic rubber output between 1958 and 1965. The planned expansion of the synthetic detergent industry in the same country could greatly reduce the utilization of domestic and imported fatty ingredients which, on a rough calculation, are currently running at some 800,000 to 1 million tons.

With increasing production of the stereo synthetic rubbers, competition in the elastomer market during the remainder of the sixties will cover all the end-uses of natural rubber, including its last exclusive preserve in heavy duty tires. On the basis of current technology, cotton will continue to compete most closely with rayon in the lower-price levels of the apparel fiber market, and wool mainly with the higher-priced synthetics. However, the whole field of interfiber competition will be wider than ever before, embracing the man-made products as well as the natural ones. Already many of the gains being made by the synthetics are at the expense of rayon or other noncellulosics as much as at that of cotton or wool. An outstanding example is the United States tire cord market where the polyesters are now competing with rayon and nylon after these had successively displaced cotton. However, the improved rayons now available are fighting back in many end-uses and competition within the industry is very intense. Competition between pro-

[5] If the four main western European consuming countries and Japan had used synthetic rubber in the same proportions as the United States, their consumption of natural rubber in 1962 would have been cut by more than one half.

ducers of other man-made fibers may also be expected to intensify as patents expire. Synthetic rubber producers are in a similar position, with the stereos endangering markets for the older types as much, if not more so, than those for natural rubber. Even before this new development, SBR producers were working far below capacity and competition was keener among themselves than with natural rubber producers.

Implications for production policies

The implications of the foregoing considerations for the production policies of agricultural raw material producing countries differ somewhat from commodity to commodity. In the case of *natural rubber*, where it is most necessary to look well ahead, the expectation is that the world will continue to consume large quantities of the product if it can be made available at prices comparable with those being charged for synthetic rubber. This is an objective well within reach of efficient producers with high-yielding trees, but it seems certain that output from large areas of old low-yielding stock will eventually be priced out of the market – a tendency which would have developed under competitive conditions even in the absence of a synthetic industry. Thus, if a vigorous policy of increasing the proportion of the total acreage under high-yielding material is not pursued, the natural rubber market will certainly shrink both absolutely and relatively to synthetic rubber. There are two alternative production policies open: (*a*) completely new areas may be planted to rubber, or (*b*) existing areas may be uprooted and replanted. There has been some progress along both these lines in the postwar period, with the newer and smaller producing countries most active in opening up new areas. The older producing countries have concentrated mainly upon replanting [6] and, on balance, it seems desirable that they should continue to do so. This, of course, involves some current sacrifice, which can be offset from the producer's viewpoint by the payment of government subsidies, but which involves the nation in a loss of export earnings. [7] In some countries, extensive replantings undertaken in recent years are reaching tapping age, so that the opportunity exists for greatly accelerating activity in this field without seriously curtailing production. However, for this reason alone, only moderate increases in world output can be visualized in the period up to 1970. Areas replanted now cannot exert a positive influence on the supply position before the early seventies. There is, in fact, a grave danger that in the intervening period some natural rubber will be priced out of markets it might otherwise have held owing to supply inelasticities in the more efficient sector of the industry.

In the case of *cotton* and *wool*, the opportunities for expansionist policies appear greater. This applies particularly to cotton in the developing countries, where most of the future growth in consumption will occur. Some of these countries have been obliged to import considerable quantities of raw cotton and cotton textiles from developed countries to meet their own requirements or those of their export markets. Thus, to some extent, the case for expanded production in the developing countries is based on considerations of import substitution and does not necessarily constitute a case for expanded production in the world generally. Indeed, the scope for increased production elsewhere will depend largely upon the success or otherwise of the developing countries in reaching this objective. Wool, on the other hand, is both produced and consumed mainly in the developed countries. Here, demand is also expected to continue growing despite competition from synthetics, but at a slower rate than the demand for cotton in the developing countries. There is, therefore, scope for moderate increases in production. In the absence of further large stocks, the situation prevailing in recent years, whereby consumption exceeded production, obviously cannot continue and, as in the case of natural rubber, there is a danger of markets being lost to man-made fibers by default.

The other two groups of products considered in detail in this report, namely *hides and skins* and *fats and oils*, are in a special position. Since the former are generally by-products, production policies will be determined mainly by the outlook for meat. Insofar as the demand for leather is a contributing factor, the outlook does not appear sound enough to warrant any significant increase in production in the immediate future. From the point of view of their utilization in soap, fats and oils are in a similar position. However, this is but one of their many outlets and the prospects for increased food use are more favorable, particularly in developing countries.

[6] Of the 1,358,125 acres (about 543,250 ha) planted to rubber in Malaya between 1955 and 1963, 73 percent represented replantings.

[7] Government finance is affected in two ways: firstly, by the payment of the subsidy and, secondly, by the loss of export taxes on the produce of the uprooted areas.

Other possible measures

There are a number of measures which might be taken by governments of producing or consuming countries, or by producers themselves, to improve the position of agricultural raw materials encountering competition from synthetics. Clearly, it is now out of the question to expect any limitations on the output of synthetic products; these have won a place for themselves in daily life which it would be retrograde to attempt to alter. However, in view of the highly competitive conditions in prospect both between producers of natural products and synthetic producers and among the latter themselves, it would appear to be in the interests of both parties to *co-ordinate policies* and so to avoid some of the less desirable effects of such a situation. The need for action along these lines appears to be most urgent in respect to the elastomers in view of the already existing excess capacity in the synthetic sector and other factors mentioned earlier. In this case, too, a clearer view may be had of long-term supply prospects in the natural sector and there is a possibility that if large consumers have some security of future supplies at competitive prices (e.g., through long-term contracts), their incentives to erect synthetic rubber plants may be diminished.

Otherwise, primary producers can only react to the situation described in more detail in the following pages in the same manner as any manufacturer facing similar marketing conditions. To a large extent, of course, their future position will depend upon *cost and price factors*. The scope for improved methods of production, particularly in the developing countries, is well known and need not be elaborated on here. Although there are obvious limitations to the use of mechanisms such as international commodity agreements to influence prices of natural materials competing with synthetics, the possibility might be explored of introducing supplementary stabilization devices to further limit fluctuations particularly for wool and extra-long staple cotton. This might include a full re-examination of present selling methods, which were evolved long before synthetic substitution became the market factor it is today. Governments of consuming countries could also co-operate by ensuring the maintenance of equal competitive conditions between the synthetic and natural sectors of the industry, and the problem of "captive" markets warrants special attention.

There is undoubtedly great scope for *improvements in quality and presentation* of all natural materials subject to competition from synthetics. Clearly the uniformity of quality achieved for synthetics under factory production conditions cannot be duplicated, but it can certainly be more closely approached than it is at present. Research may yield further new processes, similar to "drip-dry" cotton, the Ciroset process for wool and superior processing (SP) natural rubber, which impart to the natural product some of the more desirable properties of synthetics. Means might also be explored of expanding the market for oil-extended natural rubber, which opens up possibilities second only to replanting as a means of making natural rubber fully price competitive with synthetic rubber. Finally, attention might be given to alternative methods of presentation as a means of more adequately meeting consumer requirements including, for example, some change from the conventional sheet and crepe form of presenting natural rubber.

Progress along the foregoing lines could be associated with more active *promotional campaigns* to bring more forcibly to the attention of consumers the particular virtues of the natural product. In this context, promotion should be interpreted in its widest sense to include advertising, instruction of manufacturers in the use of the product, along the lines of many synthetic producers, and the development of new outlets. Much work is, of course, already being done in such fields by producer bodies at national and international level, such as the Malayan Rubber Fund, Cotton Council International, the National Cotton Council of America and the International Wool Secretariat, but, compared with those of synthetic manufacturers, the outlays have been relatively modest. Moreover, in some cases there appears to be need for more co-ordination of effort.

Finally, there is an urgent need for *improved statistics* on the output and end-uses of the natural materials and their synthetic competitors, without which such promotional campaigns can hardly be fully effective. For various reasons, not the least of which is the oligopolistic structure of the synthetic industry, such statistics are at present deplorably deficient; yet, it is widely recognized inside and outside the respective industries that both sectors would stand to benefit from a greater interchange of information and from the possibilities which the availability of such data would open up for wider research into these rapidly changing markets.

Rubber

Rubber is perhaps experiencing closer competition from synthetics than is any other natural product. Production of synthetic rubber has increased throughout the postwar period and is now slightly larger than that of natural rubber, where growth has been very much slower (Figure IV-3). During the remainder of the decade direct competition between the two products is likely to be more intense than ever before, due to the development of the new stereo-specific synthetic rubbers, and the share of natural rubber in total elastomer consumption will almost certainly contract further.

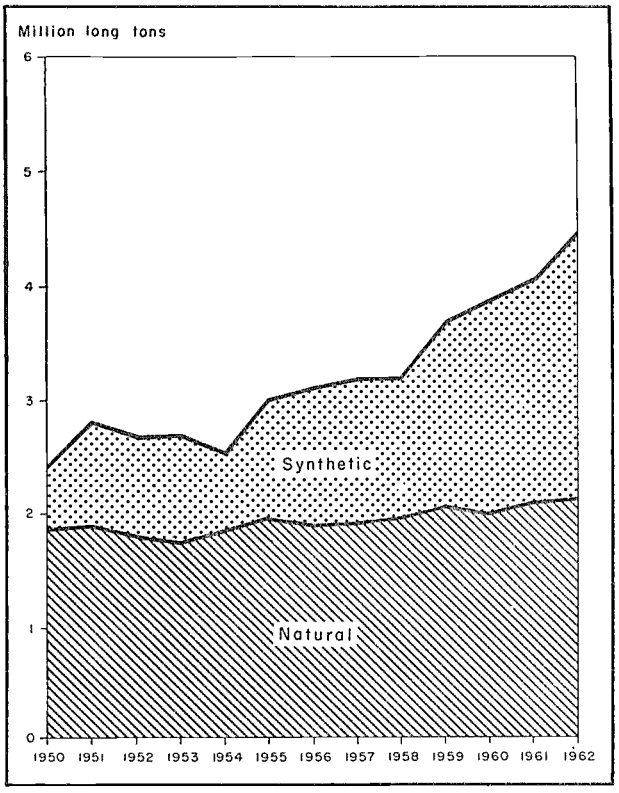
Types and properties of synthetic rubber

Synthetic rubber is by no means the homogeneous product it is sometimes thought to be. Over the years many different types have been developed having widely different characteristics and tailored to meet the specific requirements of individual end-uses. For the present purpose these may be classified into three groups: styrene-butadiene, a general purpose rubber; the speciality rubbers, consisting of butyl, neoprene and nutrile; and the new stereo rubbers, polybutadiene, and polyisoprene.

Styrene-butadiene rubber (SBR)[8] is quantitatively the most important as well as the cheapest, of the synthetic rubbers currently available in commercial quantities. As its name indicates, it is a copolymer of styrene and butadiene, consisting of about three parts of the latter to one of styrene. Different types of SBR may be produced by varying the production process in such respects as the temperature of polymerization[9] and the addition of carbon black or mineral oil. Although the earlier general purpose rubbers produced during the war were inferior to natural rubber in almost every respect, those now available are said to be superior in four important properties: (*a*) wear resistance; (*b*) groove-cracking resistance; (*c*) aging resistance; and (*d*) fast-curing properties. However, they fall short of natural rubber in resilience. This characteristic has made them unsuitable for use in heavy-duty tires (e.g., truck and bus tires), but they have found wide application in passenger car tires, having captured almost the entire market in the United States, and large segments in the United Kingdom, France and the Federal Republic of Germany. SBR is used for a great variety of other purposes where cheapness is a paramount consideration and SBR latex is also steadily displacing natural rubber latex in many applications in the United States and elsewhere.

Of the three main speciality rubbers, *butyl* is produced in greatest quantity. Made from a mixture of isobutylene and a small proportion of isoprene or butadiene polymerized at very low temperatures, it possesses a structure quite different from those of natural rubber and the butadiene-styrene copolymers. Like SBR, it has low elasticity and runs hot, but it is less permeable to air and gases than other rubbers, and for this reason it was widely adopted in the manufacture of inner tubes. Since the introduction of the tubeless tire in 1954, sales have been maintained through increased usage in other applications, including motor vehicle parts, and in the electrical insulation and proofed fabric

FIGURE IV-3. - WORLD PRODUCTION OF NATURAL AND SYNTHETIC RUBBER, 1950 TO 1962[1]



[8] Known during the period of government control of the United States industry as GR-S (Government Rubber Styrene).

[9] "Cold" rubber now represents over 80 percent of the total output of SBR in the United States.

[1] Excluding synthetic rubber production in the centrally planned countries.

fields, where butyl is valued for its resistance to deterioration by heat, ozone and outdoor weathering. The outstanding property of *neoprene*, produced from the emulsion polymerization of chloroprene, is its heat and flame resistance, and of *nitrile*, a copolymer of butadiene and acrylonitrile, its ability to withstand contact with oil or gas.

Although production of the stereo rubbers is still smaller than that of the speciality rubbers, they are potentially much more important, as they will be competing with natural rubber and SBR in the bulk uses of elastomers. *Polyisoprene* almost exactly duplicates natural rubber, having in slightly lesser or greater degree both its advantages and disadvantages. For this very reason its future in the tire sector of the market is uncertain and it may find its main application in other uses, such as surgical items and electrical products, where its high purity and the scope for adjusting the quantities and types of ingredients are considered important. It also possesses certain advantages in molded products requiring sharp detail on items of intricate design. *Polybutadiene*, on the other hand, is not regarded as a complete replacement for natural rubber. It is difficult to process alone, but a 50 : 50 mixture with natural rubber is said to retain the high resilience and low heat build-up of the parent rubbers. These qualities make it the one synthetic rubber currently available which is likely to challenge natural rubber in its last major exclusive preserve, the heavy-duty tire sector. However, for the reason given, the displacement would not be a total one.

Ethylene propylene (EPR or EPT), the least commercially developed of the new rubbers, is potentially the cheapest, as it is based on low-cost chemicals. Its main advantage is its resistance to weathering, and particularly to ozone, which is claimed to make it ideal for engine mounts and other automobile parts, hose, wire insulation, belting, coated fabrics, soles and heels of shoes and other products used outdoors. It is, therefore, likely to be in closest competition with the speciality rubbers. In respect of tires, there is a difficulty (as there is with butyl) in blending it with other rubbers, which has only been partly overcome by the newer ethylene-propylene terpolymer.

Trends in synthetic rubber production

Between 1952 and 1962, production of synthetic rubber outside the centrally planned countries increased a little more than two and a half times to reach a level of 2.2 million tons, slightly in excess of natural rubber production (Table IV-4). Until 1957, production was virtually confined to the United States and Canada, where industries were developed during the war to make good the loss of Far Eastern natural rubber supplies. Since then, new industries have been established in various western European countries, and in Japan, Australia, Brazil and India.[10] Some of these are very small, consisting of single plants of 30,000-50,000 tons capacity, but their combined output in 1962 reached 500,000 tons, or approximately one third that of the United States.

Production in the centrally planned countries is almost certainly larger than the total for all other countries outside the United States, although the exact figure is not known, due to the absence of official statistics for the U.S.S.R., the largest producer of the group and for China (Mainland). In 1961, the Economist Intelligence Unit estimated Russian production in 1960 at about 350,000 tons.[11] On the other hand, figures published recently by the Hungarian Statistical Office indicate that output reached 600,000 tons in that year, as against 350,000 tons in 1955 and 275,000 tons in 1952.[12] Capacity in China (Mainland) is believed to be fairly small, probably of the order of 30,000 tons.

The other centrally planned producing countries are Eastern Germany, Poland, Romania and Czechoslovakia. As in the U.S.S.R., production in Eastern Germany dates back to before the war,[13] the Buna works at Halle being famous for their pioneer work in this field. Output in 1962 reached 90,000 metric tons, thereby exceeding that of any other country, apart from the United States, the U.S.S.R., Canada, the United Kingdom and Italy. On the other hand, the synthetic rubber industries in Poland and Romania are quite new. The Oswiecim plant in Poland went on stream in the autumn of 1959, Romania began production in 1960 and Czechoslovakia, the second largest vehicle producer in the group, as recently as 1963.

The United States is the only country currently

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[10] The establishment of synthetic rubber industries in Brazil and India is of particular interest because both are developing countries producing natural rubber.

[11] Economist Intelligence Unit. *Rubber trends*, p. 17. December 1961.

[12] *Statistikai Szemle*, November 1962.

[13] In 1938, production in the U.S.S.R. totaled 80,000 tons. This is the only official production figure for that country ever issued.

TABLE IV-4. - PRODUCTION OF SYNTHETIC RUBBER, 1952 TO 1962

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	Thousand long tons										
United States	799	848	623	970	1 080	1 118	1 055	1 380	1 436	1 404	1 574
Canada	74	81	87	104	121	132	135	101	160	164	168
Total North America	873	929	710	1 074	1 201	1 250	1 190	1 481	1 596	1 568	1 742
Germany, Fed. Rep. of	5	6	7	11	11	12	23	48	80	86	88
United Kingdom	–	–	–	–	–	1	11	56	90	106	117
Italy	–	–	–	–	–	–	20	40	66	(86)	(89)
France	–	–	–	–	–	–	–	6	17	40	63
Netherlands	–	–	–	–	–	–	–	(1)	(12)	(40)	(45)
Total western Europe	5	6	7	11	11	13	54	(151)	(265)	(358)	(402)
Japan	–	–	–	–	–	–	–	1	19	50	68
Australia	–	–	–	–	–	–	–	–	–	3	14
Brazil	–	–	–	–	–	–	–	–	–	–	16
WORLD (EXCL. CENTRALLY PLANNED COUNTRIES)	878	935	717	1 085	1 212	1 263	1 243	(1 633)	(1 880)	(1 978)	(2 243)
U.S.S.R.[1]	275	...	...	350	...	...	...	...	600	...	...
Germany, Eastern	56	63	67	71	72	74	84	85	85	88	89
Poland	–	–	–	–	–	–	–	5	20	31	33

SOURCE: International Rubber Study Group and national sources.
[1] Figures (in metric tons) as reported in *Statistikai Szemle*, November 1962.

producing the full range of synthetic rubbers referred to in the previous section, including EPR, which is produced commercially elsewhere only in Italy. Canada produces all types, except neoprene and polyisoprene. Although detailed statistics for other countries are less readily available, the proportion of SBR is undoubtedly very high. With the exception of Belgium, where the only plant in operation produces butyl, all these countries concentrate upon the production of SBR and some, including Australia, Brazil and India, produce no other types. In the Federal Republic of Germany, SBR *capacity* represented 74 percent of the total available at the end of 1963. Proportions for other western European countries were as follows: United Kingdom, 62 percent; France, 49 percent; Italy, 71 percent; and the Netherlands, 83 percent. All of the other types of synthetic rubber are produced in one or more of the western European group. Three countries (the United Kingdom, Belgium and France) produce butyl, two (the United Kingdom and the Federal Republic of Germany) produce neoprene, while all, except Belgium, produce nitrile, usually in very limited quantity. Capacity for the production of polybutadiene already exists in Italy, France and the Federal Republic of Germany, and is under construction in the United Kingdom, but only the Netherlands has begun to produce polyisoprene.

TRADE IN SYNTHETIC RUBBER

The volume of world trade in synthetic rubber has now reached about one quarter that of the trade in natural rubber. Until about 1959, the United States and Canada were in virtually a monopoly position as exporters, the only other surplus producer of any magnitude outside the centrally planned countries being the Federal Republic of Germany (Table IV-5). In terms of volume, United States exports have since 1955 exceeded those of Canada, but the export market is of considerably more importance to the Canadian industry, absorbing 71 percent of production in 1961, compared with only 21 percent in the United States.[14]

[14] There is a small two-way trade between the countries. Exports of butyl from Canada have provided some competition for the one firm which has hitherto controlled the entire output of this type of rubber in the United States.

TABLE IV-5. - EXPORTS OF SYNTHETIC RUBBER, 1952 TO 1962

	United States	Canada	United Kingdom	Germany, Fed. Rep. of	France	Italy	Netherlands	Japan	Germany, Eastern	Poland	U.S.S.R.[1]
	Thousand long tons										
1952	22	43	–	–	–	—	—	—	27	—	...
1953	23	45	–	1	–	—	—	—	22	—	...
1954	30	60	–	1	–	—	—	—	37	—	...
1955	94	68	–	1	–	—	—	—	38	—	24
1956	149	80	–	2	–	—	—	—	39	—	23
1957	203	93	–	3	–	—	—	—	42	—	47
1958	194	99	1	5	–	1	—	—	47	—	42
1959	290	76	7	12	2	24	1	—	46	—	52
1960	342	108	20	21	(6)	36	7	—	49	9	32
1961	297	117	21	18	10	45	22	5	43	10	38
1962	304	(118)	28	24	24	41	40	6	45	10	32

SOURCE: International Rubber Study Group, *Statistical Bulletin* and national sources.
[1] Data in thousand metric tons. Statistics for 1957 to 1959 include natural rubber.

Generally speaking, synthetic rubber industries were set up outside North America only after there had been growing imports from that source. Most of the new producing countries then began to sell some of their output on the world market, but by 1962 only Italy and the Netherlands had achieved export balances. The industries in both these countries are now highly dependent upon the export trade, that of the Netherlands being acutely so as shipments in 1962 reached 40,000 tons compared with an estimated output of 45,000 tons. Australia, Brazil and India are not currently exporting synthetic rubber, but the Faber Company in Brazil aims eventually to develop markets in other Latin American countries, first in the form of unprocessed SBR, and later possibly as rubber products.[15]

The statistics in Table IV-6 indicate that a further group of countries which embarked on synthetic rubber production in 1963, or which are about to do so, were also growing importers of synthetic rubber. The new Belgian industry, like that of the Netherlands, will be highly export-oriented as it has a capacity about double that of current domestic consumption of synthetic rubber. As mentioned, the type of rubber being produced is butyl and 95 percent of the output may be sold abroad, mainly within the EEC, where butyl production is presently confined to France.[16]

The trade in synthetic rubber of the centrally planned countries is predominantly regional in character. Both the U.S.S.R. and Eastern Germany are net exporters, the latter sharing with Canada and the Netherlands the unusual position of exporting synthetic rubber in greater volume than their imports of natural rubber. A large part of Eastern German exports goes to the U.S.S.R., which also imports substantial quantities from Italy. The U.S.S.R. has a reverse trade with Eastern Germany, presumably in special types of rubber, and its exports are more widely distributed among other centrally planned countries.

TRENDS IN THE DEMAND FOR NATURAL AND SYNTHETIC RUBBER

In the postwar period the market for elastomers has been among the most dynamic of those for any raw material. Between 1952 and 1962 world consumption[17] nearly doubled to reach a level of about 4.4 million tons (Table IV-7). Although the United States remained the largest single consumer, the rate of growth was much faster elsewhere, so that its share of the total declined from 54 percent to about 40 percent over the period. The other major consuming countries are the U.S.S.R., the United Kingdom, Japan, the Federal Republic of Germany, France and Canada. Although full details are not available for the U.S.S.R., its imports of natural rubber alone are sufficient to make it the world's second largest consuming country.

Between 1952 and 1962 the share of synthetic

[15] *Rubber and Plastics Age*, June 1963.
[16] *Financial Times*, 17 July 1963.

[17] In conformity with the practice of the International Rubber Study Group, references to world consumption in this section exclude consumption of domestically produced synthetic rubber in centrally planned countries.

TABLE IV-6. - IMPORTS OF SYNTHETIC RUBBER INTO MAJOR IMPORTING COUNTRIES, 1952 TO 1962

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	Thousand long tons										
SYNTHETIC RUBBER PRODUCING COUNTRIES											
United States	20	13	17	11	8	7	9	7	9	12	14
Canada	4	4	4	11	10	14	12	31	17	19	26
United Kingdom	6	6	12	25	43	57	*56	38	57	41	50
Germany, Fed. Rep. of	5	8	11	19	26	39	40	37	49	51	63
France	12	14	13	25	35	49	58	*65	90	68	67
Italy	6	8	11	16	15	18	*17	16	34	33	35
Netherlands	–	1	1	3	4	5	5	*8	11	10	10
Japan	2	1	2	5	10	14	17	*41	50	44	49
Brazil	–	–	–	–	1	2	2	10	17	23	*17
Australia	–	–	1	2	13	16	17	18	27	*24	14
Total	55	55	72	117	165	221	233	271	361	325	345
POTENTIAL SYNTHETIC RUBBER PRODUCING COUNTRIES [1]											
Belgium-Luxembourg	2	1	2	5	6	6	6	10	12	14	16
Spain	...	–	1	1	2	3	3	4	9	12	16
India	–	–	–	1	3	4	4	5	8	9	(11)
Mexico	(1)	(2)	(3)	(5)	8	11	13	15	18	22	24
Argentina	–	1	1	2	4	5	3	9	12	18	17
South Africa	1	1	3	8	10	13	10	14	15	15	(17)
Total	4	5	10	22	33	42	39	57	74	90	(101)
OTHER [2]											
Austria	1	1	1	2	3	3	4	6	8	8	12
Sweden	1	1	1	3	5	7	7	11	16	16	20
Switzerland	2	1	1	3	4	5	4	5	8	9	9
GRAND TOTAL	63	63	85	147	210	278	287	350	467	448	(487)

* Domestic synthetic rubber production commenced.
[1] Countries where production definitely planned or embarked upon in 1963. - [2] Countries which imported more than 5,000 tons in 1962.

rubber in total world elastomer consumption increased from 38 percent to about 50 percent, all the major countries recording gains (Table IV-8). In several countries natural rubber's share of the market at the beginning of the period was as high as 90-100 percent, but ten years later it was above 56 percent only in Japan; in the United States it had fallen as low as 27 percent. In Japan and Italy, the absolute quantities of natural rubber consumed have continued to increase, but consumption has remained static in the Federal Republic of Germany and declined in the United States and the United Kingdom. In the five years ended 1962, natural rubber consumption in the two last-named countries was 17 percent and 20 percent, respectively, lower than in the preceding five years.

Tire and tire products sector

Except in the very earliest days of the natural rubber industry, the motor vehicle industry, and the tire and tire products sector in particular, has provided the main market for elastomers. In 1962, this sector accounted for 62 percent of total United States consumption. In Canada, the proportion was as high as 70 percent, but in the principal western European consuming countries it was lower than in the United States – the United Kingdom, 54 percent, the Federal Republic of Germany, 55 percent, and France, 57 percent. Japan is the only major country where elastomer consumption in tires and tire products is lower than in other uses, the proportion being less than 46 percent in 1962, although

TABLE IV-7. - CONSUMPTION OF NATURAL AND SYNTHETIC RUBBER, 1952 TO 1962[1]

	Natural		Synthetic		Total
	Thousand long tons	Percent	Thousand long tons	Percent	Thousand long tons
1952	1 468	62	885	38	2 353
1953	1 655	65	873	35	2 528
1954	1 778	71	740	29	2 518
1955	1 890	64	1 063	36	2 953
1956	1 875	62	1 135	38	3 010
1957	1 898	60	1 260	40	3 158
1958	2 008	62	1 255	38	3 263
1959	2 115	57	1 580	43	3 695
1960	2 063	53	1 798	47	3 861
1961	2 133	53	1 920	47	4 053
1962	2 188	50	2 170	50	4 358

SOURCE: International Rubber Study Group, *Statistical Bulletin.*
[1] Partly estimated. Excludes consumption of domestically produced synthetic rubber in centrally planned countries.

here, too, it has been increasing (see Table IV-9).

While consumption in this sector has accounted for a fairly constant share of the total and shows the long-term growth to be expected, the actual volume of rubber consumed is subject to considerable fluctuation. In the United States, it has ranged between 780,000 tons and 1.1 million tons over the last ten years. Moreover, the proportion of synthetic rubber used has risen each year since 1954 from 50 percent of the total to over 71 percent in 1962. This high figure has not been matched in any other country for which statistics are available, the nearest approach being in Canada, where it amounted to 68 percent in 1962 (see Table IV-10). In both the Federal Republic of Germany and the United Kingdom, the share of synthetics in the total amounted to about 51 percent in 1962, while in France, Italy and Japan it was as low as 34 to 42 percent. Although wide differences still remain, synthetic rubber is everywhere increasing its share, sometimes quite rapidly. For example, only ten years ago synthetics held less than 1 percent of the tire market in the United Kingdom and less than 7 percent in France.

The explanation for these differences lies partly in the availability of domestic synthetic rubber supplies, both in total and as between types, and partly in the different ratios of passenger cars to commercial vehicles in the various countries. The

TABLE IV-8. - CONSUMPTION OF NATURAL AND SYNTHETIC RUBBER IN PRINCIPAL COUNTRIES, 1952 TO 1962

	United States		Canada		United Kingdom		France		Germany, Fed. Rep. of		Italy		Japan	
	Natural	Synthetic	Natural	Synthetic	Natural	Synthetic	Natural	Synthetic	Natural	Synthetic	Natural	Synthetic	Natural	Synthetic
	Thousand long tons													
1952	454	807	34	34	197	5	122	11	93	10	37	7	68	–
1953	553	785	37	36	220	5	115	13	106	11	44	8	89	2
1954	596	637	42	30	244	9	127	14	130	17	53	10	89	2
1955	635	895	44	40	248	21	134	19	148	25	56	13	88	4
1956	562	874	43	48	200	41	135	32	134	36	54	15	109	9
1957	539	926	41	48	187	59	135	50	136	47	52	20	130	13
1958	484	880	37	47	182	65	137	55	129	54	55	28	128	17
1959	555	1 073	44	57	184	80	133	66	144	73	61	37	159	32
1960	479	1 079	35	56	180	116	127	91	146	104	74	57	166	61
1961	427	1 102	32	63	166	121	127	96	136	120	79	64	176	84
1962	463	1 256	35	73	163	128	125	108	146	129	79	72	190	104
	Percent													
1952	36	64	50	50	98	2	92	8	90	10	84	16	100	–
1953	41	59	51	49	98	2	90	10	91	9	85	15	98	2
1954	48	52	58	42	96	4	90	10	88	12	84	16	98	2
1955	42	58	52	48	92	8	88	12	86	14	81	19	96	4
1956	39	61	47	53	83	17	81	19	79	21	78	22	92	8
1957	37	63	46	54	76	24	73	27	74	26	72	28	91	9
1958	36	64	44	56	74	26	71	29	70	30	66	34	88	12
1959	34	66	44	56	70	30	67	33	66	34	62	38	83	17
1960	31	69	38	62	61	39	58	42	58	42	56	44	73	27
1961	28	72	34	66	58	42	57	43	53	47	55	45	68	32
1962	27	73	32	68	56	44	54	46	53	47	52	48	65	35

SOURCE: International Rubber Study Group, *Statistical Bulletin.*

TABLE IV-9. - CONSUMPTION OF ELASTOMERS BY MAJOR SECTORS, 1952 TO 1962

	United States		Canada		United Kingdom		France		Germany, Fed. Rep. of		Italy		Japan	
	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products
	Thousand long tons													
1952	843	418	44	23	108	94	80	44	...	...	...	...	...	...
1953	859	480	48	25	116	109	72	56	...	...	...	...	...	...
1954	777	456	48	24	134	120	84	57	...	...	...	...	...	...
1955	960	570	56	29	145	124	91	63	...	...	...	...	...	...
1956	897	539	62	30	127	115	99	67	87	83	...	...	...	...
1957	926	538	59	29	128	118	107	78	91	92	...	...	...	...
1958	861	503	55	27	127	121	113	79	94	89	44	39	...	...
1959	1 024	603	71	30	140	125	116	84	119	99	53	45	72	121
1960	995	563	63	28	156	140	124	94	137	113	70	61	98	129
1961	957	572	66	28	153	135	128	94	139	117	80	63	119	141
1962	1 066	652	76	32	158	132	133	100	150	125	82	69	135	159
	Percent													
1952	67	33	66	34	53	47	64	36	...	...	...	...	...	...
1953	64	36	66	34	52	48	56	44	...	...	...	...	...	...
1954	63	37	66	34	53	47	60	40	...	...	...	...	...	...
1955	63	37	66	34	54	46	59	41	...	...	...	...	...	...
1956	62	38	68	32	53	47	59	41	51	49	...	...	...	...
1957	63	37	67	33	52	48	58	42	50	50	...	...	...	...
1958	63	37	68	32	51	49	59	41	51	49	54	46	...	...
1959	63	37	70	30	53	47	58	42	55	45	54	46	37	63
1960	64	36	69	31	53	47	57	43	55	45	53	47	43	57
1961	63	37	70	30	53	47	58	42	54	45	56	44	46	54
1962	62	38	70	30	54	46	57	43	55	46	55	45	46	54

SOURCE: International Rubber Study Group, *Statistical Bulletin.*

question of availability has assumed most importance in the period under review in countries outside North America, where the establishment of industries referred to earlier was followed by increased usage in domestic tire industries. Moreover, successive improvements in the quality of SBR have undoubtedly made it more acceptable with the passing of the years. Following the introduction of the tubeless tire in 1954 and the consequent depression in butyl usage, SBR accounted for 91-92 percent of total synthetic consumption in this sector, but the gains then made were lost in 1962, when the proportion again fell below 86 percent due to competition from the new stereos. To date, at least, the stereos have not significantly raised the share of the market held by synthetic rubber, but rather have caused a readjustment of the proportions held by particular types. Butyl never recovered from the losses in the tire sector sustained after 1954, but usage stabilized at around 7-8 percent of the total.

The further point mentioned above, namely the ratio of passenger cars to commercial vehicles, has been a critical one in determining the respective shares of the market held by natural and synthetic rubbers, since SBR has failed to challenge natural rubber for usage in heavy-duty tires. Thus part of the explanation for the very heavy proportionate usage of synthetic rubber in North America lies in the relatively large number of passenger cars in the total vehicle output compared with other countries. Looking to the future, this is likely to continue to be the case; the gap may narrow somewhat in western Europe, but it will certainly remain large in the centrally planned countries, where passenger cars have a low priority in production plans, and in the developing countries where commercial vehicles are also in greatest demand. These considerations would, in the absence of the stereos, have made the future for natural rubber much brighter than it is at present. However, natural rubber is now being challenged in this sector and it is doubtful whether such factors will continue to assume their former importance.

TABLE IV-10. - PROPORTION OF SYNTHETIC RUBBER IN TOTAL ELASTOMER CONSUMPTION BY MAJOR SECTORS, 1952 TO 1962

	United States		Canada		United Kingdom		France		Germany, Fed. Rep. of		Italy		Japan	
	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products
	Percent													
1952	64.01	63.99	49.04	52.09	0.12	5.09	6.74	13.27	...	...	...	...	...	...
1953	58.27	59.31	49.13	48.55	0.35	4.11	8.44	12.28	...	...	...	...	...	...
1954	50.31	53.92	40.14	45.60	2.02	5.59	9.06	11.90	...	...	...	...	...	...
1955	57.33	60.48	46.93	48.80	8.05	8.37	11.01	14.95	...	...	...	...	...	...
1956	59.42	63.28	52.17	54.51	22.32	11.18	18.55	19.70	21.06	21.30	...	...	...	...
1957	63.00	63.59	53.16	55.07	33.52	13.75	29.24	23.88	30.48	20.92	...	...	...	...
1958	64.92	63.76	57.63	56.03	36.99	15.02	30.37	26.32	33.73	25.24	34.44	32.05	...	...
1959	65.37	66.80	55.45	58.56	40.89	18.46	33.48	32.71	35.98	31.10	34.26	42.39	12.98	20.71
1960	67.47	72.41	60.35	63.63	46.69	30.79	39.25	44.74	45.08	37.68	37.32	50.81	22.34	30.15
1961	70.95	73.92	66.24	66.73	49.15	34.32	39.59	47.49	50.05	43.30	38.27	53.13	28.53	35.43
1962	71.43	75.76	68.02	67.05	50.79	35.93	42.08	52.15	51.33	41.78	40.12	56.83	34.19	36.52

SOURCE: International Rubber Study Group, *Statistical Bulletin.*

Nontire sector

Apart from their use in tires and tire products, elastomers are extensively employed in the manufacture of a great range of other items, among which footwear, foam rubber products, belting, electrical wire and cables are the most important. In most countries for which a statistical breakdown is available the nontire sector has been expanding at about the same rate as the tire sector. The main exception is Japan where, nevertheless, the nontire sector remains relatively much more important than in the other countries (see Table IV-9). In France, the Federal Republic of Germany and the United Kingdom, the nontire sector ranged from 43-46 percent of the total market in 1962 and in the United States and Canada it was as low as 38 percent and 30 percent, respectively. This is, of course, the reverse of the order of importance of the tire sector in these countries.

Usage of synthetic rubber in nontire products in the United States is proportionately greater than in the tire sector and has been so for a number of years (Table IV-11). A similar situation exists in Canada, France and Japan, but the reverse is true of the United Kingdom and the Federal Republic of Germany. In most of the countries mentioned,[18] footwear provides the largest nontire outlet for synthetics, although in Japan, where the relative importance of the footwear industry is greatest, a larger volume of natural rubber is still used for this purpose.

In the United States, SBR is the most important synthetic rubber in nontire uses, but neoprene and nitrile are more prominent than in the tire sector. Over the last ten years, SBR usage has moved within the narrow limits of 66-70 percent of the synthetic rubber total, the lower figure being reached in 1962, when some ground (but much less than in the tire sector) was lost to the stereos. Utilization of some other rubbers is the reverse of that in the tire sector, with neoprene and nitrile together accounting for 24 percent in 1962. Here, too, the stereos already have a larger share of the market than that held by butyl, but a really competitive situation has not yet developed, as the output of EPR, the rubber with properties closest to those of butyl, is still very small. Hitherto, butyl has been making steady gains in nontire applications, such as rubber cushions and mechanical goods, where its air retention, ozone resistance, and low resilience give it an advantage. The increasing importance of such outlets is illustrated by the fact that the nontire sector accounted for nearly 31 percent of the total market for butyl in the United States in 1962, as against only 5 percent in 1952.

PRICES OF NATURAL AND SYNTHETIC RUBBER

Trends in prices for three types of synthetic rubber are compared with those for natural rubber in Ta-

[18] Statistics are not available for the United States and the Federal Republic of Germany.

TABLE IV-11. - CONSUMPTION OF SYNTHETIC RUBBER BY MAJOR TYPES AND SECTORS IN THE UNITED STATES, 1952 TO 1962

	S-type		Butyl		Neoprene and nitrile		Other		Total	
	Tire and tire products	Nontire products	Tire and tire products	Nontire products	Tire and tire products [1]	Nontire products	Tire and tire products	Nontire products	Tire and tire products	Nontire products
	Thousand long tons									
1952	470	196	67	4	2	68	—	—	539	268
1953	425	199	72	6	3	80	—	—	500	285
1954	332	168	55	6	3	72	—	—	391	246
1955	500	242	46	8	4	95	—	—	550	345
1956	489	235	40	10	4	97	—	—	533	341
1957	534	233	45	11	4	98	—	—	583	342
1958	512	218	43	10	4	92	—	—	559	321
1959	614	273	52	15	5	115	—	—	670	403
1960	621	283	46	16	5	109	—	—	671	408
1961	611	284	46	15	5	109	18	14	679	423
1962	653	326	47	21	5	121	56	26	762	494
	Percent of sector total									
1952	87	73	12	1	—	25	—	—	100	100
1953	85	70	14	2	1	28	—	—	100	100
1954	85	68	14	2	1	29	—	—	100	100
1955	91	70	8	2	1	28	—	—	100	100
1956	92	69	7	3	1	28	—	—	100	100
1957	92	68	8	3	1	29	—	—	100	100
1958	92	68	8	3	1	29	—	—	100	100
1959	92	68	8	4	1	29	—	—	100	100
1960	92	69	7	4	1	27	—	—	100	100
1961	90	67	7	4	1	26	3	3	100	100
1962	86	66	6	4	1	24	7	5	100	100

SOURCE: International Rubber Study Group, *Statistical Bulletin.*
[1] Mainly neoprene.

ble IV-12 and in Figure IV-4. This shows the well-known contrast between the stability of synthetic rubber prices and the wide fluctuations experienced in natural rubber. Over the eleven years ended 1963, the annual average price for natural rubber (No. 1 Ribbed Smoked Sheet) in New York ranged from a minimum of 23.64 cents per pound to a maximum of 39.14 cents; if account is taken of movements within the year, the range was from less than 20 cents to 52 cents. During the same period, SBR prices remained perfectly stable while butyl and neoprene prices were changed only once, and by very small amounts. If a longer period is considered, the relative instability of natural rubber prices is even greater as quotations reached exceptional heights during the Korean War boom.

Until very recently, the instability of natural rubber prices has been greater than that of any other major agricultural commodity in world trade. Essentially this seems to have stemmed from variations in demand rather than from developments on the supply side. Natural rubber production is, in fact, less subject to seasonal fluctuation than most other crops. On the other hand, demand from the automobile industry, while showing a long-term growth, reacts sharply to changes in the general economic situation in the countries concerned. In the event of such demand strengthening, producers may, as a short-term measure, increase their rate of tapping, although the scope for such action is limited. Any permanent reaction takes longer to work itself out, if only because the rubber tree normally requires seven years before tapping can begin.[19] Should demand fall off, producers may again vary the rate of tapping, in this case down to the point of discontinuing production. However, it would require a really drastic fall to force such action, particularly on estates, where supply tends to be extremely inelastic.

[19] New techniques of bud-grafting and planting have reduced this period by 6-12 months.

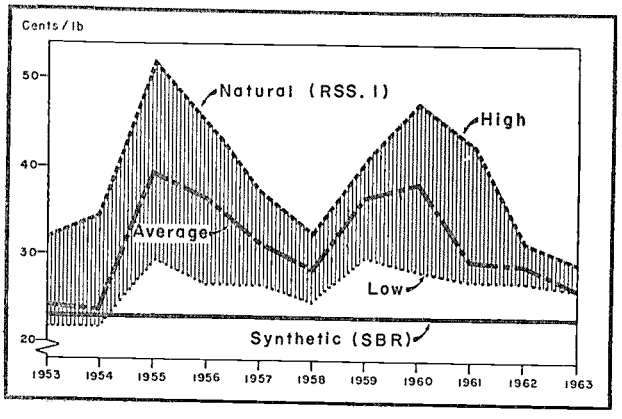
TABLE IV-12 - UNITED STATES, 1953 TO 1963, NATURAL AND SYNTHETIC RUBBER PRICES

	Synthetic			Natural (RSS.1, New York)		
	S-type	Butyl	Neo-prene	Average	High	Low
	..... *U.S. cents per pound*					
1953	23	22	40	24.23	32.00	19.75
1954	23	23	41	23.64	34.50	19.63
1955	23	23	41	39.14	52.00	29.25
1956	23	23	41	34.17	45.00	26.50
1957	23	23	41	31.15	37.25	26.50
1958	23	23	41	28.07	32.38	24.63
1959	23	23	41	36.55	48.75	29.75
1960	23	23	41	38.16	47.25	28.25
1961	23	23	41	29.50	32.75	27.13
1962	23	23	41	28.56	31.38	27.00
1963	23	25	41	26.26	29.25	23.00

SOURCE: International Rubber Study Group.

These considerations obviously were of more significance in determining price movements before the advent of the synthetic rubber industry. As this new industry, with its ability to make rapid adjustment to changes in demand, accounted for an increasing proportion of world supplies, it tended to diminish the possibility of the more violent fluctuations in natural rubber prices experienced previously. Since 1959, releases of natural rubber from government stockpiles have provided a further stabilizing influence. The arrangements for such releases have varied from time to time, but under the present mechanism no sales may be made (except of deteriorated rubber or rubber in danger of deterioration), when the average price for No. 1 RSS in the preceding month is below 28 cents a pound in the United States and 23½ pence per pound in the United Kingdom. Unlimited sales are permissible when prices are above 32 cents or 27 pence, respectively.

FIGURE IV-4. - NATURAL AND SYNTHETIC RUBBER PRICES, NEW YORK, 1953 TO 1963



To date, the market for natural rubber has remained sufficiently distinct from that of synthetic rubber to permit of quite substantial price variations, as illustrated by the strengthening which occurred in the latter part of 1963 following the embargo on Indonesian shipments to Malaysia. It will be noted also that in every year since 1949 the price for at least the top grade of natural rubber has averaged higher than the quoted SBR and butyl prices. Such comparisons should, however, be made with caution. The quoted synthetic rubber prices do not take account of the wide variety of special terms and discounts offered to consumers or of the fact that a large proportion of "sales" are, in fact, intra-company transfers. Moreover, synthetic rubber prices are usually quoted on a delivered basis, while the natural rubber prices shown in Table IV-12 are those applying in New York. Finally, the bulk of the natural rubber consumed in tire factories is of the lower grades, while, more important, the SBR used is generally the even cheaper oil-extended types.

Initially, there had been some speculation as to whether quotations for the stereo rubbers, particularly polysoprene because of its close similarity to the natural product, would show the same stability over long periods as the older synthetics had done or whether it would be necessary to follow movements in natural rubber prices more closely. The market for the stereos is still at an early stage of development and policies in this respect are not entirely clear. However, experience to date seems to indicate the adoption of a compromise, i.e., variations have been more frequent than those for other synthetic rubbers, but considerably less frequent than the fluctuations in the natural rubber market. In April 1962, the price of polybutadiene was cut 2½ cents to 25 per pound and in August 1963, a reduction of 3 cents in the polysoprene price brought quotations for the two stereos to the same level. Butyl has also been priced at 25 cents since the beginning of 1963. The increase of 2 cents caused some surprise, particularly as the one firm in the industry was about to encounter competition for the first time.

EFFECTS ON TRADE IN NATURAL RUBBER

It is difficult to generalize about the effects of the foregoing developments on the trade in natural

TAB. IV-13. - IMPORTS OF NATURAL RUBBER, 1952 TO 1962

	United States	Other synthetic rubber producing countries [1]	Potential synthetic rubber producing countries [2]	Centrally planned countries [3]	Other	Total [4]
	..... *Thousand long tons*					
1952	803	634	103	198	82	1 820
1953	639	704	99	165	141	1 748
1954	590	776	115	110	169	1 760
1955	627	865	124	139	158	1 913
1956	568	739	104	284	165	1 860
1957	543	814	121	285	185	1 948
1958	458	727	118	451	194	1 948
1959	557	792	109	440	180	2 078
1960	398	696	118	437	304	1 953
1961	385	793	126	578	198	2 080
1962	413	813	119	540	243	2 128

SOURCE: International Rubber Study Group, *Statistical Bulletin.*
[1] Excluding centrally planned countries. Includes Canada, United Kingdom, France, Federal Republic of Germany, Italy, Netherlands, Japan, Brazil, and Australia. - [2] Belgium, Mexico, Argentina, India, South Africa. - [3] Partly estimated. - [4] The totals and other figures shown include an allowance for rubber locally consumed in natural rubber producing countries in Southeast Asia and local production in India and Brazil.

rubber. Despite setbacks in some years, the volume of exports has shown a small rise over the period 1952-62 (Table IV-13) in accordance with the trend in production. End-of-year stocks in producing countries have ranged within the relatively narrow limits of 230,000-380,000 tons throughout the postwar period, the lower figure being reached in 1947 and the higher in 1962. Commercial stocks in consuming countries have shown an equally small fluctuation since 1949 between 200,000 tons and 262,000 tons.

Imports into the United States have shown a more pronounced movement than those of most other countries in the period under review. Table IV-13 indicates that in some recent years they were less than half the peak figure of 803,000 tons reached in 1952. However, this situation is not explicable solely in terms of competition between the natural and synthetic products. In 1952, as in the two earlier years, imports were greatly inflated by government stockbuilding during the Korean War. Releases from stockpiles began in 1959 and this has undoubtedly had some effect on the volume of imports in subsequent years.

The statistics in Table IV-13 have been so arranged as to indicate separately the volume of natural rubber imports into other synthetic rubber producing countries and into "potential" producing countries [20] as groups. Here again, no clear trends are apparent. Production in the former group of countries reached significant proportions only in 1959, but there has been no significant reduction in natural rubber imports in subsequent years. Either the growth of the total elastomer requirements of these countries has been sufficiently large to absorb the additional supplies of domestic synthetic rubber or imports of synthetic rubber rather than of natural rubber have been reduced below former levels. Exceptionally in the United Kingdom, the main impact appears to have been borne by natural rubber; in the five years ending 1962 (i.e., the period in which the domestic synthetic rubber industry has been operating) net imports of natural rubber averaged only about 150,000 tons, as against 222,000 tons in the five preceding years. Imports of synthetic rubber, on the other hand, increased from 28,700 tons to 48,500 tons over the same period.

The main factor compensating for the reduction of imports of natural rubber into the United States has been the simultaneous growth of imports into the centrally planned countries. It will be seen that this growth has occurred over most of the period under review, but the most remarkable expansion has occurred since 1958. There are several reasons for this. Some countries, particularly the U.S.S.R., failed to expand their synthetic rubber industries at the planned rate, so that natural rubber has been used in some products when otherwise it would almost certainly have been displaced by synthetic rubber. The demand for natural rubber has also remained keen because of the high proportion of trucks and buses in the total vehicle parks of the various countries. In the earlier part of the period, this demand was not fully effective, because of the inclusion of natural rubber in strategic embargo lists.

FACTORS INFLUENCING COMPETITION BETWEEN NATURAL AND SYNTHETIC RUBBER

Looking to the future, three factors appear likely to exert the most critical influence on competition between natural and synthetic rubber. These are: (*a*) the structure of the synthetic rubber industry; (*b*) research and development activities; and (*c*) cost and price factors.

[20] That is, countries which began production in 1963 or are about to do so.

Structure of the synthetic rubber industry

The synthetic rubber industry has two structural characteristics which have an important bearing on its competitive relationship with the natural rubber industry. The first is an inherent tendency toward oligopoly and the second is the degree of vertical integration in the industry.

In the United States, the industry was developed by the government during the war as an integrated complex of rubber, styrene and butadiene plants involving a capital outlay of some $700 million, and remained in government hands until 1955. At the time of the disposal to private enterprise it was recognized that future ownership was likely to be heavily concentrated among the rubber, chemical and petroleum companies which had been operating it on a fee basis. Largely for this reason, the Department of Justice was required on antitrust grounds to report annually during the first ten years of private operation on the state of competition in the industry.[21] The first such report indicated that ownership of the 990,000 long tons of SBR capacity in existence at the end of 1955 was vested in only ten companies, five of which accounted for over 70 percent of the total. The same firms undertook the expansions in subsequent years, so that in 1960 the situation was much the same, except for some change in the order of importance of individual firms. The total nitrile capacity in the United States was owned by five firms, while one had a monopoly of butyl production and another of neoprene production.

Integration in the United States industry extends both forward and backward, some of the plants being owned by the petrochemical companies supplying their feedstock and others by rubber fabricators, particularly manufacturers of tires. The butadiene industry, which provides the main raw material, was brought into existence by the government during the war in order to supply its synthetic rubber plants. In many cases, the purchasers of the latter also gained possession of the butadiene facilities, which for cost, safety and other reasons had been built nearby. In 1960, 46 percent of total butadiene sales in the United States represented intra-company transfers, 29 percent sales to immediately adjacent, but unaffiliated copolymer producers, and only 25 percent true open-market sales.[22] In the same year, two major tire producers owned SBR capacity totaling 528,000 tons, a volume larger than the current level of natural rubber imports into the United States.

Elsewhere, the situation is similar in some respects to that obtaining in the United States. In the United Kingdom, the main SBR producing facility at Hythe (near Southampton) is owned by a consortium of tire manufacturers. The same company is constructing the United Kingdom's first polybutadiene factory at Grangemouth, in Scotland, but the one butyl plant in the country is owned by an English affiliate of the firm with a monopoly of production in the United States. The main French tire manufacturer has an interest in the company operating the SBR plant in that country. Ownership of facilities in the Federal Republic of Germany, the Netherlands and Italy, is vested in oil or chemical companies rather than in tire manufacturers. The largest Italian producer ANIC (Azienda Nazionale Idrogenazione Combustibili), is a subsidiary of the state-owned oil company ENI (Ente Nazionale Idrocarburi). In Canada synthetic rubber production is a monopoly of Polymer Corporation, another government enterprise. A wholly owned subsidiary of this Corporation operates the new butyl plant in Belgium. Governments, oil companies or tire manufacturers also share the ownership of synthetic rubber plants in Japan, Australia, Brazil and India and the same will apply in the new Spanish and South African industries. The Indian industry is unique insofar as it has its own plants for the manufacture of butadiene from alcohol and styrene from benzene and a copolymerization plan all under one management.

This situation must weaken the competitive position of natural rubber producers which, with minor exceptions, are quite independent of tire manufacturing concerns or other large elastomer consumers. In contrast to the fixed prices, long-term contracts and captive markets characteristic of the synthetic rubber industry, natural rubber producers sell their product on an open market dominated, on the demand side, by their competitors, the synthetic rubber producers. Under such circumstances, synthetic rubber might be said always to have a competitive "edge" on natural rubber. In other

[21] As of November 1963, six reports had been published covering the calendar years up to and including 1960.

[22] Styrene is used in much smaller quantity by the synthetic rubber industry and finds its main outlets in plastics and other petrochemical products. Only one synthetic rubber producer owns facilities for the production of this raw material.

words, if price and quality factors were equal, or very nearly so, the major elastomer consumers would have an interest in giving priority to synthetic rubber. The extent to which this holds true naturally varies between individual consumers and from country to country, but it is undoubtedly a factor of major importance for the future of the natural rubber industry.

Research and development

The structure of the synthetic rubber industry with ownership vested in a relatively small number of financially powerful firms, closely integrated with the oil industry on the one hand and the tire manufacturing industry on the other, has lent itself admirably to a heavy concentration of effort and expenditure upon research and development. Early synthetic rubbers were inferior to natural rubber in almost every important respect and in seeking to duplicate more closely the natural product a wide range of rubbers was developed which excelled natural rubber in some respects and fell short of it in others. In this paper it has been possible to refer briefly only to the broader categories of synthetic rubber, but it should be remembered that the range of types and subtypes is now very extensive. [23] Patents for many of these rubbers are held by the firms developing them and they are advertised and marketed under special trade names, thereby accentuating the oligopolistic structure of the industry.

Although polyisoprene is claimed to be a complete replacement for natural rubber, this by no means signifies the termination of the research effort in this field. New special purpose rubbers are still being announced at frequent intervals and further discoveries and improvements on existing rubbers must be expected in the years ahead. It was pointed out recently that one of the most encouraging features of this research work is that it has been directed toward duplicating natural rubber rather than toward producing an entirely different product to be put to the same end-uses. Even so, natural rubber producers are now more conscious than ever before of the need to strengthen consumer acceptance of their product and to develop new markets. The main activities in these fields have been directed by the Malayan Rubber Fund Board operating through the Rubber Research Institute of Malaya, the Natural Rubber Producers Research Association and the Natural Rubber Bureau. The first two have been concerned with basic technological research, while the Natural Rubber Bureau is a promotion body. Early in 1963, the Malaya Rubber Fund Board announced that the Natural Rubber Bureau would be absorbed into the Natural Rubber Producers Research Association, with a view to streamlining the administration of its organizations in the United Kingdom. Various offices in other countries, including the United States, Australia, South Africa, New Zealand and India, formerly controlled by the NRB, are now administered directly by the Malayan Rubber Fund Board. Further research and development activities are undertaken by other institutes including the Rubber Research Institute of Ceylon and the Central Rubber Fund Board of Indonesia.

Active and systematic co-operation between these bodies and the Malayan Rubber Fund Board is promoted by the International Rubber Research and Development Board, which publishes an annual summary of their activities.

It is, of course, impossible to give an adequate account here of the achievements of these organizations and their current programs. By way of illustration of their scope and diversity mention might be made, on the market development side, of research on the use of rubber in roads which, though progressing slowly, still offers the most promising alternative bulk outlet for rubber. Also under study are improved methods of presenting rubber, by better and more simple grading, alternatives to the crepe form of presentation (such as crumb rubber), and different types of baling. On the production side, greatest attention is being given to the development of higher yielding clones, a shortening of the period taken by trees to reach maturity and other cost reducing measures, such as oil extension and the reorganization of estate practices, particularly those concerned with latex collection.

Cost and price factors

As indicated in an earlier section, natural rubber has been able to command a price premium over SBR throughout the postwar period. This situation has prevailed mainly because quality considerations remained important enough in a sufficiently large number of end-uses to ensure the disposal of all

[23] A list of price quotations in a recent issue of a technical journal itemized no fewer than 42 different types and grades of SBR (excluding SBR latices) made by a single manufacturer.

the natural rubber produced. With the advent of the new stereo rubbers, however, the field of direct competition between natural and synthetic rubber has been extended to cover virtually the whole elastomer market. In other words, natural rubber may still be sold at a premium over SBR, but it will have to compete pricewise with the stereos, particularly polybutadiene and polyisoprene. One result of this will be to limit further possible fluctuations in natural rubber prices, although some such fluctuations are inherent in the selling arrangements for this commodity.

Under competitive conditions, relative costs of production of natural and synthetic rubbers will, of course, assume critical importance. Unfortunately, it is virtually impossible to discuss such relationships meaningfully, due to the integrated structure of the synthetic rubber industry on the one hand, and the diverse conditions under which natural rubber is produced, on the other. Nevertheless, it seems clear that the trend in synthetic rubber costs will be influenced most strongly by outlays on (monomeric) materials and by the volume of production achieved, while the main influence on natural rubber costs (of which the main component is labor charges) will be the efforts to raise productivity in the industry.

EPR is, at least potentially, the cheapest of the synthetic rubbers, due to the low price of its raw materials, ethylene and propylene. However, as it is unlikely to be produced in significant quantities before 1970, the immediate outlook depends mainly on the situation in respect of the other types. Here butadiene occupies a key place, since it is the major raw material for SBR, accounting for nearly seven tenths of such rubber, and of polybutadiene, besides being an ingredient of N-type rubbers. List prices of butadiene have been under pressure in the United States since 1956, when producing facilities were overextended, falling from 15 cents per pound to $12\,^3/_4$ cents in 1961. A survey published in the latter year concluded that the larger United States producers could probably afford to reduce official prices further to $10\,^1/_2$ cents.[24] Moreover, in the period up to 1965 world butadiene capacity was expected to increase at a faster rate than requirements with most of the surplus concentrated in the United States. In view of the rather unpromising outlook for SBR production in the latter country, this situation is likely to continue in the foreseeable future, with consequent competitive conditions for butadiene sales, unless polybutadiene production expands much more rapidly than anticipated.

The United States SBR industry has itself been operating well below capacity during most of the period of private ownership and this has undoubtedly inflated costs. A similar situation seems to be arising in western Europe where, moreover, the industry is much younger than that of the United States and is, therefore, still meeting heavy amortization and development costs. Special circumstances, including the small scale of production, may raise costs further in some other countries. The Indian SBR plant, for example, is using particularly expensive raw materials derived from alcohol produced from sugarcane. In 1963, the price of indigenous SBR (Grade 1500) was Rs. 4.60 per kilogram (f.o.r. destination), as against a landed cost for the imported product of Rs. 2.75 per kilogram, including a duty of 22 percent ad valorem.[25] Such price differences may, of course, reflect factors other than costs. For example, prices for United States synthetic rubber delivered in the Federal Republic of Germany in 1963, including all special charges, were reportedly 20 percent below those in New York.[26]

It now seems to be accepted in the natural rubber industry that it would be prudent to aim to produce profitably for a selling price of 18 U.S. cents per pound f.o.b. Singapore, which is 4 cents below the lowest average price received in any year since 1950. This is held to be well within the reach of efficient producers, especially with the agronomic advances still to be extensively applied, as the reduced profit per pound can be greatly offset by increased profit per acre.[27] Undoubtedly, the most promising method of reducing costs lies in increasing yields. Considerable research on this problem has been undertaken during the last fifty years and much progress made. In a recent paper,[28] the Controller of Rubber Research and Chairman of the Malayan Rubber Fund Board pointed out that whereas unselected stock yields at the rate of about

[24] Economist Intelligence Unit. *Rubber trends*, December 1961, p. 34. It was also suggested that for polybutadiene a monomer cost of 10½ cents might mean an ex works price of 26 cents a pound, if 8½ cents is allowed for production costs and 7 cents for overheads, selling costs and profits.

[25] *Rubber India*, July 1963.

[26] *Rubber and Plastics Age*, November 1963, p. 1311.

[27] L.C. Bateman, "The Competitive Prospects of Natural Rubber over the Next Ten Years," p. 61. *Proceedings of a symposium organized by the International Rubber Study Group*, Washington, 1962.

[28] *Natural rubber and South-East Asia*. Natural Rubber Bureau. Malaya.

400 pounds per acre per year (depending on soil and other environmental conditions), the pedigree clones, developed in the twenties, raised this figure to 800 pounds, those developed in the thirties to 1,100 pounds, those developed in the forties to 1,500-1,600 pounds, and those available today to 2,000 pounds per acre. Moreover, yields as high as 2,500 pounds have been claimed for new clones still under test. The effect on costs of this progress may be gauged from an estimate presented to the Symposium on the Future of Natural and Synthetic Rubbers organized by the International Rubber Study Group in 1962, which indicated that for each increase of 100 pounds in yield there would be a consequent reduction of $1\,^4/_5$ cents per pound in costs. Another speaker at the symposium expressed the view that the cost of production on an estate in Malaya large enough to produce 1,500 tons a year and obtaining 1,500 pounds per acre would not exceed 12 cents per pound (excluding cesses, duty and other taxes).

It is true, of course, that there is often a long time lag between technical advances and their practical application. In 1962, the yield per tapped acre of estate rubber in Malaya still averaged only 745 pounds, or a little less than half the yields now known to be possible. All of the major rubber producing countries are according high priority to replanting schemes and giving financial incentives to encourage a rapid increase in the proportion of the total acreage under high yielding material. However, further replanting undertaken now cannot exert any significant influence on the productivity of the industry before 1970, due to the period required by the rubber tree to reach maturity. The situation in the intervening years will be influenced mainly by the coming into full bearing of the extensive acreages replanted in the late fifties and early sixties and, less strongly, by other improvements in husbandry, such as more widespread manuring.

Production and consumption prospects

Projections made by FAO [29] indicate that world elastomer consumption in 1970 (including consumption in centrally planned economies) is likely to range between 7.2 million and 8.5 million metric tons, according to whether low- or high-income assumptions are adopted. This represents an increase of 63-93 percent over actual average consumption in the period 1959-61, the latter figure conforming with the tendency earlier in the history of the industry for consumption to practically double itself every decade. On the other hand, production of natural rubber, even allowing for increases in all rubber-growing countries as a result of higher yielding trees and improvements in tapping and agronomic practices, is projected to increase only to within a range of 2.7 million to about 3 million tons.

From the foregoing, it is quite clear that the natural rubber industry could not possibly meet the demand for elastomers which is likely to develop between now and 1970. There is nothing new about this; in fact, much the same situation has existed throughout most of the postwar period. Every pound of natural rubber produced during this period has been sold, no surpluses have emerged, as in the case of some other major agricultural commodities, and if it were not for the existence of the synthetic industry, rubber would have been an extremely scarce and high-priced product. In view of these considerations, the natural rubber industry is concerned not so much with the simple fact of the existence of the synthetic industry as with the question whether it is likely to expand so rapidly in the future as seriously to depress prices and to give rise to major disposal difficulties for the natural product. Some of the factors influencing the relative competitive position of natural and synthetic rubber under such circumstances have been discussed in an earlier section. The question to be answered here is the order of magnitude of expansion of synthetic rubber production which would cause the emergence of highly competitive conditions in the industry and the likelihood of such an expansion occurring in practice.

If, as indicated above, the demand for rubber in 1970 reaches 7.2-8.5 million tons, while the natural rubber industry can supply only 2.7-3.0 million tons, the gap remaining to be filled by synthetic rubber would be of the order of 4.5-5.5 million tons. Even allowing for the absence of reliable data for some countries, there appears to be little room for doubt concerning the synthetic rubber industry's ability to meet this deficiency. To begin with, the industry as a whole is already operating well below capacity (Table IV-14). The position varies considerably from country to country and from one type of rubber to another, but in the United States probably 20 percent of the total capacity available in 1962

[29] FAO. *Trade in agricultural commodities in the United Nations Development Decade.* Rome, 1964.

TABLE IV-14. - PRODUCTION OF SYNTHETIC RUBBER IN 1962 COMPARED WITH CAPACITY IN 1962, 1963 AND FORECAST FOR 1966, BY COUNTRY

	Production	Capacity [1]		
	1962	1962	1963	1966
	..... *Thousand long tons*			
United States	1 574	1 969	2 173	2 230
Canada	168	165	210	220
Mexico	–	–	–	32
Total North America	1 742	2 134	2 383	2 482
United Kingdom	117	122	164	178
Belgium	–	–	27	27
Netherlands	(45)	56	66	98
France	63	98	117	168
Germany, Fed. Rep. of	88	150	162	255
Italy	(89)	103	155	175
Spain	–	–	–	14
Total western Europe	(402)	529	691	915
Argentina	–	–	–	45
Australia	14	35	30	35
Brazil	16	40	40	68
India	–	20	20	40
Japan.....	68	85	105	180
South Africa	–	–	–	25
WORLD TOTAL (EXCL. CENTRALLY PLANNED COUNTRIES)	(2 242)	2 843	3 269	3 790
Centrally planned countries .	...	767	797	1 470
WORLD TOTAL	...	3 610	4 066	5 260

SOURCES: International Rubber Study Group, *Statistical Bulletin; Rubber and Plastics Age*. November 1962 and November 1963.
[1] At the end of year. Including oil content of rubber, but not carbon black.

was idle. According to estimates made by Ruebensaal, [30] capacity outside the centrally planned economies totalled 2.8 million tons at the end of 1962 as against an output in that year of 2.2 million tons. The same authority estimated that capacity had increased to 3.3 million tons at the end of 1963. Total world capacity (i.e., including centrally planned countries) in 1962 and 1963 was placed at 3.6 million tons and 4.1 million tons, respectively, but for obvious reasons these figures are somewhat less reliable than the others quoted.

The synthetic rubber industry can hardly be expected to mark time during the next seven years. In fact, plans for the expansion of facilities in the present producing countries and for the establishment of new industries elsewhere are being announced quite frequently. Ruebensaal has collated further statistics, [31] which show that the addition of new capacity definitely planned will raise the total outside the centrally planned countries to 3.8 million tons in 1966 and for the world as a whole to 5.3 million tons. New industries in Spain, Argentina, Mexico and South Africa will account for roughly one fifth of the expansion. Announced increases in North American capacity over the three-year period are relatively small amounting to only about 4 percent overall and to less than 3 percent in the United States alone. Larger expansions are planned in western Europe, where countries currently producing synthetic rubber will increase their capacity by the order of 30 percent and where, as indicated, Spain will embark on production for the first time.

Whether or not world synthetic rubber capacity will, in fact, reach 5.3 million tons by 1966 depends largely on the situation in the centrally planned countries, particularly the U.S.S.R., where Ruebensaal forecasts an expansion from 800,000 tons to 1.5 million tons. While such large increases are planned, as they have been for some time, the Russian synthetic rubber industry has not always reached the objectives set by the government. On the other hand, Ruebensaal's starting point of 500,000 tons may be on the low side. Moreover, even if the industry does not achieve the planned level of output in 1966, it would be unrealistic to assume that the goal will still have proved unattainable by 1970. Over this longer period, too, capacity will have expanded still further in the rest of the world, so that if the figure projected for 1966 is adopted for 1970, this would appear to be a reasonably cautious assessment of the situation as it is likely to develop in practice. Yet, as has been indicated, such an output would be sufficient to ensure the continuance of highly competitive conditions in the overall market for elastomers.

Ruebensaal's figures also throw some light on changes in the pattern of synthetic rubber production which may be anticipated between now and 1966 (Table IV-15). Although this is looking only three years ahead, these are critical years in view of the recent introduction of the stereo rubbers, and the situation as it develops then will give an

[30] *Rubber and Plastics Age*. p. 1091-1098. November 1962.

[31] *Rubber and Plastics Age*, p. 1172-1182. October 1963.

TABLE IV-15. - SYNTHETIC RUBBER CAPACITY,[1] EXISTING 1963 AND FORECAST FOR 1966, BY TYPES

	1963			1966		
	World, excl. centrally planned countries	Centrally planned countries	Total	World, excl. centrally planned countries	Centrally planned countries	Total
	..... *Thousand long tons*					
SBR	2 290	722	3 012	2 507	1 020	3 527
Butyl	289	25	314	315	75	390
Neoprene	185	30	215	198	100	298
Nitrile	149	20	169	160	45	205
Polybutadiene	257	(2)	257	451	30	482
Polyisoprene	84	(2)	84	99	200	299
EPR	15	(3)	15	59	...	59
Total	3 269	797	4 066	3 790	1 470	5 260

SOURCE: *Rubber and Plastics Age*, November 1963.

[1] At the end of year. Including oil content of rubber, but not carbon black. - [2] Capacity exists, but exact figure unknown. - [3] Pilot operations, less than 1,000 tons.

indication of prospective longer-term trends. As might be expected, planned increases in stereo capacity are proportionately far greater than those for the older rubbers. Outside the centrally planned countries, polybutadiene will be ahead of polyisoprene. The greater emphasis on polyisoprene within the centrally planned countries is in accordance with announced plans of the U.S.S.R. to become virtually self-sufficient in rubber since this synthetic rubber is intended as a complete replacement for the natural product. The planned expansion of SBR capacity in the centrally planned countries is also much greater than in the remainder of the world, where it amounts to little over 9 percent, mostly in the newer and smaller producing countries. United States SBR capacity is, in fact, expected to contract slightly, while there is no increase immediately in prospect in Canada, the large expansion program decided upon by Polymer Corporation in 1960 having been completed. Butyl capacity in noncentrally planned countries is likely to increase by about 9 percent, mainly due to the construction of the new plant in the United States. Neoprene and nitrile capacity may be some 7 percent higher at the end of 1966 than at the end of 1963.

It is emphasized that the figures being discussed here refer to *capacity*, while the key question is the level of *production* to be expected. Moreover, the fact that substantial increases in new capacity are in prospect, particularly to produce the stereo rubbers, does not necessarily imply that all of the older facilities will remain in operation. Indeed, one important conclusion which appears to emerge from this study is that the period up to 1970 is likely to see increasing competition between synthetic rubber producers themselves. The development of the new stereo rubbers is often looked upon as posing a threat to natural rubber alone, but SBR appears to be in a particularly precarious position, especially in the United States. In the latter country, the future of individual SBR producers may depend a great deal on the extent to which they are integrated with the tire industry, producers without "captive" markets being worse situated than others. Their competitive position will also hinge, to some extent, on their degree of dependence on the export trade. Other serious obstacles may be encountered in world markets, notably those arising from the establishment of synthetic industries – sometimes behind tariff walls – in former importing countries. This has been reflected already in a decline in United States exports from about 342,000 tons in 1960 to an estimated 285,000 tons in 1963. However, the proportion of total production absorbed by export markets is still large enough for a continuation of the trend to exert a significant influence on the cost structure of the industry and for some firms most active in this field it could be a critical factor.

Similar considerations apply in countries other than the United States, where the ability to withstand competition is also related to captive markets and to the extent to which the industry is export-oriented. One recent survey of captive markets for SBR outside the United States concluded that the countries with most to fear in this respect were Canada, the Netherlands and Italy, since they have no captive domestic markets and are acutely dependent upon export markets.[32] In the same survey it was estimated that having regard to plans for greater self-sufficiency in the centrally planned countries and to the supplies of natural rubber likely to be available, excess capacity in the synthetic rubber industry might be of the order of 1 million tons in 1965, implying that the industry outside the centrally planned countries would be operating at between 70 and 75 percent of capacity.

[32] Economist Intelligence Unit. *Rubber trends*. March 1962. The new Belgian industry appears to be in a similar position.

Apparel fibers

Apparel fibers have been an expanding market since the war, but in relative terms the natural fibers, cotton and wool, have lost an appreciable amount of ground to man-made fibers. The latter accounted for a quarter of world consumption in 1962, against less than 16 percent on average over the years 1948 to 1950.

Types and properties of man-made fibers

The man-made competitors of natural apparel fibers fall into two distinct groups: *cellulosic* fibers, that is, viscose and acetate rayon, and *noncellulosics*, or the true synthetics. In turn, there are three main types of synthetics: the *polyamides*, that is, nylon in its various forms; the *polyesters*, of which the main representative is the British-made Terylene, manufactured elsewhere under such trade names as Dacron, Tergal and Tetoron; and the *acrylics*, comprising Orlon, Acrilan, Courtelle, Leacril and Cashmilon. Between them, these three types made up 90 percent of the world's synthetic fiber production in 1962. The remaining 10 percent were accounted for by various *polyvinyl* fibers.

The physical properties of fibers, such as length, fineness, elasticity, etc., can be controlled more easily in man-made than in natural, and in synthetic than in cellulosic, fibers. Both are made as filament yarn i.e., long threads twisted together, and as staple fibers, i.e., filaments cut into short lengths for processing on machinery used in the cotton and wool textile industries.

No man-made fiber produced so far has all the properties of either wool or cotton, but all have some of them in varying degree, and some have additional desirable qualities occasionally gained by the presence of additional undesirable ones. Among the cellulosic fibers, *viscose rayon*, the earliest man-made fiber, is to this day one of the most versatile ones. It has high moisture absorption and heat resistance, but is not a good insulator and is vulnerable to strong acids and alkalis, mold and mildew. In the early days rayon used to wash badly, but this defect is now largely overcome. It takes dyes better than cotton, though some dyes affect its physical properties. Viscose rayon can be made in varying strengths; high-tenacity types are used for industrial purposes, such as tire cords and car upholstery, and regular and intermediate tenacity rayon for clothing and household products. Woven viscose rayon is used in most clothing items for men and women, knitted rayon, mostly for underwear, having been displaced in hosiery by nylon. Household uses include blankets, curtains, upholstery, and tufted carpets and rugs.

Acetate rayon is weaker and less heat-resistant than viscose, but has a softer handle and drapes well. Its uses are similar to viscose rayon, except for articles which have to take hard wear, like carpets, tire cord or car upholstery.

Among synthetic fibers, the *polyamides* group comprises all the various types of *nylon*, the chief advantages of which are strength, resistance to abrasion and quick drying. Nylon is a good insulator and resists dilute acids and alkalis, and its high melting point allows it to be " heat set " at temperatures around 200 °C to retain any given shape unless reheated to the same temperature. The main disadvantages of nylon are that it generates static electricity, which makes it attract dirt and cling to the wearer; it is all the more uncomfortable for its low moisture absorption. Nylon fabrics also tend to discolor with use. These defects, in many cases, outweigh the advantages of easy care and hard wear, especially since easy-care cotton fabrics have also been developed. Nylon is little used in woven apparel. In knitted goods, however, which " breathe " more than woven ones, nylon first stormed the market for women's stockings in the late forties and recently made much headway in knitted underwear, nightwear and men's socks. The only major household use of nylon is in carpets, where its hardwearing qualities are an advantage, as they are in certain industrial uses, such as tire cords and fishing nets.

The *polyester* group of synthetics is represented mainly by Terylene, as it is called in its home country, the United Kingdom; elsewhere, Dacron, Tergal and Tetoron belong to this group. These fibers have much in common with nylon, especially tensile strength, low moisture absorption and resistance to heat, acids and solvents. They take permanent pleats with ease and are extremely crease-resistant, which makes them suitable for women's skirts and frocks, and also for men's and women's slacks. A tendency to " pill " has so far limited their use in knitwear, but this outlet is now expanding. In the household, their ability to withstand exposure to sunlight makes

polyesters suitable for curtains. Recently, they have begun to be used industrially for tire cord.

The *acrylics group* of synthetics includes Orlon, Acrilan, Courtelle, Crylor, Leacril and Cashmilon. They all have lower tensile strength than nylon and the polyesters, but a softer handle; they also have less resistance to abrasion but more than wool. The acrylics are light, resist sunlight, dry quickly and do not shrink, and their springiness and bulkiness can be increased by super drawing. Low moisture absorption makes them less comfortable than cotton or wool, but other disadvantages such as dyeing difficulties and a tendency to pill have been largely overcome. Few fabrics are woven from acrylics, but in knitwear the combination of warmth with light weight has enabled them to make inroads into the market for such clothing items as sweaters, jackets, knitted dresses and suits. The same qualities fit them for use in blankets and in carpets they are stronger than wool and softer than nylon.

Other synthetics, mainly *polyvinyl* fibers such as polypropylene, polyurea, spandex and other types, accounted for only 10 percent of the world's synthetic fiber production in 1962. Polyvinyl alcohol fibers, of which Vinylon [33] is an example, have good chemical resistance and low affinity for water, which suits them for use in raincoats, umbrellas, filter cloths and fishing nets. Polyvinyl chloride fibers, such as Pe Ce in Germany, also have resistance to some chemicals and to rotting, mildew and water, and are used for fishing gear, ropes and sailcloth. Polyvinyledene chloride fibers (saran) are used mainly for upholstery, because they are washable, do not stain or fade, and wear well. Saran has a low ironing temperature and is not used for clothing. Spandex elastomeric fibers are light, soft and strong and are used in foundation garments, swim-wear and ski suits. Polypropylene, one of the newest synthetics, is cheaper than some others used for similar purposes. It has tensile strength, low density and high reversible elongation. Disadvantages are high static electricity, low heat resistance and poor dyeability by conventional techniques. The main end-uses so far have been in outdoor furniture webbing, car seat covers, ropes and brushes; improvements are expected to adapt polypropylene for use in clothing, both alone and in blends with other fibers.

[33] Vinylon was developed in Japan in the thirties. It has not found acceptance in other countries.

PRODUCTION AND TRADE IN MAN-MADE FIBERS

In 1962, world production of man-made fibers is estimated to have reached 3.9 million tons. At this level it was approximately three times the volume of wool output but still represented only 36 percent of the output of cotton. Production of rayon totaled 2.9 million tons and of synthetic fibers just over 1 million tons (Table IV-16).

TABLE IV-16. - WORLD PRODUCTION OF CERTAIN TEXTILE FIBERS, 1952 TO 1962

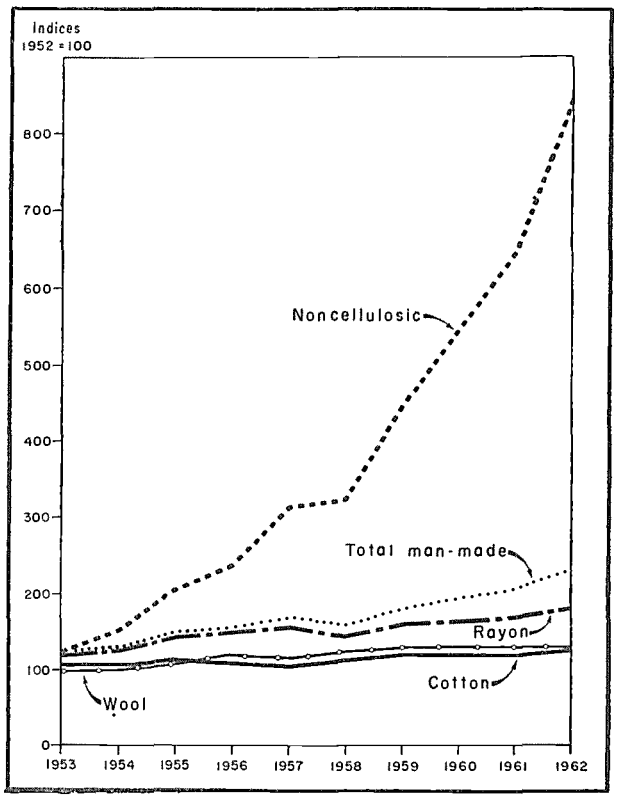
	Cotton (raw)	Wool (scoured)	Man-made fibers			Total [1]
			Rayon	Noncellulosics	Total	
	Thousand metric tons					
1952	8 693	1 157	1 603	129	1 732	11 609
1953	9 061	1 165	1 884	158	2 043	12 296
1954	8 916	1 190	2 027	195	2 222	12 354
1955	9 491	1 265	2 282	263	2 546	13 331
1956	9 215	1 338	2 385	306	2 691	13 276
1957	9 030	1 310	2 475	406	2 881	13 253
1958	9 736	1 384	2 280	418	2 698	13 852
1959	10 259	1 462	2 521	577	3 098	14 851
1960	10 259	1 462	2 603	710	3 313	15 065
1961	10 330	1 486	2 690	838	3 528	15 377
1962	10 824	1 287	2 864	1 080	3 944	16 269

[1] Includes silk production, which has risen from 19,000 metric tons in 1950 to 33,000 metric tons in 1962.

Rayon production, already well established before the last war, increased by nearly 80 percent between 1952 and 1962 (Table IV-16), with some significant changes in the relative importance of the main producing countries. The United States has remained by far the largest of these, but its output reached a peak in 1951 and has shown no further growth. On the other hand, European production increased by nearly one half over the period and that of Japan more than doubled. Latin American production (principally Argentina, Brazil, Colombia and Mexico), while remaining smaller than that of the other countries mentioned, also showed a 36 percent increase.

The most rapid growth was achieved by synthetic fibers (Figure IV-5). Output of these was nearly nine times as high in 1962 as in 1952 – a rate in excess of that of rayon in its own infancy, when production increased a little less than sevenfold between 1926 and 1936. This growth in synthetic fibers is largely the success story of nylon, the oldest and quantita-

FIGURE IV-5. - WORLD PRODUCTION OF NATURAL AND MAN-MADE FIBERS, 1953 TO 1962



tively the most important of the group. In 1962, nylon production is estimated to have represented 56 percent of the synthetic fiber total. Next in order of importance were the polyesters (18 percent) and the acrylics (17 percent), the balance being represented by minor fibers. [34]

Production of synthetic fibers is more heavily concentrated than that of rayon, the major countries being the United States, Japan, the Federal Republic of Germany, the United Kingdom, France, Italy and the U.S.S.R. (Table IV-17). In 1962, the United States alone produced 40 percent of the world's synthetics, while Japan produced a further 17 percent. In all cases, the picture is one of extremely rapid growth, Japan leading with a twelvefold increase over a period of eight years. Since commercial production of vinylon was started in Japan in 1950, the range of fibers has been extended to include six others, all of which have participated in the expansion of the industry. Apart from the United States, most other countries produce a smaller range of synthetics.

[34] *Textile Organon.* June 1963.

About one sixth of the world's man-made fiber output moved into international trade in 1962 – 17.3 percent of rayon, 14.9 percent of synthetics, and 16.5 percent of all man-made fibers. This is an increase of 18 percent in the volume of man-made fiber trade of the year before, but only a small increase in relative terms, 15.2 percent of all man-made fibers produced having entered world trade in 1961. But over the whole postwar period more striking changes have taken place: in 1949, 20 percent of the world's rayon production moved into world trade, and only 4.3 percent of the still minute output of synthetic fibers; in 1954, the proportion of exports of rayon had risen to 25 and of synthetics to 7.4 percent of world production. Rayon exports have declined since then in relation to world output, since many countries have stepped up their own production and reduced their import dependence. Since synthetics are still produced in only a few countries, a larger proportion of world output finds its way into international trade.

Of the main rayon producing regions of the world, only eastern Europe is a net importer. North American imports and exports have tended to balance in recent years, the big net exporters being western Europe and Japan. As regards synthetics, western Europe in the last two years very nearly caught up with the United States as the world's biggest net exporter, and Japan exported less than half as much as either.

Latin America, the Near East, Africa and Oceania are all net importers of man-made fibers. In each case, imports have tended to rise since the war (in Africa strikingly so), and in all of them rayon far outpaces synthetics. Countries like Argentina, Brazil and Mexico, which have sizeable man-made fiber industries of their own, import little or nothing.

TRENDS IN THE DEMAND FOR NATURAL AND MAN-MADE FIBERS

The overall demand

In recent years, world consumption of apparel fibers has, on average, closely followed the trend of production, rising from 10.5 million tons in 1952 to 15.9 million tons in 1962. Exceptionally in the case of cotton, large stocks have accumulated, prin-

TABLE IV-17. - WORLD PRODUCTION OF RAYON AND SYNTHETIC FIBERS, 1955 TO 1962[1]

	United States	Total North America	France	Germany, Fed. Rep. of[2]	Italy	United Kingdom[3]	Total western Europe	U.S.S.R.	Eastern Europe and China (Mainland)	Japan	Asia, Africa and Oceania	South America	World Total
	Thousand metric tons												
RAYON AND ACETATE YARN AND STAPLE													
1955	571.9	634.6	110.6	225.1	131.2	195.7	903.4	...	328.7	332.1	356.8	58.7	2,282.2
1956	520.7	585.8	106.5	240.0	147.8	196.3	940.1	...	350.8	416.1	446.7	62.3	2,385.6
1957	516.8	578.5	120.3	250.3	145.8	191.5	975.7	...	382.0	438.6	473.7	65.3	2,475.2
1958	469.4	525.9	126.0	215.9	137.4	160.7	899.5	154.7	414.3	326.0	373.9	66.8	2,280.4
1959	529.3	599.7	109.8	239.0	155.5	193.6	975.6	165.6	436.3	384.8	442.8	66.5	2,520.9
1960	466.5	530.8	118.6	246.5	161.5	206.7	1,031.9	190.5	472.6	433.4	497.9	69.6	2,602.9
1961	496.8	556.2	124.5	245.3	173.4	190.1	1,027.5	220.4	518.0	445.4	514.4	74.2	2,690.3
1962	577.0	644.2	125.4	261.3	189.9	200.4	1,091.0	238.1	550.5	427.3	510.9	67.6	2,864.2
SYNTHETIC FIBERS													
1955	172.1	177.7	11.2	11.6	8.5	18.4	55.7	–	13.3	15.7	15.8	0.5	263.0
1956	181.6	188.1	14.8	14.1	11.5	23.0	71.4	–	17.0	28.8	28.9	0.7	306.0
1957	233.9	243.5	19.8	19.0	15.9	32.1	96.7	–	21.4	42.4	42.5	1.8	405.8
1958	222.5	233.5	23.4	24.4	18.8	30.3	108.7	–	25.5	46.4	47.5	2.7	417.9
1959	292.7	306.9	32.7	38.6	25.1	39.9	153.0	–	30.3	80.8	83.0	3.8	577.0
1960	307.2	325.8	45.3	52.6	34.2	61.9	215.8	–	40.6	118.3	121.2	6.5	709.9
1961	340.6	361.9	51.3	65.3	43.5	67.4	255.0	–	55.4	153.1	156.4	9.1	837.8
1962	440.2	466.4	65.5	94.0	63.3	84.1	348.4	–	64.8	182.3	186.8	13.0	1,079.5

SOURCE: *Textile Organon*, June 1963.

[1] The table lists separately all countries producing more than 200 million pounds (91,000 metric tons) of rayon or 100 million pounds (45,000 metric tons) of synthetic fibers in 1962. - [2] Including the output of the Zehlendorf plant in West Berlin. - [3] Rayon figures are estimated from published figures of man-made fiber divided between yarn and staple.

cipally in the United States. The main additions to these occurred between 1952 and 1956; subsequently, stocks have been drawn upon, thereby raising consumption above the level of current production. Much smaller quantities of wool were stockpiled by governments during the Korean War. These also have been disposed of in later years and are no longer a factor in the situation.

As shown in Table IV-18, total world consumption of cotton, wool, rayon and synthetic fibers increased by more than 50 percent between 1952 and 1962. The six main consuming countries in developed regions accounted for less than a third of this increase. United States consumption rose by only 13 percent, as against 79 percent in the Federal Republic of Germany, 69 percent in Italy and 39 percent in the United Kingdom and France. Japanese consumption more than doubled over the period, despite a sharp curtailment in 1962.

Total consumption of apparel fibers has grown at a faster rate than world population, so that usage per head has increased. However, considerable differences still remain between individual regions and countries. In 1959, the most recent year for which full international statistics are available, North American consumption per head was lower than some ten years earlier, but it was still more than three times as high as the world average and nearly double the per caput consumption in western and eastern Europe and in Oceania, the regions with the next highest consumption per head. Next came Latin America, not far short of the world average, and then the Near East nearly one third below the world average. The figures for the Far Eastern region mask striking internal differences; the inhabitants of populous China (Mainland) and India each consuming less apparel fibers than those of any other region, except Africa, while per caput consumption in Japan was well in excess of the world average.

The composition of demand

All the main apparel fibers participated in the expansion of world consumption between 1952 and 1962. However, the advances in man-made fiber

TABLE IV-18. - WORLD CONSUMPTION OF COTTON, WOOL AND MAN-MADE FIBERS, 1952 TO 1962

	Cotton	Wool	Rayon			Synthetics	Total
			Filament yarn	Staple	Total		
	Thousand metric tons						
1952	7 670	1 088	831	773	1 604	151	10 513
1953	8 221	1 220	947	930	1 877	184	11 502
1954	8 534	1 182	926	1 111	2 037	225	11 978
1955	8 728	1 226	1 047	1 237	2 284	302	12 540
1956	9 081	1 322	1 021	1 362	2 383	356	13 142
1957	9 396	1 360	1 057	1 421	2 478	467	13 701
1958	9 483	1 276	964	1 317	2 281	478	13 783
1959	10 150	1 446	1 098	1 426	2 524	663	14 783
1960	10 455	1 471	1 139	1 468	2 607	818	15 351
1961	10 522	1 493	1 153	1 539	2 692	906	15 613
1962 [1]	10 386	1 475	1 225	1 637	2 862	1 177	15 900
	Percent						
1952	73.0	10.3	7.9	7.4	15.3	1.4	100.0
1953	71.5	10.6	8.2	8.1	16.3	1.6	100.0
1954	71.2	9.9	7.7	9.3	17.0	1.9	100.0
1955	69.6	9.8	8.3	9.9	18.2	2.4	100.0
1956	69.1	10.0	7.8	10.4	18 2	2.7	100.0
1957	68.6	9.9	7.7	10.4	18.1	3.4	100.0
1958	70.2	9.4	7.2	9.7	16.9	3.5	100.0
1959	68.7	9.8	7.4	9.6	17.0	4.5	100.0
1960	68.1	9.6	7.4	9.6	17.0	5.3	100.0
1961	67.4	9.6	7.3	9.9	17.2	5.8	100.0
1962 [1]	65.3	9.3	7.7	10.3	18.0	7.4	100 0

SOURCE: International Cotton Advisory Committee, *Cotton - Monthly Review of the World Situation*, April-May 1963.
[1] Preliminary.

consumption were much more rapid than in the case of the natural fibers. Consumption of synthetics increased nearly sevenfold, while rayon consumption rose by 78 percent. By comparison, cotton and wool each made gains of only about 35 percent.

As a result, the shares of the market held by cotton and wool have fallen from 73 percent to 65 percent, and from 10 percent to 9 percent, respectively. On the other hand, rayon's share has increased from 15 percent to 18 percent, and the synthetics' from 1.4 percent to 7.4 percent. Thus in 1962 the natural fibers together accounted for roughly three quarters of total consumption and the man-made fibers for a quarter. In eleven years nearly 9 percent of the market was lost to man-made fibers.

In 1962, the man-made fibers held from 30-40 percent of the apparel fibers markets in the six main developed countries referred to in Table IV-19. The proportion was highest in Japan and lowest in the United States, the only one of the six with a large domestic natural fiber industry. In each case the shares of man-made fibers, particularly the synthetics, in these growing markets have been increasing. In 1952, consumption of synthetics in France, the Federal Republic of Germany, Italy and Japan amounted to only 2-3,000 tons, but by 1962 it represented 8-16 percent of the total, the lower figure applying to Italy and the higher to Japan. The latter country now consumes a higher proportion of synthetics than any other country in the world including the United States and the United Kingdom where the proportions were 12-13 percent in 1962. However, it is at the lower end of the range of 20-30 percent in rayon consumption in the countries mentioned.

Less recent regional data show that changes in the composition of demand between 1952 and 1960 did not benefit man-made fibers exclusively.[35] In the Far East, for example, wool as well as rayon was making gains on cotton, while in Africa and the Far East cotton was improving its position relative to wool. In eastern Europe, the share of wool fluctuated narrowly around 10 percent, while cotton lost ground to man-made fibers. In Latin America, nearly all the gain of man-made fibers was at the expense of wool.

In 1960, cotton was still the most important apparel fiber in all regions, the proportion ranging as high as 83 percent in the Far East and 73-75 percent in the Near East and Latin America. The share of cotton in fiber consumption was lowest in western Europe and Oceania, where it amounted to 52-54 percent. The other regions, including North America, the U.S.S.R. and eastern Europe, and Africa, fell midway between these two groupings with a share of 65-66 percent.

The relative importance of the other fibers varied from region to region. Rayon was everywhere, except in the U.S.S.R., eastern Europe and Oceania, more important than wool, as also were synthetic fibers in the United States and Japan. Apart from North America and western Europe, synthetics still accounted in 1960 for at most only 5 percent of total fiber consumption, although within the Far Eastern region the proportion was approaching 12 percent in Japan.

The foregoing patterns of consumption, and particularly the usage of natural fibers, are explicable

[35] FAO. *Per caput fiber consumption levels, 1948-58*. Rome, 9160. And *Monthly Bulletin of Agricultural Economics and Statistics*. January 1962.

TABLE IV-19. - CONSUMPTION OF APPAREL FIBERS IN CERTAIN COUNTRIES, 1952 TO 1962

	United States		United Kingdom		France		Germany, Fed. Rep. of		Italy		Japan	
	Natural	Man-made	Natural	Man-made	Natural	Man-made	Natural	Man-made	Natural	Man-made	Natural	Man-made
	Thousand metric tons											
1952	2 146	598	365	92	264	56	266	138	188	43	332	140
1953	2 196	642	469	115	286	71	326	155	193	47	392	185
1954	1 978	603	429	163	309	71	348	161	188	72	369	208
1955	2 141	778	427	166	276	78	367	181	155	60	338	213
1956	2 135	694	441	184	320	88	402	190	164	79	492	280
1957	1 956	732	404	195	360	108	441	194	191	94	509	281
1958	1 880	682	386	160	325	105	410	180	180	101	413	186
1959	2 155	824	452	193	283	101	425	211	209	106	498	295
1960	2 109	580	443	224	308	134	462	241	236	112	525	369
1961	2 035	786	423	210	313	134	446	253	216	116	742	410
1962	2 148	964	407	228	296	149	442	279	244	149	585	398
	Percent											
1952	78	22	80	20	82	18	66	34	81	19	70	30
1953	77	23	76	24	80	20	68	32	80	20	68	32
1954	77	23	72	28	81	19	68	32	72	28	64	36
1955	73	27	72	28	82	18	67	33	72	28	61	39
1956	75	25	71	29	78	22	68	32	67	33	64	36
1957	73	27	67	33	77	23	70	30	67	33	64	36
1958	73	27	71	29	76	24	70	30	64	36	69	31
1959	72	28	70	30	74	26	67	33	66	34	63	37
1960	78	22	66	34	70	30	66	34	68	32	61	39
1961	72	28	67	33	70	30	64	36	65	35	64	36
1962	69	31	64	36	66	34	61	39	62	38	60	40

partly in terms of the availability, or otherwise, of domestic supplies. An obvious example of this is the high usage of wool in Oceania, mainly Australia and New Zealand, where cotton production is still only very small. A reverse situation obtains in the United States, where the existence of a small domestic sheep industry may be acting as a positive handicap to wool consumption in the country, since protective tariffs raise the price of the larger quantities imported. Cotton is, of course, in abundant supply in the United States, but here again the price support arrangements have restricted the ability of the industry to compete pricewise with man-made fibers.

Trends in end-uses

United States. The data presented in Tables IV-20 and IV-21 show trends in fiber end-usage in the United States from two viewpoints: firstly, the relative importance of individual outlets (clothing, household, industrial, etc.) for the various fibers and, secondly, the ratio of individual fiber use to total fiber use in the same outlets. The first of the tables brings out immediately the fact that although cotton, wool and man-made fibers are commonly called apparel fibers, clothing accounts for only half the total consumption.[36] For wool, the proportion is indeed very high (70 percent in 1961) and for cotton it is greater than 50 percent, but for rayon and synthetics it is lower. Moreover, proportionately less man-made and more natural fibers went into clothing in 1961 than during the years 1949-53. Other major outlets exist in household uses, including bedding, carpets and rugs, upholstery, curtains, etc., and in industry for such products as tire cords, belting and electrical goods. A fairly steady proportion of natural and a sharply rising proportion of man-made fibers have been going into household uses, and the general drop in the utilization of all fibers in industry was most pronounced in the case of natural fibers.

The most rapidly growing sector of consumption in the United States has been the household uses one (Table IV-21). Between the 1949-53 base period and 1961, the use of all fibers for such purposes increased by 35 percent, as against 20 percent in clothing. Industrial utilization and exports actually

[36] The justification for the terminological convention lies in the fact that other fibers, such as jute and sisal, find no outlet at all in apparel uses.

TABLE IV-20. - PROPORTION OF EACH END-USE [1] TO ALL USES OF SPECIFIED FIBERS, UNITED STATES

	Average 1949-53	Average 1954-58	1959	1960	1961
	..... Percent				
COTTON					
Clothing	45	52	54	54	55
Household	24	25	26	26	26
Industrial	23	17	15	15	14
Export	8	6	5	5	5
Total	100	100	100	100	100
WOOL					
Clothing	64	70	67	67	70
Household	28	26	31	30	28
Industrial	7	3	2	2	2
Export	1	1	(2)	(2)	(2)
Total	100	100	100	100	100
RAYON					
Clothing	49	39	39	40	43
Household	12	24	28	29	30
Industrial	31	31	29	26	23
Export	8	6	4	5	4
Total	100	100	100	100	100
SYNTHETIC FIBERS					
Clothing	50	46	42	40	41
Household	8	14	16	19	20
Industrial	40	36	38	37	35
Export	2	4	4	4	4
Total	100	100	100	100	100
ALL FIBERS					
Clothing	48	51	51	51	52
Household	21	24	26	26	26
Industrial	23	20	19	18	17
Export	8	5	4	5	5
Total	100	100	100	100	100

SOURCE: *Textile Organon*, November 1961 and November 1962.

[1] *Clothing* includes retail piece goods, linings, narrow fabrics, handwork yarns, shoes and slippers; *household* includes home furnishings, handbags, toys, medical and miscellaneous uses; *industrial* includes tire cord, car upholstery, electrical applications, rope, tarpaulins, reinforced plastics, etc.

[2] Less than 0.5 percent.

showed declines of 16 percent and 33 percent, respectively, thereby counterbalancing most of the gains in the other two sectors.

The increase in the overall use of synthetic fibers was accompanied by a declining quantity of rayon and a constant quantity of wool used in clothing, less wool in household uses and less cotton, wool and rayon in industrial uses. Cotton is still more important than any fiber in each of the sectors. It is followed by rayon, except in the contracting industrial sector, where synthetics moved up to second position in 1960 and continued their advance in 1961.

The tire sector, which is the main industrial outlet for rayon and synthetics, provides an outstanding illustration of the successive displacement of one fiber by another in a particular end-use. Originally, cotton was the principal fiber used in tire cords. By the early fifties, however, it had been almost completely displaced by rayon. Almost immediately rayon itself came under challenge from nylon, which thereafter increased its share of the market year by year. In 1962, nylon constituted 47 percent of total tire cord and fabric production, rayon 51½ percent and cotton only one half of 1 percent.[37] Moreover, there is still no certainty that this process of substitution has been completed, as the polyesters are said to offer advantages over nylon, such as lower elasticity.

Nothing comparable to this has occurred in other industrial outlets, where rayon usage has always been relatively small. Here, the synthetics have been competing directly with cotton and wool and also with nonapparel fibers, such as jute and sisal. The second largest industrial outlet for synthetics is now in reinforced plastics and the third in rope, twine, cordage, etc.

Japan. End-use statistics for Japan, the only other reasonably comprehensive ones available, serve to illustrate the differences in consumption patterns which may exist between countries (Table IV-22). A higher proportion of fibers goes into apparel uses in Japan than in the United States (88 percent in 1960) and a lower proportion into industrial uses. However, both the absolute quantities used in industry and the share of this sector in total fiber consumption have been increasing, the reverse of the situation in the United States.

In the apparel and household sector, synthetic fibers made considerable gains between 1952 and 1960, almost entirely at the expense of cotton, although the absolute usage of cotton continued to rise. The quantities of wool and rayon used for the same

[37] In the second quarter of 1963 the use of nylon in tire cords and fabric exceeded that of rayon for the first time, the proportions being 52 percent and 48 percent, respectively.

TABLE IV-21. - END-USES[1] OF FIBERS AND PROPORTIONS OF EACH FIBER TO ALL FIBERS IN THE SAME END-USES, UNITED STATES

	Average 1949-53		Average 1953-58		1959		1960		1961	
	1 000 metric tons	Percent	1 000 metric tons	Percent	1 000 metric tons	Percent	1 000 metric tons	Percent	1 000 metric tons	Percent
COTTON										
Clothing	829	64	958	67	1 043	67	1 015	67	1 024	65
Household	430	74	474	69	505	64	492	63	482	62
Industrial	412	66	309	56	295	50	272	50	265	51
Export	155	76	113	73	104	74	101	72	97	72
Total	1 826	67	1 854	66	1 947	63	1 880	63	1 868	62
WOOL										
Clothing	174	13	173	12	178	11	170	11	175	11
Household	77	13	65	9	81	10	77	10	70	9
Industrial	20	3	7	1	5	1	5	1	5	1
Export	2	1	1	1	1	1	1	1	1	1
Total	273	10	246	9	265	9	253	8	251	8
RAYON										
Clothing	263	20	198	14	201	13	201	13	214	14
Household	65	12	120	18	148	19	144	18	149	19
Industrial	162	26	160	29	151	26	133	24	115	22
Export	44	22	31	20	22	15	24	17	22	16
Total	534	20	509	18	522	17	502	17	500	17
SYNTHETIC FIBERS										
Clothing	40	3	98	7	144	9	142	9	164	10
Household	6	1	29	4	54	7	47	9	80	10
Industrial	32	5	77	14	133	23	134	25	138	26
Export	2	1	9	6	14	10	15	10	15	11
Total	80	3	213	7	345	11	358	12	397	13
ALL FIBERS										
Clothing	1 306	100	1 427	100	1 565	100	1 528	100	1 577	100
Household	578	100	688	100	788	100	780	100	782	100
Industrial	625	100	553	100	548	100	543	100	523	100
Export	203	100	154	100	141	100	141	100	135	100
Total	2 712	100	2 822	100	3 078	100	2 992	100	3 017	100

SOURCE: *Textile Organon*, November 1961 and November 1962.
[1] See footnote of 1 Table IV-20.

purpose also increased, but these fibers simply maintained their previous shares of the market. Tendencies in the industrial sector were similar, except that rayon, as well as synthetics, was making inroads on cotton consumption. An expanding industrial use of synthetics is in fishing net production. Of the total of 11,732 tons of nets produced in 1962, an estimated 9,400 tons were made of synthetic fibers, mainly nylon and vinylon. Although prices of such nets are about 50 percent higher than ones made from cotton, nylon nets are said to be durable for roughly three years and vinylon about two years, while cotton nets last only half a six-months' fishing season.[38]

[38] *Asian Textile Annual*, p. 127, 1963.

PRICES OF NATURAL AND MAN-MADE FIBERS

Movements in prices of natural and man-made fibers in the United States and United Kingdom are charted in Figures IV-6 and IV-7. Two features are immediately apparent. One is the generally greater price stability of man-made fibers; the other is their almost uninterrupted downward trend in recent years. Between July 1958 and December 1963 only one price adjustment was made to the price of Terylene in the United Kingdom and only three to Dacron, the United States equivalent of Terylene; in each case, the adjustments were downward ones. During the same period, nylon prices were adjusted twice in the United Kingdom and once in the United States. There was a comparable stability in Acrilan and rayon prices in the two countries. By contrast, cotton and wool prices experienced wide short-term fluctuations.

In the latter part of 1963, Terylene and nylon (3 denier) prices in the United Kingdom were at roughly comparable levels, some 30 percent higher than Acrilan, which, in turn, was between $3^{1}/_{2}$ and 4 times dearer than viscose rayon. On 1 January 1964, however, the price of Terylene staple was cut sharply from 110 pence per pound to 90 pence. In the United States, nylon was considerably more expensive than Dacron, the equivalent of Terylene, but the relationship between Acrilan and rayon prices was similar to that obtaining in the United Kingdom.

Comparisons between the absolute levels of man-

TABLE IV-22. - END-USES OF FIBERS AND PROPORTIONS OF FIBERS TO ALL FIBERS IN THE SAME END-USES, JAPAN

	1952		1956		1959		1960	
	1 000 metric tons	Percent	1 000 metric tons	Percent	1 000 metric tons	Percent	1 000 metric tons	Percent
COTTON								
Apparel and household	219	57	265	50	244	47	255	41
Industrial	36	88	36	65	39	49	40	46
Total	255	60	301	52	283	47	295	42
WOOL								
Apparel and household	67	17	88	17	91	17	103	17
Industrial	1	2	1	2	1	1	1	1
Total	68	16	89	15	92	15	104	15
RAYON								
Apparel and household	100	26	145	28	132	25	155	25
Industrial	4	10	11	20	20	25	23	26
Total	104	24	156	27	152	25	178	25
SYNTHETIC FIBERS								
Apparel and household	1	(1)	25	5	56	11	102	17
Industrial	–	–	7	13	20	25	24	27
Total	1	(1)	32	6	76	11	126	18
ALL FIBERS								
Apparel and household	387	100	523	100	523	100	615	100
Industrial	41	100	55	100	80	100	88	100
Total	428	100	578	100	603	100	703	100

SOURCE: International Cotton Advisory Committee, *Prospective trends in consumption of textile fibers*, March 1962.

(1) Less than 0.5 percent.

FIGURE IV-6. - UNITED STATES: PRICES OF NATURAL AND MAN-MADE FIBERS, 1958 TO 1963

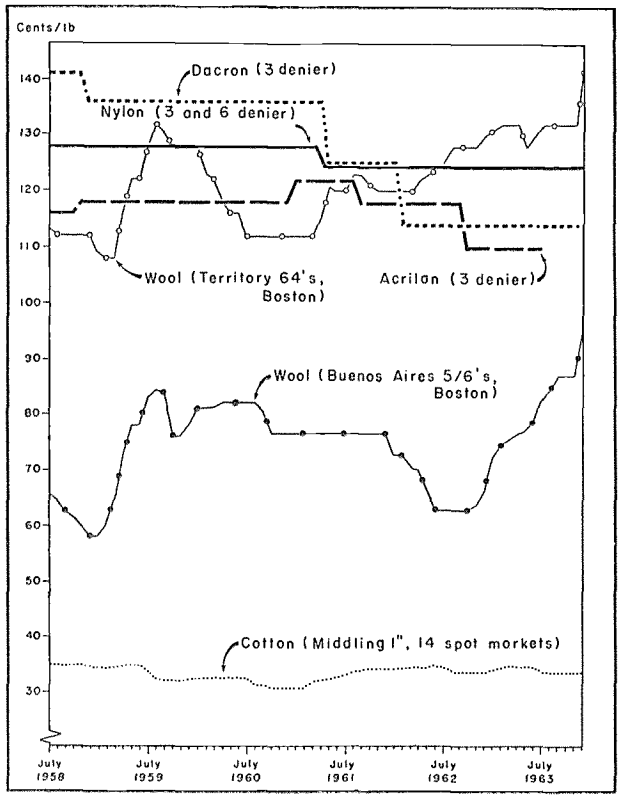
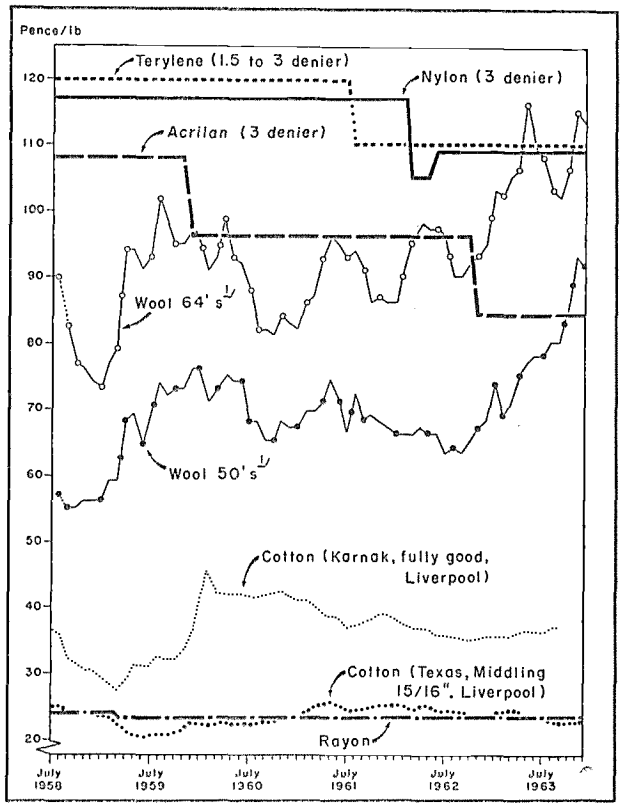


FIGURE IV-7. - UNITED KINGDOM: PRICES OF NATURAL AND MAN-MADE FIBERS, 1958 TO 1963



[1] United Kindgom and Dominion auctions adjusted to London costs.

made and natural fibers are complicated by the fact that the former, and particularly synthetic fibers, have a greater "utility poundage," i.e., they yield greater quantities of yarn and fabric per unit of weight.[39] Even so, synthetic fibers are clearly dearer than cotton in both countries. Rayon is cheaper than cotton, its closest competitor, its greater utility poundage only serving to widen further an already existing and increasing price advantage. In 1961, this advantage averaged as much as 21 percent in the United States and 6 percent in the United Kingdom. In both countries synthetic fiber prices were generally higher than wool prices until 1961, but since then the reverse has applied.

In the United States, the further price reductions for most synthetic fibers during 1961 brought them much closer to wool prices and in 1962/63 the rise in wool gave the synthetics a price advantage. In early 1963 nylon staple was priced at 6 percent less than a comparable wool type in the United States, and Dacron and acrylic staple fibers 14-16 percent less. United Kingdom Terylene and nylon prices were still slightly higher than wool prices, but Acrilan was 20 percent cheaper pound-for-pound.

Some of the differences in price relationships in the two countries are explicable in terms of the United States price support arrangements for domestically produced natural fibers. Prices of United States cotton are lower in the United Kingdom than in the United States, due to the fact that cotton may not be disposed of in the latter country below government price-support levels, while exports are subsidized.[40] This, incidentally, also means that foreign rayon producers must compete with cotton at lower price levels than their United States counterparts, so much so that they are able to make sales in the United States market, despite the existence of a 15-percent import tariff. Similarly, United States wool prices are inflated by a duty on imported apparel wool, while United Kingdom imports are

[39] Utility poundage can also be taken to include the longer-wearing attributes of the man-made fibers, which is a further factor entering into interfiber competition.

[40] In the last five seasons this subsidy has been as follows: 1959/60, 8 cents per pound; 1960/61. 6 cents: 1961/62-1963/64. 8½ cents.

duty-free. Price relationships in the United Kingdom, therefore, more closely approach those to be expected in a free fiber economy. However, there is some inflexibility resulting from the oligopolistic structure of the man-made fibers industry. It should be remembered also that the United States cotton price support system has world-wide ramifications insofar as it sets a ceiling on prices for foreign growths. Support schemes for wool are also in operation in New Zealand and South Africa, but prices under these are fixed at conservative levels and, in any case, they influence mainly crossbred types, as there is no similar scheme in operation at Australian auctions.

Price data available for other major fiber consuming countries indicate that the situation there is more similar to that obtaining in the United Kingdom than in the United States. In 1961, the price advantage of rayon over cotton in France and Italy was greater than in the United Kingdom, but smaller than in the United States. In Japan, on the other hand, it was as high as 36 percent. Prices for Japanese spun rayon (30s) fell from 168 yen per pound in 1951 to 96 yen in 1961, a sharper reduction than in any of the other countries mentioned. Nylon prices in the same country, too, have been reduced in practically every year since 1954. In 1962, quotations were comparable with those for acrylic fibers, both being lower than wool. However, polyester fiber remained significantly dearer than wool.

Effects on trade in natural fibers

The effects of the foregoing developments on trade in natural fibers are extremely difficult to disentangle. One reason for this is that it is by no means certain that the total market for apparel fibers would be as large as it is today if man-made fibers did not exist. It is sometimes said that, insofar as the various fibers complement each other, they widen the choice of the consumer and to some extent, therefore, increase total demand for textiles.[41] In some uses this could be true, as with lightweight suits, where the demand for pure wool products may be limited to some extent by the high price. One view is that blends of polyester/wool enable wool to be used in lightweight fabrics to a greater extent than would be possible if there were no blending. A contrary argument is that each time a quantity of fiber is blended with cotton or wool it displaces a similar amount of the natural fiber. In general, the natural fiber interests prefer to conduct research into finishes which give properties similar to those obtained by blends. To some extent, this has already proved successful as with "drip-dry" cotton, where the all-cotton fabric gives a similar performance to a cotton/nylon blend. However, it has to be acknowledged that such processes raise costs and prices.

On the extreme assumption that no additional fiber demand is created, and making allowance for their greater utility value, the man-made fibers may be said to have displaced rather more than the 3.3 million tons produced on average in the period 1958-62. Obviously, however, the impact on trade in natural fibers has been very much smaller than this. As far as cotton is concerned, the losses in the United States market resulting from the expansion of the production and consumption of man-made fibers have been borne almost exclusively by the domestic industry.[42] The United States, as the largest cotton exporter in the world, has, of course, also been affected by the rapid expansion in man-made fiber production in western Europe and Japan, which has had its impact on the total demand for cotton. However, it is generally acknowledged that the main factor behind the decline in American exports has been their relatively high price compared with foreign growths rather than competition from man-made fibers. The United States has, in effect, set a ceiling on world cotton prices and acted in the role of a residual supplier. Other exporting countries, particularly those producing extra-long staples, have also been affected by competition from man-made fibers, but they have had a fortuitous opportunity to dispose of all available supplies. Moreover, the volume of their trade, as of the world cotton trade generally, has been increasing, despite cotton's declining share in total fiber consumption in the principal importing countries.

The position of the wool trade has corresponded to that of the latter group of cotton exporting countries. The overall market for apparel fibers has been expanding sufficiently rapidly to enable it to accommodate all the wool available for export as well as increasing quantities of the other fibers. International trade in raw wool has risen consistently with the expansion in production in recent

[41] Cf., R. Robson. *The man-made fiber industry*, p. 103. London, 1958.

[42] Only relatively small quantities of extra-long staple cotton are imported into the United States.

TABLE IV-23. - WORLD MAN-MADE FIBER-PRODUCING PLANTS, BY REGION, 1963

	Western Europe	Eastern Europe	North America	South America	Asia	Total
CELLULOSIC						
Acetate	16	–	11	8	11	46
Rayon	83	31	21	14	37	186
Total	99	31	32	22	48	232
NONCELLULOSIC						
Acrylic	22	5	8	–	11	46
Nylon	49	11	26	22	24	132
Olefin	14	–	27	1	18	60
Polyester	14	7	8	9	9	47
Saran	5	–	6	3	5	19
Spandex	6	–	11	–	4	21
Vinal	1	1	1	–	5	8
Vinyon	2	1	3	1	5	12
Other	6	1	1	–	1	9
Total	119	26	91	36	82	354
GRAND TOTAL	218	57	123	58	130	586

SOURCE: *Textile Organon*, June 1963.

years and in view of the relatively high prices obtained on average, it seems certain that larger supplies could have been disposed of without difficulty, had they been available. Indeed, the availability of supplies is currently more of a limiting factor than competition from man-made fibers.

The foregoing conclusions are, of course, based on the situation as it has existed to this point of time. The prospective future position, which is rather different, is considered in a later section.

FACTORS INFLUENCING COMPETITION BETWEEN NATURAL AND MAN-MADE FIBERS

The structure of the man-made fiber industry

In 1963, as is shown in Table IV-23, an estimated 586 man-made fiber producing plants were in operation throughout the world.[43] A total of 232 were producing cellulosic fibers and 354 synthetic fibers; the average output of the former was considerably greater than the latter. The largest numbers of both types of plants existed in western Europe followed by Asia, North America, South America and eastern Europe.

The degree of concentration in the industry is, in fact, much greater than these figures would suggest, since single firms may own a number of plants and, of course, some plants may be much larger than others.[44] Only eight companies are now responsible for the entire output of cellulosic fibers in the United States, and plans announced recently for extensions to one plant, the largest in the country, will bring its rated capacity to over 200 million pounds a year.[45] The oligopolistic structure of the industry is further accentuated by the fact that the principal man-made fibers are advertised and sold not as bulk commodities – polyamides, polyesters and the rest – but under special trade names, such as Brinylon, Terylene, Orlon and Courtelle, each developing its own particular market.

Most typically, man-made fibers have been developed only after long research in the laboratories of chemical firms large enough to finance such expensive undertakings. Nylon, the oldest of the synthetic fibers, took a United States chemical company (Du Pont) almost eleven years and the expenditure of $27 million to develop to the stage where nylon hosiery could be put on sale throughout the United States in 1940.[46] These firms then hold patent rights over their product and whether they engage in commercial production themselves or license others to do so the end result is a high degree of concentration. In the United Kingdom, the most important nylon 66 patents were held until recently by one firm jointly owned by two others, which have a monopoly of the production of Terylene and Courtelle, respectively. Terylene is a true monopoly product in the United Kingdom,[47] as no other polyester is produced there. However, Courtelle, manufactured by the world's largest man-made fiber producer, meets competition from another acrylic, Acrilan.

The degree of vertical integration in the man-made fibers industry is less significant than in the synthetic rubber industry. The giant chemical firms engaging in the industry produce their own polymers, but

[43] *Textile Organon*. June 1963. The figure excludes U.S.S.R. and North Korean plants, owing to lack of data.

[44] The classification is also on a product basis, so that a single plant may be listed more than once if it is producing several fibers.

[45] *Financial Times*, 20 December 1963, London.

[46] According to the company, the nylon industry of the United States now has almost $1,000 million invested in capital equipment and working capital funds and its annual output is valued at close to $900 million. *Textile Organon*, p. 161. November 1963.

[47] It is also produced under license in the Federal Republic of Germany, Italy, Netherlands, France and Japan.

only rarely textiles.[48] Most of their output is, therefore, sold on the open market in direct competition with natural fibers and other man-made fibers. However, such firms conduct a considerable amount of research into the processing of their fibers and have made modifications to adapt them to different end-uses; there is also a constant search for new end-uses. New developments from research are passed on to textile manufacturers and become a creative force in assisting the evolution of new and attractive products.[49] Most producers provide skilled advice to textile manufacturers on technical problems which arise in processing the fiber, and on designs, colors, etc. They also assist manufacturers to find sales outlets for their products and help to finance their advertising.

In these fields the large firms of the concentrated man-made fibers industry obviously have a clear advantage over the dispersed natural fibers industry. The latter have, however, replied through producer associations at national and international level, all of which are active in the fields of research and promotion and in spreading knowledge of new manufacturing processes. Examples of such bodies are the International Wool Secretariat, Cotton Council International, the National Cotton Council of America, the Cotton Promotion Institute of Japan, and similar organizations in Europe.

Technical factors and consumer preferences

A great variety of apparel fibers is now available on the world market, each offering particular characteristics for use in textile products. Consumers' choices between these are influenced, to some extent, by trends in living patterns, at least in the more developed countries. Trends which favor man-made fibers are the shift away from formal to more casual clothing, and from heavier to lighter clothing with the better heating of homes and offices. These trends also benefit cotton at the expense of wool. Wool, on the other hand, has gained from the more widespread adoption of western style clothing in Japan.[50]

As in the case of many modern consumer goods, demand is often not so much a condition as a result of supply and tastes are largely fashioned by promotion. Man-made fiber manufacturers spend considerable sums in advertising to convince consumers that their product has particular properties and also that such properties, e.g., the thermoplastic and hydroplastic qualities which make for permanent pleats or creases, are desirable. Obviously, consumers will not be convinced unless these fibers not only live up to the virtues claimed for them, but also give a satisfactory all-round performance. There have been several false starts with synthetics which had certain faults when they first appeared on the market. An example is the dyeing difficulties and excessive pilling associated with Orlon, when it was used originally in knitwear. Research has overcome these and other difficulties, but certain limitations remain.

The competitive strength of the man-made fibers lies partly in the fact that they may be "tailored" to meet the requirements of specific end-uses, where some of the advantages of natural fibers have no particular relevance. High tenacity rayon, for example, was developed specifically for use in tire cords. However, most of the fibers are basically multipurpose types which were first developed and then, by experiment, promotion and other means, found suitable for certain end-uses.

Improvements achieved over the natural products are often gained at the expense of other properties, but the consumer may consider the sacrifice worthwhile. A case in point is the use of nylon in men's socks, where its durability is greater than wool while it lacks some of the softness and comfort of wool.

In some end-uses, particularly certain ones traditionally held by wool, a state of equilibrium may have been reached in the competition between man-made and natural fibers through their use in blends. For example, it seems unlikely, at least in the immediate future, that synthetics will be used again in suitings without some admixture of other fibers. Blending has the advantage of imparting to the final product the best qualities of both groups of fibers and sometimes of reducing costs by adding cheaper fibers or fiber waste.[51] Synthetics are blended with cotton to provide crease resistance, permanent pleating, or greater strength and durability. Similarly, wool is blended with nylon for greater

[48] In the United States, captive markets are most prominent in the olefin sector of the industry, where several producers consume all, or part, of their output in the manufacture of rope and other products.

[49] Bureau of Agricultural Economics. *Wool consumption trends in western Europe and the United States.* Wool Economic Research Report No. 3. Canberra, Australia, January 1961.

[50] It has also been estimated by the International Wool Secretariat that 38 percent of all kimonos sold in Japan are made of wool. See *Asian Textile Annual, 1963*, p. 35.

[51] In the cotton industry rayon and fiber waste are blended chiefly for cheapening purposes, though a rayon admixture sometimes achieves special effects.

strength (e.g., in men's socks), with polyesters to give crease resistance and the ability to hold permanent pleats (e.g., in skirts and slacks), and with acrylics to give lighter weight without loss of warmth.

The predominance of one or other fiber in blends obviously will depend, to a large extent, on the relative importance attaching to their particular characteristics and to economic and technical considerations. For example, an excessive admixture of nylon with cotton may destroy the absorbent properties of the latter and lead to discomfort in clothing. Similarly, if synthetics are blended in too high proportion with wool, they offset some of its advantages, such as its soft handle and greater comfort in clothing. Some polyester fiber manufacturers specify that a blend must contain 55 percent polyester fiber if the product is to receive advertising assistance, but in some heavier-weight suitings a blend of 65 percent wool/35 percent polyester fiber is permitted. In the United Kingdom, one of the most successful blends in carpet manufacture is an 80/20 wool/nylon construction.

A wide range of end-uses remains, in which competitive conditions must ultimately lead to a decision in favor of one or the other of the individual fibers. A case in point is tire cords, a market which, for technical reasons and regardless of the outcome of the present competition between rayon, nylon and the polyesters, seems to have been lost permanently by cotton in some countries and to be in imminent danger of doing so in others. The competition between individual man-made fibers in this sector also highlights the fact that the range of man-made fibers is now so large that the gains of one are not necessarily always at the expense of a natural fiber. Natural fibers are now also, to some extent, fighting back at the man-made fibers on their own ground. Outstanding illustrations of this are the easy-care properties developed especially for cotton, and the moth-proofing and shrink-proofing of wool.

Technological developments in the fiber industry as a whole are, of course, by no means at an end. Not only are further new and improved synthetic fibers to be expected, but the whole structure of the textile industry, as it is known today, is subject to change. What is implied here is not so much possible developments in textile machinery, which to date have tended to be neutral in effect, insofar as competition in individual fibers is concerned,[52] but rather the evolution of new processes which will dispense altogether with spinning and weaving operations and cause unprecedented reductions in costs. The uses to which nonwoven or bonded fiber fabrics could be put have been limited hitherto by certain disadvantages, such as lack of draping power and peculiar "handle." These now seem to have been largely overcome by the invention of fibrids, minute synthetic fibers with twiglike projections, which hold the fibers in random mesh until lasting bonds are formed by heat fusion. Another unorthodox development is foam lamination, by which a thin sheet of plastic foam is combined with a lightweight knitted or woven cloth. The resulting product remains light in weight, but acquires both the additional stability and the insulating properties of a much heavier weight or knitted cloth.

Cost and price factors

With the gradual solution of technical problems of fiber substitution and the growing acceptance of synthetics by manufacturers and consumers, it is not difficult for textile manufacturers to replace cotton or wool if their prices get too far out of line with those for other fibers. The effect of this is, therefore, to place a ceiling on the prices of natural fibers. Equally, however, the possibility of reverse substitution tends to place a floor under cotton and wool prices. A floor is also imposed by virtue of the fact that there remains, and probably will continue to exist, a substantial field of end-use in which man-made fibers are not suitable substitutes for natural fibers or in which they can only be used in blends with natural fibers.

The ceiling on the prices of natural fibers referred to is most likely to be a declining one in the foreseeable future. As indicated earlier, prices for man-made fibers have been falling in recent years and further reductions must be expected due to lower raw material costs and the usual economies of scale. Estimates made in 1959 indicated that raw materials accounted for roughly 60 percent of the total cost of viscose rayon and as much as 80 percent of the cost of the more expensive acrylics and polyesters.[53] In the case of rayon, the basic raw material is cellulose, the main source of which is regenerated wood pulp. The synthetics are produced from chemicals

[52] However, the higher speeds attained by modern machinery favor the stronger man-made fibers.

[53] J.J. Press, ed. *Man-made textile encyclopaedia*, p. 53-57. Textile Book Publishers Inc. New York, 1959.

derived from coal, petroleum, air or water. Nylon was originally coal-based (benzene), but is now increasingly petroleum-based (acetylene or butadiene) as the polyesters always have been. The basic chemical for the acrylics (Orlon, Acrilan, Courtelle, etc.) is acrylonitrile.

Relevant chemical prices, in particular, are now much lower than they were some years ago. As indicated in the previous chapter, United States butadiene prices have been falling since 1956 and the tendency is for capacity to exceed the demand. Similarly, the price of acrylonitrile in the same country fell from 43 cents per pound in 1952 to 28 cents in 1956 and 14.5 cents in 1962. United States prices for standard quality viscose rayon dissolving pulps have shown some fluctuation. Between 1950 and 1958 they rose from $159 per short ton to $188 per ton, but reductions since then have brought them down to $170 per ton. Since wood pulp is in demand for a number of other purposes besides cellulose production, the future course of prices is rather uncertain. However, productivity in the industry is increasing through the adoption of controlled planting and other improved land management methods, and yields of cellulose per unit of wood are rising.[54]

Due to the oligopolistic character of the man-made fibers industry, cost reductions are not necessarily immediately reflected in prices. However, although profit margins have been high, a great deal of capital is being plowed back into the industry and competition is tending to become more intense. In recent years, most of the price adjustments have, in fact, been downward ones, even though demand was often outrunning supplies. Rayon prices were reduced in the United States during the period when prices of the basic raw material and of cotton, rayon's closest competitor, were rising.

Production and consumption prospects

In most countries which now produce man-made fibers, manufacturers are planning expansion of capacity. On the basis of announced plans, the Textile Economics Bureau published in June 1963 its estimates of world capacity in March 1963 and at the end of 1964, as shown in Table IV-24, together with actual output in 1962. By December 1964, the world's capacity for producing all man-made fibers was expected to be 10 percent higher than in March 1963 and 32 percent higher than actual output in 1962. The 3.9 million tons produced in 1962 represent 84 percent of estimated capacity in March of the same year.

The figures reveal a continuing interest in synthetic fibers rather than rayon. Production capacity for the former was expected to expand by 24 percent, as against less than 4 percent for rayon. This would raise the share of synthetics in total man-made fiber capacity to 35 percent, compared with 27 percent of 1962 output and 31 percent of 1963 capacity. The United States should, on the basis of these data, have almost 40 percent of the world's synthetic fiber capacity at the end of 1964; in western Europe, France, the Federal Republic of Germany, Italy and the United Kingdom are planning sizable increases, and Japan expects to expand capacity to 341,000 tons, about 87 percent more than actual output on 1962. Elsewhere, major expansion plans have been announced in the U.S.S.R., Poland, Argentina, Brazil and Australia.

Although the estimated rates of increase were larger for polyesters, acrylics and some of the newer synthetics, nylon was still expected to account for half the world's synthetic fiber capacity at the end of 1964 – only a little less than its 56 percent share in total 1962 output. As shown in Table IV-24, capacity was expected to expand by 28 percent in the case of polyester fibers, and by 25 percent in the case of acrylics. Capacity increases for other synthetics would still give the latter only an 11.5 percent share in end-1964 world synthetic fiber capacity, as against 9.5 percent in 1962 actual output.

Projects to become operable in 1965 or later include rayon plants in India, Ceylon and Iraq; nylon plants in Greece, India, Pakistan, Burma and New Zealand; plants for producing acrylic fibers in India and Korea, and for polyesters in Mexico and Switzerland.

Although these figures give an indication of general tendencies, the man-made fibers industry is currently passing through such a dynamic phase that a number of other projects have been announced since their publication. In view of the virtual stagnation of rayon production in the United States during the last decade and the closure of one plant in 1963, a particularly significant development was the announcement by a British firm of plans to increase substantially its capacity in the United States. This

[54] Between 1945 and 1963 the quantity of wood pulp required to produce a pound of viscose was reduced from 1.12 to 1.05 pounds.

TABLE IV-24. - OUTPUT AND ESTIMATED CAPACITY FOR RAYON AND SYNTHETIC FIBER PRODUCTION

	Rayon and acetate				Synthetics			
	Output 1962	Estimated capacity			Output 1962	Estimated capacity		
		March 1962	March 1963	Dec. 1964		March 1962	March 1963	Dec. 1964
	Thousand metric tons							
North America	618	692	690	691	463	562	644	732
of which:								
United States	577	643	638	639	440	535	614	698
Western Europe	1 091	1 251	1 263	1 285	347	367	474	560
of which:								
France	125	159	160	163	65	70	85	105
Germany, Fed. Rep. of	261	273	272	272	94	85	125	141
Italy	190	237	237	237	63	66	86	105
United Kingdom	200	234	234	234	84	98	118	141
U.S.S.R. and eastern Europe	530	568	585	615	65	74	94	129
of which:								
U.S.S.R.	238	249	263	281	39	41	54	73
Germany, Eastern	142	156	159	159	10	12	16	16
Poland	76	79	82	82	8	10	11	20
Near East	12	14	13	18	1	2	2	4
of which:								
United Arab Republic	12	14	13	18	(1)	1	1	1
Far East (incl. Mainland China)	513	788	540	601	183	184	223	349
of which:								
India	61	64	79	105	(1)	1	1	3
Japan	427	[2] 704	[3] 436	[3] 452	182	181	220	341
Latin America	94	146	145	151	17	22	32	49
of which:								
Argentina	12	24	20	20	3	8	10	16
Brazil	39	48	50	56	8	8	13	17
Mexico	23	34	34	34	4	3	5	8
Oceania	7	8	8	8	3	2	6	10
WORLD TOTAL	2 864	3 467	3 244	3 368	1 079	1 213	1 474	1 833
of which:								
Nylon	–	–	–	–	601	627	758	918
Polyester	–	–	–	–	195	226	293	375
Acrylic	–	–	–	–	183	219	264	329
Other	–	–	–	–	101	140	158	210

SOURCE: Textile Economics Bureau, *Textile Organon*, June 1962 and June 1963.
[1] Less than 50,000 metric tons. - [2] Registered capacity. - [3] Operable capacity.

presumably reflects the revival of interest in the newer types of rayon now available. Nylon remains prominent in expansion plans and the lapse of patent rights in various countries may presage the approach of more highly competitive market conditions for this fiber. A new plant is going into operation in Northern Ireland, thereby terminating one firm's monopoly of the United Kingdom market. The expiry of German patents has been a factor in the decision of the latter firm to build a nylon plant near Heidelberg with an eventual capacity of 35 million pounds of yarn. Since the Du Pont patent expired, subsidiaries of two British firms have announced plans to commence nylon production in Canada.

The situation in respect of man-made fiber pro-

ducing capacity is so fluid that the best indication of longer-term prospects may be had from considering the likely demand situation for fibers generally. On the basis of forecast population growth and alternative high and low income assumptions, FAO has projected world apparel fiber consumption around 1970 to a level some 40-50 percent higher than in the base period 1957-59.[55] Regionally, the projected rates of increase in apparel fiber consumption range from 24 percent in North America (on both income assumptions) to 70-80 percent in Latin America and Japan. For all high-income countries taken together, the range was from 33-37 percent and for low income countries from about 60-80 percent.

In the present context, the significant feature of these projections is that the indicated rate of expansion is lowest in countries where the bulk of the increase in man-made fiber production and consumption has occurred. Even so, the projected increase is higher than is likely to occur in practice due to the expected further rising share of man-made fibers with a higher utility poundage. Ignoring this factor, total apparel fiber consumption in such countries in 1970 could be somewhere in the vicinity of 9 million tons, compared with an average of 6.7. million tons in 1957-59. For the man-made fibers simply to maintain the same share of this total (26 percent), consumption of such fibers would have to increase by 36 percent over the base period. On the same assumption, consumption of natural fibers would increase from 5 million tons in 1957-59 to about 6.7 million tons in 1970. If, on the other hand, the share of man-made fibers were to increase to, say, 50 percent in 1970, consumption of natural fibers, at 4.5 million tons, would be at least 10 percent lower than the 5 million tons consumed on average by the developed countries in the period 1957-59.

A reduction in prices of clothing and household textiles could, of course, stimulate demand during the sixties, as was the case during the fifties. In high income countries, a 10 percent reduction in prices of all clothing items might raise the volume purchased by about 3 percent; however, a 10 percent reduction in the price of all raw fibers would have a much smaller effect on the final demand, since the cost of raw fibers accounts for only a small percentage of the retail value of clothes. The major impact of price changes will result from substitution either at the consumer level between various types of textile goods, or at the factory level between various raw fibers or yarns.

On the assumption that technological improvements in man-made fibers will continue, but excluding any major technological breakthrough, cotton consumption could continue to increase by some 1 percent a year in the United States and western Europe and by about $2^{1}/_{2}$ percent a year in Japan. Consumption of wool is likely to increase more rapidly than that of cotton in these countries, except in the United States, where the tariff remains a barrier.

In most developing countries, consumption of synthetics will probably remain modest during the sixties, but that of rayon may progress substantially. In view of the large potential increase in the demand for textiles in such countries, especially on the high income assumption, the competition of man-made fibers is not expected to cause serious domestic marketing problems for the natural fibers. Demand is fairly responsive to price changes; during the postwar period gains in textile consumption were largely stimulated by the development of domestic textile industries and the situation is likely to remain the same during the sixties.

On the basis of the assumptions made in the FAO study, import demand for raw cotton in western Europe may show a small rise during the sixties, despite the expected gains of man-made fibers and the possible decline in the region's net exports of cotton goods. Taking all the developed and centrally planned countries together, import demand could increase by 10-20 percent. If United States production is adjusted to the demand and if the larger part of the rising production in developing countries is absorbed internally, equilibrium could be maintained on the world market albeit at a relatively low price level.

Again on the assumptions made in the FAO study, wool imports into the developed and centrally planned countries could increase by 24-32 percent over the 1957-59 base, although a decline in United States imports cannot be excluded. Thus a projected increase of 30 percent in availabilities in the major wool exporting countries could be absorbed with relative ease by the world market, if imports into the centrally planned countries were to expand in the sixties. However, as for cotton, wool prices are likely to decline further, though at a slower rate than in the fifties.

[55] FAO. *Agricultural commodities - projections for 1970*. p. II.67. Rome, 1962.

Fats and oils

Fats and oils are encountering competition from synthetic substitutes in a number of industrial outlets, particularly drying oil products, such as paint, varnishes and linoleum and soap. In the paint industry, technological changes have resulted in a shift from a drying-oil type of ingredient to synthetic resins and the use of aqueous dispersions of polymerizates as binding agents. Instead of organic solvents, which are inflammable and often detrimental to health, the latter contain water as the volatile substance. They can be easily used by the " handyman " and therefore under present circumstances find a large market, especially in the United States, where this type now constitutes about half the house paints produced. Linoleum has been displaced to some extent by synthetic rubber and other types of floor-coverings, while soap has steadily lost markets to synthetic detergents.

The effect of synthetic competition in paints and varnishes has been to reduce the proportion of drying oil used per unit of paint or varnish produced. However, since the overall paint market has been expanding quite rapidly, this has stabilized the absolute quantities used in such products rather than caused a decline. The strongest influence on traditional outlets for fats and oils has been exerted by the rapid expansion of the synthetic detergent industry, and it is this aspect of competition between natural and synthetic materials which will be examined here.

Properties of synthetic detergents and soaps

Oils and fats are chemically a combination of glycerine, the name applied to commercial forms of glycerol and fatty acids. In soap making an alkali, such as caustic soda or carbonate of soda, is reacted with the oil or fat. The sodium from the alkali replaces the glycerine which is recovered as a by-product, and the chemical combination of sodium with fatty acids is soap. The sodium fraction of the soap molecule has an affinity for water, while the fatty-acid fraction has an affinity for oils and greases. In this way, soap is able to emulsify greasy substances with water. Soap also has the property of reducing the surface tension of water and thus increasing its " wetting power " and also permitting it to foam. For these various reasons, soap makes a good cleansing agent.

Soap, however, has some defects. Its cleansing power is seriously reduced by water containing minerals such as calcium and magnesium (hard water). These minerals not only react with the soap to form a curd which is undesirable in itself, but in doing so they remove part of the soap before it can perform its function. In water with a high salt content – sea water is an extreme example – soap is nearly useless. Another disadvantage of soap arises from the nature of the raw materials. Natural oils and fats contain a mixture of fatty acids, each fat having a typical assortment. While soap makers can combine the various fats in different proportions in order to produce soaps designed to meet specific need, flexibility is limited. Fats are not originally produced to meet a specific requirement and cannot be rigidly controlled with regard to their chemical composition.

Synthetic detergents are largely free from these defects. They do not appreciably lose their power in hard water, and with the continuous advance of chemical research they have more and more the ability to be tailor-made to fit specifications arising from particular uses. Like soap, synthetic detergents are constructed in such a way that one part of the molecule has an affinity for water and another part of the molecule an affinity for oils and fats. Unlike soap, however, synthetic detergents react only to a negligible degree with the minerals in hard water. In addition, the properties of synthetic detergents can be more sharply defined and more easily built-in than those of soap. Detergents can be made with free-foaming properties for ordinary household use, to accord with the expectations of housewives, or they can be made with no-foaming properties for use in the newer type of washing machines. In most industrial uses, where the requirements are even more exact, synthetic detergents are also superior to soap.

Usable synthetic detergent materials first became available in Germany in about 1930. Since then, a large number of materials have been developed which differ in chemical composition while possessing much the same detergent characteristics. Some (mainly primary alkylsulfates) are produced from natural vegetable or animal oils and fats[56] while others (mainly alkylbenzene sulfonates) are derived

[56] A very small amount is obtained from sperm oil or waxes. The detergent value of fats or oils converted to synthetics is about 3.5 times as great as the equivalent quantity converted to soap.

from a petroleum base, principally propylene, ethylene and olefins from cracked waxes and paraffins. Used in isolation, these synthetics are good emulsifiying agents, but the best results as regards fabric washing are obtained when so-called "builders" are added. Phosphates are the most important builders, others commonly employed being sodium silicate, sodium carboxyl methyl cellulose and soda ash. A small proportion of lather booster, derived from fatty acids, is sometimes added in order to stabilize the lather.[57]

Trends in production

The earliest use of synthetic detergents was in industry, particularly in the woolen trades, where the emulsifying properties of the unblended product were a decided advantage. Soapless shampoos were on sale both in Europe and North America in the early thirties and the first domestic washing product appeared in the United States in 1933. Light duty household washing products were marketed in Germany and the United Kingdom in 1936, but a further ten years elapsed before the first blended synthetic product suitable for heavy domestic laundry appeared in the United States. The development of synthetic detergents at that time was given an impetus by the conversion of aviation fuel to the production of tetrapropylene which, when coupled to benzene, yielded tetrapropylene benzene, the sulfonate of which is an excellent detergent. Because of early postwar conditions, Europe could not follow the American lead for a further three or four years and in some countries production did not reach significant proportions until the late fifties.

Since 1946, the growth of the United States synthetic detergent industry has been extremely rapid, *sales* increasing fron 125,000 tons in that year to 960,000 tons in 1953 and again to 1.8 million tons in 1962. In 1961, United States detergent *production*, at 1.2 million tons, was roughly the same as that of the whole of western Europe. Most western European countries produce some synthetic detergents, but only in the Federal Republic of Germany, France, the United Kingdom and Italy does the output exceed 150,000 tons. Elsewhere, the largest producers for which statistics are available are Japan, Mexico, Eastern Germany and Poland.

In most of these countries, the total detergent market has been expanding only at about the same pace as population, so that the growth of synthetic detergents has been largely at the expense of soap (Table IV-25 and Figure IV-8). In the United States, synthetic detergent production outpaced that of soap as early as 1953 and had almost trebled it by 1960. In 1962, soap accounted for only 24 percent of total detergent sales, as against 92 percent in 1946. Per caput consumption declined over the same period from 21 pounds to 6 pounds, while consumption of synthetic detergents increased from 2 pounds to 21 pounds. Elsewhere, the shares of the market held by synthetic detergents differ considerably from country to country. In 1961, the most recent year for which reasonably comprehensive statistics are available, the only major western European country where the proportion approached that of the United States was the Federal Republic of Germany (70 percent). Synthetic detergents had also captured more than half the market in France (57 percent) and several of the smaller consuming countries, including Austria, Belgium and Sweden. However, there were still some countries, notably the United Kingdom (44 percent) and Italy (40 percent), where the reverse applies. Similarly in Japan, synthetic detergents represented only 34 percent of the total, but they were rapidly gaining ground and continued to do so in 1962.

The soap market is, of course, not a single entity, but consists of a number of different products, such as bar household soap, soap powders, industrial soap, toilet soap, shaving soap, etc., each subject to varying influences. Until the turn of the present century most soap was produced in the form of hard soap, soft soap[58] or toilet soap. Subsequently, hard soap was largely replaced for laundry use by soap powders, which are a blend of soap and various chemical substances, generally of an alkaline nature, and by soap chips and flakes. The powders were more efficient than hard soap and their ready solubility reduced the labor involved in washing. By the beginning of the second world war they had

[57] The composition of an ordinary high-sudsing washing powder is roughly as follows: tetrapropylene benzene or dodecylbenzene sulfonate, 20-30%; lauroyl ethanolamide, 1-3%; sodium tripolyphosphate, 30-50%; sodium silicate, 9-10%; sodium carboxyl methyl cellulose, 1%; sodium sulfate, 10-30%; water, 8-12%; fluorescers, 0.05-0.10%; perfume, a few tenths of a percent. In northwestern Europe almost all soap powders and synthetic detergent powders contain 10-15 percent sodium perborate as a bleaching agent.

[58] Soft soap is the simplest of soap-making processes. As its name implies, it is produced as a soft mass and is marketed in cans or kegs.

TABLE IV-25. - PRODUCTION OF SOAP AND SYNTHETIC DETERGENTS IN SELECTED COUNTRIES, 1961

	Soap							Synthetic detergents [1]	Total
	Household soap	Soap powder	Industrial soap	Toilet soap	Shaving soap	Other	Total		
	Metric tons								
Austria	5 127	2 784	716	3 048	139	1 854	13 668	29 205	42 873
Belgium	5 521	10 158	2 708	8 033	209	25 056	51 685	52 125	103 810
Denmark [2]	2 847	12 000	29	4 672	57	6 704	26 309	...	...
France	126 301	2 295	8 196	24 523	1 748	43 925	206 988	271 137	478 125
Germany, Fed. Rep. of	22 753	(15 000)	1 961	48 892	1 915	27 498	118 019	278 000	396 019
Ireland	3 184	3 311	–	1 544	34	598	8 671	3 716	12 387
Italy	195 000	1 500	3 000	25 000	1 000	11 000	236 500	158 000	394 500
Japan	141 528	71 902	9 192	70 068	...	6 051	298 741	150 471	449 212
Nètherlands	7 500	34 400	2 200	8 200	200	12 300	64 800	32 000	96 800
Norway	1 647	4 945	242	2 525	58	5 449	14 866	9 888	24 754
Portugal	61 948	171	347	2 210	135	1 081	65 892	...	...
Spain	106 000	10 100	–	8 000	1 600	3 000	128 700	22 500	151 200
Sweden	160	9 200	...	5 800	110	6 800	22 070	39 000	61 070
Switzerland	3 823	17 165	785	2 389	214	4 878	29 254	...	...
United Kingdom	130 000	188 000	[3]	109 000	...	14 000	441 000	345 000	786 000
United States	63 066	99 251	4 405	268 554	833	13 620	449 729	[4] 1 240 325	1 690 054

SOURCE: OECD, *The chemical industry, 1961/62*, and Nippon Oils and Fats Co., *Review of Japan's fat and oil processing industry for 1961.*

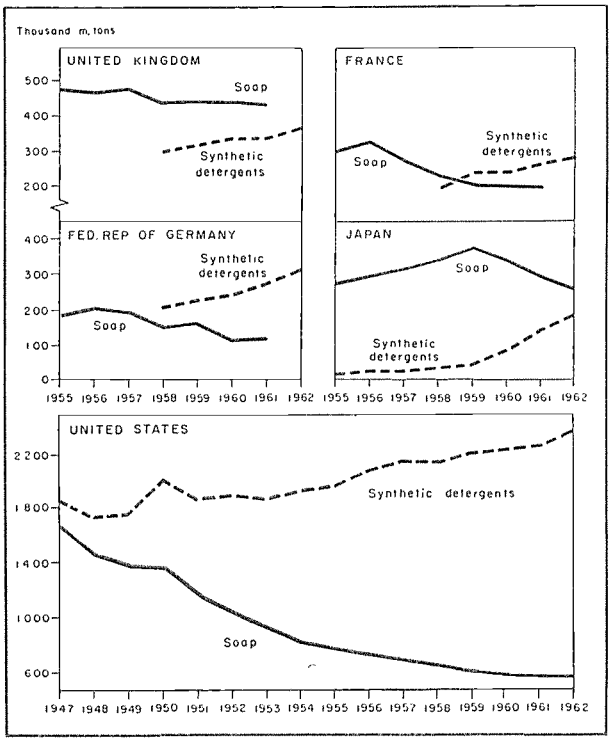
[1] Surface active finished detergent powders only. - [2] Soap details are for 1959. - [3] Included under other headings. - [4] Estimate of producers' sales of finished detergents (powder plus liquid); 65 percent of detergents produced were sold in powder form.

already captured a substantial proportion of the soap market in North America and Europe and it is with these that the synthetic detergents have mainly competed.[59] Household bar soaps have also lost some further ground, but not to the same extent as soap powders, doubtless because a cleanser in bar form has certain uses in which it cannot be replaced by powders or liquids.

By 1961, the production of soap powders in the United States had fallen below 100,000 tons and other household soaps to 66,500 tons, compared with 900,000 tons and 350,000 tons, respectively, in 1947. It is of interest to note that a relatively large quantity of soap is used in the United States in the production of synthetic rubber, particularly SBR. This arises from the fact that the copolymerization process involves the suspension of the materials in finely divided emulsion form in a large proportion of soapy water. Between 1952 and 1962 the use of soap for such purposes increased from 40,000 tons to 78,000 tons, or from 4 percent of total sales of soap to 14 percent. However, further expansion at this rate is unlikely, as the emulsion process is not used for the newer types of synthetic rubber.

The United Kingdom is currently the largest western European producer of soap powders. In

FIGURE IV-8. - PRODUCTION OF SOAP AND SYNTHETIC DETERGENTS IN CERTAIN COUNTRIES



[59] Since the giant soap-making concerns are also the producers of synthetic detergents, but not of their raw materials, they have, in a sense, no direct interest in the ascendancy of one or other type of detergent. However, there do appear to be certain manufacturing advantages in producing synthetic detergents arising from the relative stability of raw material prices and savings on inventories.

contrast to the position in most other countries, some of the most heavily advertised and best-known washing powders there are still made from soap, and the encroachments by synthetic detergents have been mainly at the expense of bar household soap. In the Federal Republic of Germany and France very sharp reductions in output of soap powders occurred during the fifties and the level of production is now quite low. Bar household soap has declined over the same period in both countries, but it remains by far the largest sector of the soap market in France and is rather more important than soap powder in the Federal Republic of Germany. In Japan, soap powders increased their share of the market concurrently with synthetic detergents until 1959, but since then the latter have pulled ahead and are now displacing both soap powders and bar household soap.

The only really dynamic sector of the soap market in industrialized countries is toilet soap, production of which is generally showing a contrary trend to that of other types. Although some bar toilet soaps containing synthetic detergents are on the market, these have found little consumer acceptance and the share of traditional types in total soap production has increased. In western Europe as a whole, it rose from 8 percent in 1952 to 18 percent in 1961, but still remained well below the level of 60 percent achieved in the United States. The United States market has, in fact, now reached the point where, with current technology, the further encroachments by synthetic detergents are likely to be very limited and possibly offset by a slow growth in the output of toilet soap.

Soap is an almost universal product and trends in consumption elsewhere are sometimes quite different from those which have been described. The U.S.S.R., which as yet has no significant synthetic detergent industry, is by far the largest soap producer in the world. Its output has been increasing year by year to the point where it now exceeds that of the whole of western Europe. Similarly, neither soap powders nor synthetic detergents have made the same inroads on the usage of bar soap in the developing as in some industrialized countries. This is partly because use of the former presupposes the availability of relatively sophisticated laundry equipment, while large sectors of the populations of many countries must still do their washing in running streams. Often soap industries are among the first manufacturing enterprises to be established in such countries, but the underdeveloped areas also still provide the main markets for the relatively small proportion of soap production which enters world trade.

Effects on the demand for fats and oils

The principal fats and oils used in soap making are inedible tallow and the lauric acid oils, coconut and palm kernel. Some of the best synthetic detergents are also derived from natural fats, but the output of these is very limited. Thus the displacement of soap by synthetic detergents in certain countries has, in general, caused corresponding reductions in the usage of fats and oils. In the United States, for example, the volume of saponifiable materials used in soap making declined by 28 percent between 1955 and 1962.[60] In the United Kingdom and France, the reductions were of the order of 5 percent and 28 percent, respectively.

The effect on the demand for individual ingredients has followed no uniform pattern. In the United States, the usage of both tallow and greases and the lauric acid oils has declined in absolute terms over the eight-year period, but both have increased their shares of the soap outlet at the expense of minor materials. In the United Kingdom and France, usage of tallow and grease has actually increased both absolutely and relatively to the lauric acid oils. In the former country the main impact was borne by palm oil, with usage of coconut oil actually increasing. The share of tallow and grease in the total rose from 45 percent to 69 percent in France and from 32 percent to 62 percent in the United Kingdom. In both cases, this reflects the increasingly large supplies of tallow and grease, mainly from the United States, available on the international market and the expansion of domestic production.

The market situation for the various saponifiable materials has been further influenced by trends in alternative outlets in food and industrial uses. In the United States, where the principal soap-making materials are little used for food, other industrial outlets have been growing fast enough to more than compensate for the losses in soap, as well as drying-oil products (Table IV-26), and soap making now accounts for only about 18 percent of the total industrial use of fats and oils. Moreover, this applies equally to the individual fats and oils used

[60] Compared with 1938 utilization, the volume was halved.

TABLE IV-26. - INDUSTRIAL UTILIZATION OF FATS AND OILS, UNITED STATES, 1952 TO 1962

	Soap				Drying oil products					Other [3]	Total
	Inedible tallow and greases	Coconut oil	Total [1]	Total [2]	Paint and varnish	Resins	Floor coverings and oilcloth	Other	Total		
	Million pounds										
1952	1 084	204	1 485	1 384	691	128	125	87	1 033	1 256	3 672
1953	1 026	175	1 403	1 320	750	128	117	93	1 086	1 299	3 707
1954	907	175	1 267	1 197	693	132	113	79	1 018	1 370	3 585
1955	864	173	1 213	1 136	677	178	111	158	1 124	1 650	3 910
1956	813	177	1 135	1 058	687	185	106	129	1 107	1 860	4 025
1957	789	173	1 086	1 010	622	187	102	122	1 032	1 980	4 022
1958	727	161	995	928	602	139	86	107	934	2 198	4 060
1959	729	144	953	876	619	186	63	56	924	2 499	4 299
1960	746	145	953	872	558	171	41	63	833	2 627	4 331
1961	721	140	911	838	593	161	44	54	855	2 572	4 265
1962	683	141	860	783	610	167	43	57	877	2 752	4 412

SOURCE: U.S. Department of Agriculture, *Fats and oils situation*, May 1963.

[1] Total saponifiable materials (including rosin and tall oil). - [2] Adjusted for foreign trade and changes in stocks. - [3] Includes fats and oils used in synthetic detergents and fat equivalent of soap used in synthetic rubber.

in soap making. Although usage of tallow in soap making in the United States declined by 37 percent between 1952 and 1962, total industrial usage of this product (including the usage in soap) increased by 17 percent. Similarly, industrial usage of coconut oil increased by 37 percent, despite a decline of 30 percent in usage in soap. Coconut oil slightly improved its position relatively to other saponifiable materials used, accounting for 16 percent of the total in 1962, as against an average of 13 percent between 1952 and 1954. This was presumably due to the growing share of toilet soap in total soap production as a certain minimum percentage of lauric-acid oils (15-20 percent) is needed in toilet soaps to give quick lathering properties.

In a number of western European countries the lauric-acid oils have large alternative outlets in the manufacture of margarine and shortening, production of which has been slowly increasing. However, in France, where the largest advances have been recorded (nearly 50 percent between 1955 and 1962), coconut and palm kernel oil have benefited directly only to a moderate extent.

PRODUCTION AND CONSUMPTION PROSPECTS

Looking to the future it is to be expected that synthetics will further increase their share of the detergent market in industrialized countries, particularly for fabric washing in hard water areas where the proportion is still relatively low. Such a development is in prospect in the U.S.S.R. Although it is the world's largest soap producer, it has abundant raw materials for a synthetic detergent industry. This could greatly reduce the utilization of domestic and imported fatty ingredients which, on a rough calculation, are currently running at some 800,000 to 1 million tons annually. In the United States, on the other hand, markets for synthetic detergents show signs of having been fully exploited and it is likely that soap production will at least stabilize in the immediate future. Where detergents are marketed specifically for hard surface cleaning (dish-washing liquids, car shampoos, etc.) it is unlikely that ordinary soap will be reintroduced to any extent.

Some changes in the types of synthetic detergents produced are imminent. Recently tetrapropylene benzene sulfonate (having a *branched* alkyl chain) was blamed for the occurrence of large amounts of foam near weirs and sluices in the United States, the Federal Republic of Germany, the United Kingdom and other countries. This phenomenon was explained by the fact that the detergent was only slowly decomposed by the bacteria in the sewage treatment plants and in the sewers and canals. For this reason, it may be expected that in western Europe and the United States tetrapropylene benzene sulfonate will in the near future be replaced in detergent formulations by straight-chain alkylbenzene sulfonate, primary straight-chain alkylsulfates, straight-

chain alkylsulfonate (which is only slightly less bio-degradable than the straight-chain alkylsulfate), or mixtures of these synthetics, all of which are more quickly decomposed by micro-organisms.

Another factor operating against tetrapropylene benzene sulfonate and other synthetics with powerful lathering capacity is the growing popularity of the lather intolerant drum-type washing machines throughout western Europe and the United States. Attention is now being directed increasingly to low lathering detergents. These can be made from nonionics [61] in admixture with other synthetic detergents, but also by adding soap, since this has a strong lather depressing effect on synthetic detergents. Nonionics are made by reacting ethylene oxide with long-chain alcohols or alkyl phenols. They show excellent detergency, but their poor lathering characteristics and their price have until now limited their use to some extent.

These developments are likely to exert a slightly favorable influence on the demand for fats and oils, since certain types of nonionics (Igepon A and Igepon T) and the primary alkylsulfates are based on these. Since the invention of the Ziegler process, however, straight-chain alcohols (and hence the corresponding alkylsulfates) may be produced from ethylene with an aluminum catalyst. Whether this process will be competitive with the catalytic hydrogenation of fatty acids remains to be seen.

The most promising prospects for ordinary soaps in industrialized countries undoubtedly lie in the toilet sector, where ordinary soap will almost certainly remain the most important raw material for many years to come. However, since per caput consumption in such countries is near saturation level, the growth in the market will be relatively slow and might well be canceled by further losses in other sectors. In the developing countries, on the other hand, the scope for rapid increases in the consumption of both toilet soap and bar household soap is quite considerable. Per caput consumption in most of these countries is still very low and responds significantly to changes in income. The higher incomes to be expected during the United Nations Development Decade could, of course, also exert a negative influence on soap consumption by creating conditions more conducive to the use of synthetic detergents. As against this, few of the developing countries have petrochemical industries, while many produce animal or vegetable fats and oils.

Thus as far as the use of fats and oils in soap making is concerned, the position is that the developing countries as a group are themselves likely to provide the main growth element in the market, while their opportunities for expanding sales to the rest of the world will be, at best, limited. In this respect, the situation is the same as that facing fats and oils generally. According to FAO projections, consumption in developed countries in 1970 will be nearly 25 percent higher than the 1957-59 average, but all of this will be met by increased domestic production, net imports actually declining to about one third the 1957-59 average. At the same time, a large increase is projected in the overall demand for fats and oils in the developing countries, principally for food. The lauric-acid oils used in soap making are, at least, potentially edible, and it is likely that they will be used increasingly for food purposes.

Hides and skins

Synthetic substitution for leather first began on a large scale during the second world war, when synthetic materials began to displace the natural product in many traditional end-uses, particularly in the United States. By the early sixties, synthetics had invaded almost every use to which leather had been put, and in some uses, such as luggage, had been virtually completely replaced, while in others, such as the soles of children's shoes, the process was far advanced. Gloves seem to be exceptional in so far as the proportion made from leather has, if anything, somewhat increased over the past decade.

Footwear has traditionally been the main end-use of leather, accounting for about four fifths of the leather made from cattle hides and calfskins in the United States, about three quarters in the United Kingdom and over 80 percent in Canada. There seems little doubt that footwear would be the predominant end-use for bovine leather in most other countries. Leather made from sheep- and goatskins

[61] Synthetic detergents fall into three classes: cationics, anionics, and nonionics, depending upon whether the active ingredient is electrically charged postively or negatively, or is neutral.

is somewhat less dependent on footwear though, even here, over half the total consumption in the United Kingdom and two thirds in the United States was used for this purpose. A major use of goat leather is in gloves, while sheep and goat leather is extensively used for shoe linings. Some cattle hides and calfskins are also used for clothing, as well as for fancy goods, upholstery and other industrial products such as belting and saddlery. For all leather together, a recent estimate put footwear consumption in the United Kingdom at two thirds of the total, the next largest end-use, clothing, at one eighth, and fancy goods at one tenth.[62]

The future trend of leather consumption in the developed areas thus very largely depends on the extent to which substitution by synthetic materials will be carried in footwear production, as well as on the probable rate of growth in footwear production itself. In this case, the synthetic material involved is synthetic rubber,[63] especially the special purpose synthetic rubber, neoprene, which is admirably suited for this purpose by virtue of its strength and resistance to weathering. As indicated earlier in this chapter, footwear now provides a major outlet for synthetic rubber, second only to motor vehicle tires. Moreover, it is an outlet which has been growing rapidly not at the expense of natural rubber, but to the detriment of hides and skins, particularly cattle hides used in soles.

In footwear production, leather has important technological and cost disadvantages compared with synthetic rubber. In particular, its quality and thickness vary considerably, thereby entailing a number of hand operations and the carrying of large stocks. Synthetic rubber is cheaper than leather [64] and has the added attraction of stable prices, whereas prices of hides and skins – and consequently of leather – fluctuate with changes in the world market situation. The uniform quality of the synthetic material, combined with its virtually constant price, thus allow the manufacturer to make much more accurate estimates of his future production costs. From the consumers' viewpoint, synthetic rubber has an advantage over leather insofar as it is more durable for a given thickness. On the other hand, leather has a reputation as a " quality " product, and there may well be prolonged consumer resistance to the purchase of shoes in the more expensive ranges if they are not all-leather products.

[62] *Financial Times*, 31 May 1963. London. The proportion for " clothing " presumably includes gloves.

[63] The principal materials competing with leather in other uses are fibreboard and plastics.

[64] At the end of 1963, for example, the cost to the manufacturer of a resin rubber sole for men's footwear was typically one half that of a leather sole in the United Kingdom.

Trends in footwear production

Most of the developed countries are essentially self-sufficient in footwear production. In 1959-61, for example, net imports into the United States represented only about 2 percent of total footwear consumption, while in the United Kingdom the proportion was about 1 percent. Italy is exceptional in being a major exporter of shoes, shipments in 1959-61 averaging 20 million pairs or some 30 percent of total production. For the EEC area as a whole, however, net exports in 1959-61 were only about 8 percent of total footwear output.

The production of footwear with leather uppers increased substantially in western Europe during the fifties; from 1950-53 to 1960-61, the total rose by 60 percent. The corresponding rise in North America was much smaller (about 15 percent), footwear consumption per head in the United States and Canada having virtually reached a saturation level (almost 3 pairs per head in the United States in 1960-61) with the existing distribution of income.

In the few countries for which statistics are available. the proportion of leather-soled footwear in total production has declined sharply. In the United States, for example, only 26 percent of the total output in 1962 had leather soles compared with 73 percent in 1947 (Table IV-27). The rate of substitution was even faster in the United Kingdom, where the proportion with leather soles fell from 79 percent to 18 percent. In the latter country the use of leather soles for children's footwear had virtually ceased by the early sixties. In Canada (and probably in the United States also), leather soling for children's shoes remains of importance (one quarter of the total in Canada in 1962), as it does also in continental western Europe, though data for the Netherlands indicate a continuing substitution for leather soles. A similar trend against leather, though at a much slower rate, is apparent for women's and girls' shoes, while the rate of substitution is slowest for men's and boys' footwear. For women's shoes, substitution again seems to have been fastest in the United Kingdom, where in 1962 only 12 percent of production in this category had leather soles.

TABLE IV-27. - PROPORTION OF LEATHER-SOLED FOOTWEAR IN PRODUCTION OF FOOTWEAR IN THE UNITED STATES, CANADA, THE UNITED KINGDOM AND THE NETHERLANDS, 1947-62

	Year	Men's	Women's	Children's	Total
			Percent		
United States [1]	1947	74	80	62	73
	1954	47	41	29	38
	1958	...	...	...	31
	1962	...	...	...	26
Canada [1]	1954	52	39	33	40
	1958	50	37	29	37
	1962	38	27	27	30
United Kingdom [2]	1947	84	89	66	79
	1954	78	76	33	63
	1958	66	49	14	44
	1962	41	12	3	18
Netherlands [1]	1955	65	57	33	48
	1958	68	66	21	47
	1962	62	39	14	34

SOURCES: *U.S. Census of Manufactures*, 1954 and 1958; *Current Industrial Reports*, M. 31A, Department of Commerce, Washington; *Census of Manufactures*, Ottawa; *Business Monitor*, Production Series, Board of Trade, London.

[1] All footwear. - [2] Footwear with leather uppers.

A more comprehensive comparison, covering all the developed countries, can be made by relating hides and skins consumption to total footwear production in each country. This is a relatively crude basis for intercountry comparisons, since the proportion of leather going into footwear varies from country to country. However, apart from Japan, the resulting consumption figures per pair of footwear seem reasonably consistent (see Table IV-28); by 1959-61, most developed countries were using between 1 and 2 kg of cattle hides and calfskins per pair of footwear produced. There was considerably more intercountry variation for sheep- and goatskins consumed per footwear unit, as might be expected in view of the greater importance of nonfootwear uses for these skins.

The trends over time shown by the figures in Table IV-28 are, however, more interesting. They indicate that the rate of substitution against bovine leather accelerated between the early and late fifties. The percentage changes in cattle hides and calfskins consumption per pair of shoes produced in North America and western Europe were as follows:

	1950-52 to 1953-55	1953-55 to 1956-58	1956-58 to 1959-61
		Percent	
United States	..	— 7	— 7
Canada	..	— 5	— 18
United Kingdom	— 9	— 18	— 20
EEC	— 6	— 8	— 20
EFTA (excl. U.K.)	— 3	— 4	— 13
Other western Europe	..	0	— 12

Insofar as this acceleration was associated with the rapid displacement of leather in the soling of women's and children's shoes, the greater part of the maximum potential loss in this use of leather has already taken place. Future rates of substitution against leather soling are therefore likely to

TABLE IV-28. - CONSUMPTION OF HIDES AND SKINS IN RELATION TO PRODUCTION OF FOOTWEAR IN THE DEVELOPED COUNTRIES, 1950-61

	Cattle hides and calfskins [1]				Sheep- and goatskins [2]			
	1950-51	1953-55	1956-58	1959-61	1950-52	1953-55	1956-58	1959-61
	Kilograms per pair of footwear produced [3]							
United States	...	1.12	1.04	0.97	...	0.11	0.10	0.10
Canada	...	1.49	1.41	1.16	...	0.06	0.05	0.06
United Kingdom	2.25	2.05	1.68	1.34	0.35	0.34	0.35	0.30
EEC	2.47	2.33	2.14	1.72	0.28	0.28	0.25	0.22
EFTA (excl. U.K.)	2.36	2.28	2.19	1.90	0.19	0.17	0.17	0.24
Other western Europe [4]	...	[5] 1.60	1.60	1.40	...	[5] 0.40	0.38	0.36
Japan	...	13.2	14.2	13.1	...	0.02	0.02	0.03
Australia, New Zealand and South Africa	...	1.91	1.51	1.24	...	0.10	0.09	0.08

SOURCES: FAO, *Production yearbook*, Rome; OECD, *The hides and skins industry*, Paris; Commonwealth Economic Committee, *Hides and Skins* (quarterly), London; United Nations, *Statistical yearbook, 1959*, New York, 1960; estimates by National Institute of Economic and Social Research, London.

[1] Wet-salted weight. - [2] Dry weight. - [3] Excluding slippers and rubber footwear. - [4] Approximate estimates. - [5] 1954-55.

be slower, possibly substantially so, than in the late fifties.

On the same basis, the rates of substitution against sheep and goat leathers appear to have been relatively quite small. This is mainly because upper leather in footwear has not yet had to face competition from synthetic materials. To some extent, goat leather has also been used in place of calf leather, the supply of which has tended to decline, or to rise relatively slowly, because the increasing demand for beef in the developed countries has resulted in a tendency to reduce the slaughtering of calves.

Trends in prices

As mentioned earlier, one of the main incentives for the use of synthetics in footwear comes from their extreme price stability compared with the wide fluctuations in quotations for the natural products.

There have been two major peaks in cattle hide prices over the past decade. The first occurred during the general price inflation which accompanied the Korean War; the second occurred in 1959, when increased demand in the United States and western Europe coincided with reduced supplies caused by the rebuilding of cattle herds in Argentina and the United States and by large purchases by the Soviet Union in Latin America. Between 1958 and 1959, the average price of Argentine ox hides at United Kingdom ports rose by almost 50 percent, while the wholesale price per pound of native steer hides in Chicago increased by about 65 percent. Prices fell off in 1960 and again in 1961 as supplies recovered, and there were further declines in 1962 and 1963 (see Table IV-29).

The course of calfskin prices has differed from that of cattle hides, because of the marked decline in calf slaughterings after 1957, in order to build up herds of beef cattle. The decline in slaughterings was particularly marked in the United States (the world's largest producer of calfskins), where calf slaughter fell by 35 percent between 1954/55 and 1959-61. As a result of the reduction in supplies, calfskin prices rose sharply in 1959 and remained high in 1960-62. There was, however, a decline in calfskin prices in the United States during 1963, reflecting reduced demand from footwear manufacturers.

Price trends for goatskins have generally moved in sympathy with those for calfskins, for which they are fairly close substitutes in many end-uses. The price of Australian sheepskins – nearly all of which are exported with the wool on – is determined largely by the movement in raw wool prices. Sheepskin prices fell off in 1958 with the decline in raw wool prices, but the rise in calfskin prices in the following year led to increased demand for

Table IV-29. - Trends in prices of hides and skins, leather, synthetic rubber and footwear, 1950-63

		1950-52	1953-55	1956-58	1959-60	1961-62	1963 [1]
		Indices: 1954-57 = 100					
Cattle hides:	United States [2]	206	109	98	137	126	97
	United Kingdom [3]	180	112	97	128	102	87
Calfskins:	United States [4]	122	100	107	133	139	88
Sheepskins:	Australia [5]	...	[6] 97	92	70	72	82
Goatskins:	India [7]	...	[6] 95	106	135	122	129
Leather:	United States						
	Sole leather [8]	126	104	100	125	114	111
	Upper leather [9]	94	94	111	128	131	113
	United Kingdom [10]	124	103	98	116	111	108
Synthetic rubber:	United States [11]	90	99	100	100	100	100
Leather footwear:	United States	98	97	104	113	116	116
	United Kingdom	96	98	101	106	108	110

Sources: FAO, *Production yearbook* and *Monthly Bulletin of Agricultural Economics and Statistics*, Rome; Commonwealth Economic Committee, *Raw Hides and Skins* (1960), *Hides and Skins* (quarterly) and *Plantation Crops*, London; U. S. Department of Commerce, *Statistical abstract of the United States* and *Survey of Current Business; Board of Trade Journal.*

[1] January-June or January-August. - [2] Native steers, heavy, 58 lb and upward, wholesale price, Chicago. - [3] Argentine, frigorifico, ox, c. and f., United Kingdom port. - [4] Unshorn, packer's type, 9½-15 lb, spot, Chicago. - [5] Sydney, merino, full wool. - [6] 1954-55. - [7] Calcutta, first quality. - [8] Light bends. - [9] Upper chrome calf, B and C grades. - [10] Leather for footwear, wholesale. - [11] Neoprene (U.S. Government selling price up to 1955).

sheepskins to replace calfskins which, in turn, resulted in an upturn in sheepskin prices.

Leather prices have generally moved in sympathy with the relevant raw hides and skins prices. The sharp decline in United States sole leather prices from the Korean War peak reflects the much greater amplitude of the price fluctuation at that time in cattle hides than in calfskins. Similarly, the sharper fall in upper leather prices than in those of sole leather from 1962 to 1963 reflects the relatively greater decline in calfskin prices compared with those of cattle hides. Compared with 1953-55, sole leather prices in the United States in 1959-61 had risen by some 15-20 percent, whereas synthetic rubber prices (neoprene) were virtually unchanged. Thus, though the cost advantage held by the synthetic product has narrowed appreciably since 1959, the cost of leather in the early sixties was still appreciably above the cost of competing synthetic materials in many important end-uses, particularly in soling for footwear.

Effects on trade in hides and skins

The effects of these developments on the trade in hides and skins are obscured to some extent by the concentration of world production of hides and skins in the developed countries, which account for roughly three fifths of the total output of the two main categories, cattle hides and calfskins, and sheep- and goatskins. Moreover, between 1950-53 and 1960-61, the number of cattle and calves rose by 12 percent (an annual rate of 1.3 percent) in both North America and western Europe. With a constant rate of slaughtering, there was a corresponding increase in the number of cattle hides and calfskins produced. For sheep and goats, the largest increase was in Australia, New Zealand and South Africa, where the number of sheep rose by 28 percent (3.0 percent per year, on average), though the rate of increase fell off considerably in the latter part of the period. The rise in western Europe was mainly in the Mediterranean area. Slaughtering rates have tended to rise slowly for sheep and goats, so that the production of skins has increased at a somewhat faster rate than the animal population.

Hides and skins production in the developing countries has also increased, in cattle hides and calfskins at a somewhat faster rate than in the developed countries, in sheep- and goatskins at a somewhat lower rate, from 1953-55 to 1959-61. Production of cattle hides and calfskins in Brazil rose by 24,000 metric tons (one fifth) over this period, accounting for as much as 40 percent of the total output expansion of the developing countries. For sheep- and goatskins, however, Latin American production declined marginally, most of the increase in output of the developing countries taking place in India and other Asian countries.

In North America, the increase in production was associated with an expansion in net exports of cattle hides and calfskins and fluctuating net imports of sheep- and goatskins, consumption showing little change. Western Europe was a growing importer of sheep- and goatskins, and remained a large net importer of cattle hides and calfskins. However, between the two periods 1954-57 and 1960-61, net imports of cattle hides and calfskins were reduced by more than 20 percent (Table IV-30).

An estimate of the loss in hides and skins consumption resulting from the substitution of synthetics for leather is given in Table IV-31. If the consumption of cattle hides and calfskins had increased from 1954-57 to 1960-61 in the same proportion as footwear production, the rise in consumption in North America and western Europe (EEC and EFTA areas) would have been some 270,000 metric tons (20 percent), whereas in fact there was a decline of 74,000 metric tons in this period. Thus, the loss in consumption which can be attributed to substitution for leather amounted to almost 350,000 metric tons, equivalent to an annual rate of substitution of about $4^{1}/_{2}$ percent compound.

If it is assumed that the rate of substitution of synthetic materials for leather applied equiproportionally to imported and home-produced hides and skins, then the decline of 115,000 metric tons in net imports into North America, EEC and EFTA, can be divided into three elements, as follows:

	Thousand metric tons
1. Change in footwear production	+ 39
2. Substitution by synthetics	— 40
3. Substitution by home-produced hides and skins	— 114

Thus, over the latter part of the fifties, the exports of hides and skins from the developing to the developed countries were adversely affected by the substitution both of synthetic materials for leather and of home-produced for imported hides and skins. On the assumptions made, the latter factor was roughly three times as great as the former.

TABLE IV-30. - TRENDS IN CONSUMPTION OF HIDES AND SKINS IN RELATION TO CONSUMPTION OF LEATHER AND PRODUCTION OF FOOTWEAR IN NORTH AMERICA AND WESTERN EUROPE, 1950-61

	North America				Western Europe [1]			
	1950-53	1954-57	1958-59	1960-61	1950-53	1954-57	1958-59	1960-61
CATTLE HIDES AND CALFSKINS	*Thousand metric tons, wet-salted weight*							
Production	580	764	700	754	395	457	457	507
Net trade	— 20	— 166	— 140	— 211	+ 299	+ 323	+ 296	+ 253
Apparent consumption	560	598	560	543	694	780	753	760
Index	100	107	100	97	100	113	109	110
SHEEP- AND GOATSKINS	*Thousand metric tons, dry weight*							
Production	15	17	17	17	23	24	25	28
Net trade	+ 40	+ 38	+ 42	+ 35	+ 61	+ 74	+ 78	+ 83
Apparent consumption	55	55	59	52	84	98	103	111
Index	100	100	107	95	100	117	123	132
BOVINE AND CALF LEATHER CONSUMPTION	*Thousand metric tons*							
Heavy leather	218	182	143	119	209	175	138	115
Index	100	84	66	55	100	84	66	55
	Million square meters							
Light leather	98	101	100	97	80	94	106	114
Index	100	103	102	99	100	117	132	142
SHEEP AND GOAT LEATHER CONSUMPTION	...	...	...	...	55	59	63	72
Index	...	...	...	...	100	108	115	131
	Million pairs							
FOOTWEAR PRODUCTION [2]	432	529	558	550	289	357	409	469
Index	100	110	116	114	100	123	141	162

SOURCES: OECD, *The hides and skins industry*, Paris; FAO, *Production yearbook*, Rome; Commonwealth Economic Committee, *Hides and Skins*, (quarterly), London; National Shoe Manufacturers' Assn., *Facts and figures on footwear*, 1961, New York; estimates by NIESR, London.

[1] EEC and EFTA countries only. - [2] Footwear with leather uppers.

PROSPECTS FOR CONSUMPTION, PRODUCTION AND TRADE

Consumption prospects

The future trend in consumption of hides and skins depends on the rate of growth in production of manufactures which are actual or potential users of leather, and on the rate at which leather is being displaced by synthetic or other natural materials. Since footwear is the predominant end-use of leather, and is likely to remain so (at least up to 1970), an approximate guide to the probable future trend in output of potential leather-using manufactures can be had by projecting the total output of leather footwear.

Footwear consumption per head increased rapidly in the late fifties in western Europe. From 1953-55 to 1959-61, per caput consumption rose by one fifth in the United Kingdom and by nearly two fifths in continental western Europe. The corresponding increase in North America was only marginal, at a relatively high number of pairs per head.

Estimates of the income-elasticity of demand for footwear in the developed countries have been made on the basis of time series regressions of per caput

TABLE IV-31. - ESTIMATED LOSS IN CONSUMPTION OF CATTLE HIDES AND CALFSKINS DUE TO SUBSTITUTION BY OTHER MATERIALS, 1954-57 TO 1960-61

	Apparent consumption			Loss due to substitution [2]		Annual rate of substitution [3]
	1954-57	Change to 1960-61		Total	As proportion of 1954-57	
		Actual	Hypothetical [1]			
	Thousand metric tons			.. *Percent* ..		*Percent compound*
United States ...	548	— 45	+ 17	62	11.3	— 2.3
Canada	50	— 10	+ 7	17	34.0	— 6.8
United Kingdom	197	— 38	+ 32	70	35.5	— 7.0
EEC	490	+ 24	+197	173	35.3	— 5.6
EFTA (excl. U.K.)	93	— 6	+ 19	25	26.9	— 4.9
Total	1 377	— 74	+272	346	25.2	— 4.6

SOURCES: OECD, *The hides and skins industry*, Paris; FAO, *Production yearbook*, Rome; Commonwealth Economic Committee, *Hides and Skins* (quarterly), London.

[1] Assuming hides and skins consumption had risen in the same proportion as the production of footwear with leather uppers. - [2] Hypothetical change *minus* actual change. - [3] Substitution being measured by the ratio of actual to hypothetical consumption.

footwear consumption on per caput real income.[65] The results show that in the United States, per caput consumption is not responsive to changes in the average level of real income; in most western European countries, however, the income-elasticity lies between 0.9 and 1.5. These elasticities [66] can be combined with assumptions about the growth of population and real per caput income which were made in the FAO projections study [67] to arrive at projections of footwear consumption in the developed countries. In view of the marginal nature of foreign trade in footwear in most developed countries, it seems reasonable to assume that the increase from 1959-61 to 1970 in production will be the same as that calculated for consumption.

The proportionate growth in hides and skins consumption will be less than that in footwear production to the extent that substitution of synthetic materials for leather will continue in the future. It was argued above that the rate of substitution is likely to be lower in the sixties than it was in the late fifties, since the most obvious areas of substitution have already been largely exploited. It is assumed here that the rate of substitution in the sixties will be generally only about one half the rate attained in the fifties. For the United Kingdom, to take one example, the decline of 18-25 percent assumed in consumption of cattle hides and calfskins per pair of footwear between 1959-61 and 1970 is equivalent to a reduction in the proportion of shoes with leather soles from 27 percent to 10-15 percent in the two periods. In the United States, on the other hand, the rate of substitution is assumed to continue to be much less than in western Europe.[68]

It was seen earlier that substitution against sheep- and goatskins has been relatively small, or negligible. The projections of consumption per pair of footwear produced in 1970 assume that such substitution will continue to be small during the sixties.

On the basis of these various assumptions, projections for hides and skins consumption in the developed countries in 1970 can be made (Table IV-32). The low projection combines the low income growth assumption (and thus the low assumption for footwear production) with the high assumption for the rate of substitution of synthetics for leather. Conversely, the high projection combines the high income growth and low substitution assumptions. The results show that, for cattle hides and calfskins, consumption in the developed countries in 1970 range from 1.7 to 2.1 million metric tons, that is, from virtually no change to up to about 30 percent above the 1959-61 average. For sheep- and goatskins, the increase is likely to be greater – from 25 to 65 percent on the low and high projections, respectively. For both categories of hides and skins, any increase in consumption up to 1970 would, on these projections, be largely concentrated in continental western Europe.

Production and trade prospects

The 1970 projections of hides and skins output shown in Table IV-33 imply generally some decline in the rates of growth in animal populations achieved over the past decade. Slaughtering rates in 1970

[65] Semilogarithmic functions were used covering annual data for 1954-61, inclusive. At 1961 levels of per caput consumption, the income-elasticities were as follows:

		R^2
United States	0.14 (± 0.62)	0.009
United Kingdom	1.88 (± 0.21)	0.934
EEC	0.90 (± 0.06)	0.973
EFTA (excl. U.K.)	1.29 (± 0.05)	0.990

[66] For Japan, which has a very low per caput consumption, the income-elasticity has been taken as 1.5; for Australia, New Zealand and South Africa, which have relatively high consumption levels, the elasticity has been taken as 0.2.

[67] FAO. *Agricultural commodities - projections for 1970*, Supplement to *Commodity review*, 1962.

[68] A major implicit assumption here is that synthetics do not displace leather in footwear uppers to any significant extent before 1970. The prospects after 1970 are much more uncertain.

have, however, been assumed to be the same as in 1960-61 for each of the main developed areas. Insofar as feeding practices improve and the average carcass weight of livestock increases, the rise projected in hides and skins production will be proportionately somewhat smaller than the corresponding increase in meat production.

The projections show that, in aggregate, production in the developed countries in 1970 would rise to 15-25 percent above the 1959-61 level, for both cattle hides and calfskins and sheep- and goatskins. For cattle hides and calfskins, the annual rate of growth in production projected for the period 1959-61 to 1970 ranges from 1.3 to 2.2 percent per annum, compound, rather higher than that achieved from 1953-55 to 1959-61 (1.0 percent). For sheep- and goatskins, however, the projected rates (1.4-2.1 percent per annum) are less than in the previous period (3.6 percent per annum), mainly because sheep numbers in Australia, New Zealand and South Africa are assumed to increase more slowly than they did during the fifties.

Projections of the net export availabilities or net import requirements of hides and skins by the developed countries can be made by combining the relevant projections of production and consumption. For cattle hides and calfskins, the net imports of western Europe and Japan (408,000 metric tons in 1959-61) are estimated to lie between about 350,000 and 620,000 metric tons in 1970, on the various assumptions made; that is, net imports into this group of countries could fall by 10-15 percent over the period on the low income growth assumption, and assuming also a relatively high rate of substitution of leather by synthetic materials. On the high income growth assumption, and a lower rate of substitution, net imports into western Europe and Japan in 1970 would be some 50 percent higher than the 1959-61 average level.

For North America and the three Southern Hemisphere countries, net exports would be much the same on either income assumption (the higher output on the high income assumption being offset by the lower assumed rate of substitution against

TABLE IV-32. - PROJECTIONS OF CONSUMPTION OF HIDES AND SKINS IN THE DEVELOPED COUNTRIES IN 1970

	Index of footwear production in 1970		Consumption of hides and skins				
			Per pair of footwear		Total [1]		
						1970	
	Low	High	1959-61	1970	1959-61	Low	High
	1959-61 = 100		*Kilograms*		*Thousand metric tons*		
CATTLE HIDES AND CALFSKINS							
United States	118	118	0.97	0.85-0.95	513	530	590
Canada	120	125	1.10	0.85-0.95	43	40	45
United Kingdom	135	160	1.34	1.0 -1.1	159	160	210
EEC	145	160	1.72	1.2 -1.4	512	515	665
EFTA (excl. U.K.)	140	160	1.90	1.3 -1.5	101	95	130
Other western Europe	175	210	1.40	1.1 -1.2	105	140	185
Japan	155	180	13.1	8 -10	110	105	150
Australia, New Zealand, South Africa	120	130	1.24	1.0 -1.1	80	75	95
Total	...	...	...	...	1 623	1 660	2 070
SHEEP- AND GOATSKINS							
United States	118	118	0.10	0.10	54	65	65
Canada	120	125	0.05	0.05	2	2	2
United Kingdom	135	160	0.30	0.2 -0.25	36	32	47
EEC	145	160	0.22	0.2 -0.25	67	86	119
EFTA (excl. U.K.)	140	160	0.24	0.2 -0.25	11	13	18
Other western Europe	175	210	0.36	0.3 -0.35	25	44	65
Japan	155	180	0.03	0.03	2	3	4
Australia, New Zealand, South Africa	120	130	0.08	0.08	4	5	5
Total	...	...	...	...	200	250	325

[1] Wet-salted weight for cattle hides and calfskins; dry weight for sheep- and goatskins.

TABLE IV-33. - PRODUCTION AND NET TRADE OF THE DEVELOPED COUNTRIES IN HIDES AND SKINS: 1959-61 AND PROJECTIONS FOR 1970

	1959-61		1970			
			Production		Net trade [1]	
	Production	Net trade [1]	Low	High	Low	High
CATTLE HIDES AND CALFSKINS [2]	*Thousand metric tons*					
Net importers:						
United Kingdom	81	+ 78	90	100	+ 70	+ 110
EEC	329	+ 183	375	410	+ 140	+ 255
EFTA (excl. U.K.)	87	+ 15	80	85	+ 15	+ 45
Other western Europe	68	+ 37	100	110	+ 40	+ 75
Japan	14	+ 96	15	20	+ 90	+ 130
Subtotal	579	+ 408	660	725	+ 355	+ 615
Net exporters:						
United States	678	— 165	785	845	— 255	— 255
Canada	55	— 12	60	65	— 20	— 20
Australia, New Zealand, South Africa	123	— 43	135	150	— 60	— 55
Subtotal	856	— 220	980	1 060	— 335	— 330
TOTAL	1 435	+ 188	1 640	1 785	+ 20	+ 285
SHEEP- AND GOATSKINS [3]						
United States	16	+ 38	17	20	+ 48	+ 45
Canada	1	+ 1	1	1	+ 1	+ 1
United Kingdom	13	+ 23	13	15	+ 19	+ 32
EEC	12	+ 55	12	13	+ 74	+ 106
EFTA (excl. U.K.)	2	+ 9	2	3	+ 11	+ 15
Other western Europe	36	— 11	43	46	— 1	+ 19
Japan	0	+ 2	0	0	+ 3	+ 4
Australia, New Zealand, South Africa	46	— 42	54	56	— 49	— 51
TOTAL	126	+ 74	145	155	+ 105	+ 170

[1] Plus sign denotes net imports, minus sign net exports. - [2] Wet-salted weight. - [3] Dry weight.

leather). In any event, net export availabilities, particularly in the United States seem virtually certain to expand over the present decade, for the reasons given earlier. It therefore seems reasonable to assume that the United States will supply a larger proportion of the total cattle hide and calfskin requirements of the developed countries in 1970 than it did in 1959-61. Consequently, on the low income growth assumption (with relatively higher rates of substitution for leather), net imports of cattle hides and calfskins into the developed countries would be reduced to a negligible amount (the 20,000 tons shown in Table IV-33 must be taken as purely illustrative). On the other hand, on the more favorable set of assumptions, net imports could be almost 300,000 tons, or some 50 percent higher than in 1959-61.

For sheep- and goatskins, the range of probabilities appears to be smaller. On either income growth assumption, net imports in 1970 would exceed the 1959-61 level, by 35 percent on the low basis and by as much as 140 percent on the high. Since goatskins are more valuable per ton than cattle hides,[69] the projected rise in the former will more than offset a decline in the latter, even on the low income growth and high substitution rate assumptions. In 1959-61, exports of hides and skins of all kinds from the developing to the developed countries amounted to some $165 million, f.o.b. The projections of net imports into the developed countries for 1970 imply that, at 1959-61 prices, exports of hides and skins from the developing to the developed areas in 1970 would be in the region of $80-90 million on the low income growth and high substitution rate assumptions (a reduction of about 50 percent

[69] The bulk of the developed countries' imports of "cattle hides and calfskins" would consist of cattle hides; similarly, goatskins would constitute the greater part of "sheep- and goatskins."

in volume from the 1959-61 level), whereas on the more favorable assumptions, exports would amount to about $350-375 million (an increase of over 100 percent).

Another uncertainty in the outlook for world trade in hides and skins surrounds the change in imports into the centrally planned countries during the sixties. All the countries of eastern Europe have published plans for a substantial increase in footwear production between 1958 and 1965; in the U.S.S.R., for example, footwear *production is planned* to grow by 45 percent over this period.[70] On the basis of these plans, and assuming an increasing substitution of synthetics for leather, the Economic Commission for Europe estimates that, at a rough guess, imports of hides and skins into eastern Europe might grow by some 40 percent between 1958 and 1965.[71] If this conclusion is of the right order of magnitude, it would not perhaps be unreasonable to put the corresponding increase between 1959-61 and 1970 at 50-75 percent. On this basis, exports to the centrally planned countries in 1970 from the rest of the world would be in the region of $125-150 million, f.o.b.

If the developing countries maintain their position of supplying rather more than half the total hides and skins imports into the centrally planned countries, then the expansion in these markets would partly offset the decline in their exports to the developed areas on the unfavorable assumptions of low income growth and a high rate of substitution for leather.

A further uncertainty relates to the outlook for hides and skins prices. As world production expands, and the rate of growth of consumption in the developed areas is retarded by continued substitution by synthetic materials, a downward secular pressure on prices is likely to develop, particularly for cattle hides. It therefore seems unlikely that the export earnings of the developing countries from the sale of hides and skins will be very much higher, in real terms, in 1970 than they were in 1959-61 (except on the most favorable assumptions about the growth in footwear production and the substitution by synthetics), and they could well be very much less.

Looking further ahead, to 1980, there remains the possibility of the development of new synthetic materials on a commercial scale to replace leather in footwear uppers. A synthetic material suitable for footwear uppers has recently been introduced on an experimental basis in the United States. This next synthetic is considerably more expensive than the average grades of upper leather, and it has still to prove itself in actual usage. Should it prove successful technically, it could well become price-competitive with upper leathers on the basis of large-scale production, and its extensive use would undoubtedly have a serious adverse impact on the hides and skins market in the long term.

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[70] The corresponding percentages for the other countries are: Czechoslovakia, 30; Eastern Germany, 85; Hungary, 60; Poland, 41; and Romania, 87 (see *Economic survey of Europe in 1960*, Chap. V, United Nations. Geneva, 1961).

[71] *Economic survey of Europe in 1960, op. cit.*

ANNEX TABLES

ANNEX TABLE 1A. - INDICES OF TOTAL AGRICULTURAL PRODUCTION, BY COUNTRIES AND REGIONS

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
WESTERN EUROPE	94	101	101	102	103	107	109	113	118	117	123
Northwestern Europe	95	100	102	101	103	105	107	109	119	117	124
Austria	91	103	96	102	107	112	116	108	122	126	129
Belgium-Luxembourg	93	96	104	107	100	107	110	103	113	113	118
Denmark	100	101	101	97	101	111	110	110	116	121	126
Finland	98	105	100	97	100	107	110	112	127	126	123
France	91	99	104	102	102	102	104	112	123	117	127
Germany, Federal Republic	95	101	101	100	102	105	110	107	121	109	120
Ireland	96	97	105	98	104	113	103	96	108	122	117
Netherlands	100	99	100	104	98	105	115	117	118	120	121
Norway	97	99	99	97	108	101	101	98	102	104	99
Sweden	104	104	101	90	101	99	95	98	99	103	101
Switzerland	101	100	103	99	98	99	108	106	110	110	110
United Kingdom	97	98	100	99	106	105	101	110	118	123	129
Southern Europe	90	103	98	105	104	112	114	122	116	119	123
Greece	79	102	99	109	112	128	122	125	117	140	133
Italy	92	104	96	105	103	101	116	116	108	113	118
Portugal	87	106	104	102	102	105	99	101	102	103	111
Spain	100	96	102	98	104	108	110	117	118	121	126
Yugoslavia	70	114	92	120	104	147	119	158	143	129	136
EASTERN EUROPE AND U.S.S.R.	89	94	96	104	116	118	129	132	133	135	139
NORTH AMERICA	99	99	97	101	103	98	106	108	109	108	112
Canada	111	103	79	99	108	92	98	100	108	91	116
United States	98	98	99	101	103	99	106	109	110	110	111
OCEANIA	97	97	98	103	105	102	117	119	123	125	131
Australia	97	97	97	104	105	99	119	119	124	127	133
New Zealand	96	95	100	103	105	109	116	120	122	125	129
LATIN AMERICA	94	96	100	103	107	113	118	121	121	125	126
Central America	89	92	100	106	113	124	132	131	139	134	135
Cuba	99	97	94	99	111	114	114	115	127	102	85
Guatemala	93	97	100	102	109	115	119	130	133	143	162
Honduras	99	104	95	97	105	107	110	120	120	126	129
Mexico	83	88	103	111	115	130	143	139	146	149	158
Panama	91	99	99	107	104	113	119	121	116	124	124
South America	96	96	100	102	106	110	114	119	117	124	123
Argentina	100	96	100	97	107	109	112	105	102	110	108
Brazil	93	96	99	106	107	114	124	142	135	144	133
Chile	101	95	103	102	99	112	108	110	114	115	119
Colombia	98	101	98	101	102	109	112	118	118	118	119
Peru	97	98	103	103	99	100	107	113	116	121	125
Uruguay	97	108	101	97	96	91	86	78	91	93	99
Venezuela	94	95	99	105	106	109	113	115	127	133	145

ANNEX TABLE 1A. - INDICES OF TOTAL AGRICULTURAL PRODUCTION, BY COUNTRIES AND REGIONS (*concluded*)

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
FAR EAST [1]	92	98	100	104	107	106	111	115	119	122	124
Burma	102	98	96	97	107	93	107	112	113	113	121
Ceylon	95	95	102	108	101	106	110	111	117	123	128
China: Taiwan	88	94	101	104	112	119	126	123	131	132	138
India	89	100	101	103	107	105	110	113	118	119	119
Indonesia	92	101	105	101	102	104	107	109	110	107	113
Japan	96	85	94	114	110	115	116	120	123	123	131
Korea, Republic of	71	98	112	114	106	117	121	122	121	131	120
Malaysia: Malaya	95	93	99	105	107	108	110	119	123	125	127
Pakistan	100	98	102	97	103	102	102	108	111	114	111
Philippines	93	98	99	101	109	113	114	115	122	128	130
Thailand	89	105	86	105	115	95	108	112	131	140	146
NEAR EAST	94	99	97	100	109	112	118	121	122	123	131
Iran	91	97	97	104	111	118	120	124	117	126	124
Iraq	84	104	118	89	105	122	104	101	102	108	120
Israel	81	92	100	104	123	129	150	170	165	200	218
Syria	88	98	115	80	120	137	96	99	100	116	149
Turkey	100	108	86	99	107	108	124	126	130	123	128
United Arab Republic	96	92	102	103	107	115	117	122	127	113	132
AFRICA	94	98	101	101	106	104	109	111	117	113	120
Northwest Africa	91	103	107	94	105	93	107	102	108	86	104
Algeria	91	100	106	96	106	98	93	100	103	85	98
Morocco	[2] 91	[2] 103	[2] 109	[2] 96	[2] 100	[2] 83	114	101	106	89	114
Tunisia	94	109	103	81	112	101	134	109	130	85	100
South of Sahara [3]	95	97	100	103	106	106	109	113	119	118	123
Ethiopia [4]	98	99	100	100	102	100	100	104	104	107	107
South Africa	90	99	100	102	109	106	110	113	122	133	134
WORLD [1]	94	98	98	102	107	107	113	116	119	120	124

NOTE: Country indices are calculated by FAO on a uniform basis. They may differ from national indices produced by the countries themselves because of differences in concepts of production, coverage, weights, and methods of calculation. They are not yet available for 1963/64.

[1] Excluding Mainland China. - [2] Former French zone only. - [3] Derived by subtraction of subtotal for northwest Africa from regional total. - [4] Excluding Eritrea.

ANNEX TABLE 1B. - INDICES OF PER CAPUT AGRICULTURAL PRODUCTION, BY COUNTRIES AND REGIONS

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
WESTERN EUROPE	95	102	101	101	101	104	106	108	112	111	115
Northwestern Europe	97	101	102	100	101	102	103	104	113	110	115
Austria	91	103	96	102	107	112	115	107	121	123	125
Belgium-Luxembourg	94	96	104	107	99	105	108	100	109	108	113
Denmark	101	102	101	96	100	109	108	106	112	116	119
Finland	100	106	100	96	97	104	105	107	120	118	115
France	93	100	104	102	101	99	100	106	116	108	116
Germany, Federal Republic	97	102	102	99	100	101	105	101	113	100	109
Ireland	95	97	104	99	105	115	106	99	112	127	121
Netherlands	102	100	100	102	95	101	109	109	109	109	109
Norway	99	100	99	96	106	98	98	94	97	98	93
Sweden	105	104	101	89	100	97	93	95	96	99	96
Switzerland	103	102	103	98	95	95	102	99	100	98	95
United Kingdom	97	99	100	99	105	104	100	107	114	118	123
Southern Europe	91	104	98	104	103	109	111	117	111	113	116
Greece	81	103	99	108	110	125	118	119	111	132	124
Italy	94	105	96	104	102	100	114	113	104	108	113
Portugal	88	106	104	101	101	104	98	98	99	100	107
Spain	102	96	102	98	102	106	107	113	112	114	117
Yugoslavia	72	116	92	118	102	143	115	150	135	120	125
EASTERN EUROPE AND U.S.S.R.	92	96	96	103	113	113	122	123	122	123	124
NORTH AMERICA	103	101	97	99	100	93	98	98	98	96	97
Canada	117	106	79	96	102	84	87	87	92	76	96
United States	102	100	99	100	99	94	99	100	99	98	98
OCEANIA	102	99	97	101	100	95	107	106	107	107	110
Australia	101	100	97	102	100	93	109	106	108	109	112
New Zealand	101	97	100	101	101	102	106	107	108	107	108
LATIN AMERICA	100	98	100	100	102	104	106	106	103	104	101
Central America	94	95	100	103	107	114	118	113	117	110	108
Cuba	103	100	94	97	106	107	105	104	112	89	72
Guatemala	99	100	100	99	103	105	106	113	112	116	128
Honduras	105	107	95	94	99	98	97	104	100	102	102
Mexico	89	92	103	108	109	119	127	120	122	121	124
Panama	96	102	99	104	99	105	107	106	99	103	101
South America	101	99	100	99	100	102	103	104	100	102	100
Argentina	104	98	100	96	103	103	104	96	92	97	94
Brazil	98	99	99	103	101	105	110	121	111	115	103
Chile	106	97	103	99	94	104	98	97	99	97	98
Colombia	102	103	98	99	98	102	102	105	103	101	100
Peru	101	101	103	101	94	93	96	99	98	100	100
Uruguay	101	110	101	96	92	86	80	72	83	84	87
Venezuela	102	99	99	101	98	97	98	96	103	104	110

ANNEX TABLE 1B. - INDICES OF PER CAPUT AGRICULTURAL PRODUCTION, BY COUNTRIES AND REGIONS (*concluded*)

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
FAR EAST [1]	95	100	100	102	103	100	103	104	105	105	104
Burma	105	99	96	96	104	90	103	107	102	96	101
Ceylon	100	97	102	105	96	98	99	98	100	103	104
China: Taiwan	95	98	101	101	105	108	110	104	106	104	105
India	93	102	101	101	103	99	102	102	104	103	100
Indonesia	96	103	105	99	98	98	98	98	96	92	95
Japan	99	86	94	113	108	111	112	115	116	115	121
Korea, Republic of	73	98	112	114	103	111	112	109	105	111	98
Malaysia: Malaya	101	96	99	103	102	99	98	102	103	101	100
Pakistan	105	100	102	95	99	95	93	97	97	98	94
Philippines	99	101	99	98	103	104	101	99	102	103	102
Thailand	95	108	86	102	108	87	96	97	110	114	116
NEAR EAST	99	102	97	98	104	104	107	108	106	104	107
Iran	96	99	98	102	106	110	111	113	104	109	104
Iraq	89	108	118	86	99	111	92	87	86	89	97
Israel	87	96	101	102	114	115	129	142	134	156	163
Syria	94	101	115	77	113	127	86	86	83	92	114
Turkey	105	111	86	97	101	99	111	109	110	101	102
United Arab Republic	101	94	102	101	102	108	107	108	111	96	109
AFRICA	98	100	101	99	101	98	99	99	102	96	100
Northwest Africa	96	105	107	92	100	87	92	85	88	70	82
Algeria	95	103	106	94	102	92	84	87	89	73	83
Morocco	[2] 96	[2] 106	[2] 109	[2] 93	[2] 95	[2] 76	89	77	78	64	80
Tunisia	98	111	103	80	109	97	126	102	120	77	89
South of Sahara [3]	99	99	100	101	102	100	101	101	104	101	103
Ethiopia [4]	103	101	100	98	98	93	91	94	91	91	90
South Africa	95	101	100	100	104	99	100	101	105	112	111
WORLD [1]	98	100	99	101	103	101	105	106	106	105	106

NOTE: See explanatory note to Annex Table 1A.

[1] Excluding Mainland China. - [2] Former French zone only. - [3] Derived by subtraction of subtotal for northwest Africa from regional total. - [4] Excluding Eritrea.

ANNEX TABLE 2A. - INDICES OF TOTAL FOOD PRODUCTION, BY COUNTRIES AND REGIONS

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962,63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
WESTERN EUROPE	94	101	101	102	103	107	109	113	118	118	124
Northwestern Europe	95	100	102	100	103	105	107	109	119	117	124
Austria	91	102	96	103	108	112	116	109	123	126	129
Belgium-Luxembourg	94	96	104	107	100	108	112	105	114	114	118
Denmark	100	101	101	97	101	111	110	110	116	121	126
Finland	98	105	100	97	100	107	110	112	127	126	124
France	91	100	104	102	102	102	105	112	124	117	128
Germany, Federal Republic	95	101	101	100	102	105	110	107	121	110	121
Ireland	95	97	105	98	104	113	103	96	108	122	117
Netherlands	99	99	101	103	98	106	117	119	119	121	122
Norway	97	99	99	96	108	101	101	97	102	104	99
Sweden	104	104	101	90	101	99	95	98	99	103	101
Switzerland	101	100	103	99	97	99	108	106	110	110	110
United Kingdom	97	98	100	100	106	105	101	110	118	123	129
Southern Europe	90	103	98	105	104	111	115	122	116	119	123
Greece	82	105	99	104	111	125	121	126	118	139	128
Italy	92	104	96	105	104	102	117	117	109	115	120
Portugal	87	106	104	102	102	105	99	101	102	103	111
Spain	101	96	102	98	103	108	110	116	117	118	123
Yugoslavia	70	115	90	119	105	147	120	160	147	132	138
EASTERN EUROPE AND U.S.S.R.	90	95	96	104	116	119	130	133	134	138	141
NORTH AMERICA	99	98	97	101	104	101	109	110	111	110	113
Canada	112	105	78	99	106	91	96	100	106	90	116
United States	98	97	99	102	104	102	111	111	112	113	113
OCEANIA	99	99	98	103	100	99	117	115	122	124	133
Australia	98	100	99	104	99	95	120	114	124	127	137
New Zealand	98	96	100	103	103	109	113	115	117	121	123
LATIN AMERICA	93	96	100	102	109	112	117	117	119	121	122
Central America	91	94	99	102	114	123	132	134	140	135	133
Cuba	100	97	94	98	111	114	115	115	127	102	84
Guatemala	97	98	100	99	106	107	110	114	117	124	127
Honduras	102	105	93	95	105	104	108	118	118	123	124
Mexico	84	91	103	106	116	131	146	148	151	156	162
Panama	91	98	98	108	106	114	119	121	115	123	124
South America	94	96	101	102	108	109	113	112	114	118	120
Argentina	99	95	100	98	108	108	113	105	101	109	108
Brazil	88	96	101	103	112	115	122	127	132	136	138
Chile	101	95	103	102	99	113	108	109	114	115	120
Colombia	97	99	97	104	103	103	107	109	111	110	112
Peru	99	100	103	102	97	100	106	113	112	118	119
Uruguay	94	109	101	99	97	89	83	78	90	90	96
Venezuela	92	96	99	108	105	110	112	116	129	138	150

ANNEX TABLE 2A. - INDICES OF TOTAL FOOD PRODUCTION, BY COUNTRIES AND REGIONS (*concluded*)

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
FAR EAST [1]	91	99	100	103	107	106	111	117	121	122	124
Burma	102	98	96	97	107	93	109	114	114	114	123
Ceylon	98	90	102	112	97	101	105	112	117	126	132
China: Taiwan	88	95	101	104	112	118	125	122	130	131	137
India	89	101	101	103	106	105	110	114	118	119	118
Indonesia	89	102	105	101	103	104	109	111	114	108	117
Japan	97	85	94	114	110	115	117	121	125	125	133
Korea, Republic of	70	99	112	114	106	119	124	125	125	135	122
Malaysia: Malaya	91	89	102	103	114	113	111	124	134	131	131
Pakistan	97	101	103	95	103	101	101	108	113	114	112
Philippines	94	98	99	101	108	112	113	113	120	125	127
Thailand	89	107	84	105	115	91	105	108	124	132	143
NEAR EAST	93	101	97	100	109	113	117	120	121	121	129
Iran	92	96	97	104	111	118	120	123	113	122	121
Iraq	84	106	119	87	105	121	104	99	101	108	120
Israel	82	92	100	103	123	127	148	166	157	190	207
Syria	93	106	117	68	117	133	85	87	85	102	135
Turkey	100	110	85	99	107	109	126	126	131	123	128
United Arab Republic	86	93	103	106	112	116	114	119	125	119	134
AFRICA	95	99	101	100	105	103	107	109	114	111	117
Northwest Africa	91	102	107	93	107	93	108	102	109	88	106
Algeria	91	99	106	96	109	98	95	101	104	87	100
Morocco	[2] 90	[2] 104	[2] 110	[2] 95	[2] 101	[2] 82	115	101	106	89	115
Tunisia	95	109	103	79	113	101	135	109	131	85	100
South of Sahara [3]	95	98	100	102	105	105	106	110	115	116	119
Ethiopia [4]	99	100	100	100	102	99	99	103	103	105	105
South Africa	89	100	100	102	109	106	110	114	125	137	139
WORLD [1]	94	98	99	102	107	108	114	117	120	120	124

NOTE: See explanatory note to Annex Table 1A.

[1] Excluding Mainland China. - [2] Former French zone only. - [3] Derived by subtraction of subtotal for northwest Africa from regional total. - [4] Excluding Eritrea.

ANNEX TABLE 2B. - INDICES OF PER CAPUT FOOD PRODUCTION, BY COUNTRIES AND REGIONS

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
WESTERN EUROPE	95	102	101	101	101	104	106	109	113	111	115
Northwestern Europe	97	101	102	100	101	102	103	105	113	110	115
Austria	91	103	96	103	108	112	115	108	121	124	126
Belgium-Luxembourg	95	97	104	106	99	106	109	102	110	109	113
Denmark	101	102	101	96	100	109	108	106	112	116	119
Finland	100	106	100	96	97	104	105	107	121	119	115
France	93	101	105	102	100	99	101	107	117	109	116
Germany, Federal Republic	97	102	102	99	100	101	105	101	113	101	110
Ireland	95	97	105	99	105	115	106	98	112	127	121
Netherlands	102	101	101	102	95	102	111	111	110	110	110
Norway	99	100	99	96	106	98	98	93	97	98	92
Sweden	105	104	101	89	100	97	93	95	96	99	96
Switzerland	103	102	103	98	95	95	102	99	100	98	95
United Kingdom	97	99	100	99	105	104	100	107	115	119	123
Southern Europe	92	104	98	104	103	109	112	118	111	113	116
Greece	83	106	99	103	109	122	117	121	112	131	120
Italy	93	104	96	104	103	100	115	114	105	110	114
Portugal	87	106	104	101	101	104	97	98	99	99	107
Spain	102	97	102	97	102	106	106	112	111	111	115
Yugoslavia	72	117	90	118	102	143	115	152	138	123	127
EASTERN EUROPE AND U.S.S.R.	92	96	96	103	113	114	123	124	123	125	126
NORTH AMERICA	103	100	97	99	100	96	101	100	100	97	99
Canada	118	108	78	96	100	83	86	87	91	75	96
United States	101	99	100	100	100	97	103	102	101	100	99
OCEANIA	104	102	98	101	95	92	106	102	106	105	111
Australia	102	103	99	102	94	89	110	102	109	109	116
New Zealand	102	98	100	101	99	102	103	103	104	104	104
LATIN AMERICA	99	98	100	99	103	103	105	102	101	100	98
Central America	96	97	99	100	107	113	118	116	118	110	105
Cuba	104	100	94	96	107	107	106	104	113	88	71
Guatemala	103	101	100	96	100	98	98	98	98	100	100
Honduras	108	108	93	92	99	95	95	101	99	100	98
Mexico	90	94	103	103	110	120	129	128	126	126	127
Panama	96	101	98	105	101	106	107	106	98	102	100
South America	99	99	101	99	102	101	102	99	97	98	97
Argentina	102	97	100	97	104	102	105	96	91	97	94
Brazil	94	99	102	100	106	105	109	109	109	109	107
Chile	106	98	103	100	94	104	98	97	99	97	99
Colombia	102	101	97	102	99	97	98	98	98	94	94
Peru	103	102	103	100	92	92	95	98	95	97	95
Uruguay	98	111	101	97	93	84	77	72	82	81	85
Venezuela	100	100	99	103	97	98	96	97	104	108	113

ANNEX TABLE 2B. - INDICES OF PER CAPUT FOOD PRODUCTION, BY COUNTRIES AND REGIONS (*concluded*)

	1952/53	1953/54	1954/55	1955/56	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63 (Preliminary)
	Indices, average 1952/53-1956/57 = 100										
FAR EAST [1]	95	101	100	102	103	100	103	105	107	106	105
Burma	104	99	96	96	105	90	105	108	103	97	102
Ceylon	104	92	102	110	93	94	95	99	100	106	108
China: Taiwan	95	99	101	100	105	107	109	103	105	103	105
India	93	103	101	101	102	99	101	103	104	102	99
Indonesia	93	104	105	99	99	98	100	99	100	93	98
Japan	99	86	94	113	108	111	112	116	118	117	123
Korea, Republic of	71	100	112	114	103	113	114	112	109	114	100
Malaysia: Malaya	97	92	102	101	108	104	98	107	112	106	103
Pakistan	102	103	103	93	99	95	93	98	100	98	94
Philippines	100	101	99	98	102	103	100	97	100	101	99
Thailand	95	110	84	102	108	83	94	93	104	108	113
NEAR EAST	98	103	97	98	104	105	107	107	105	102	106
Iran	97	99	97	101	106	110	111	112	101	105	102
Iraq	89	109	119	85	99	111	92	86	85	89	97
Israel	87	96	102	101	114	113	127	139	127	148	155
Syria	99	110	116	65	110	123	75	75	70	80	104
Turkey	106	113	85	96	101	100	112	110	111	101	103
United Arab Republic	90	95	103	104	107	108	104	106	109	101	111
AFRICA	99	101	101	98	101	96	98	97	99	94	96
Northwest Africa	95	104	107	91	102	87	93	85	89	71	83
Algeria	95	101	107	94	104	92	86	89	90	75	85
Morocco	[2] 95	[2] 107	[2] 110	[2] 93	[2] 95	[2] 76	90	77	79	64	81
Tunisia	99	111	102	78	110	97	127	102	121	77	89
South of Sahara [3]	100	100	100	100	101	98	98	99	101	99	99
Ethiopia [4]	103	102	100	98	97	93	91	93	90	89	88
South Africa	92	102	100	100	104	99	100	101	108	115	114
WORLD [1]	98	100	99	101	103	102	106	107	107	105	107

NOTE: See explanatory note to Annex Table 1A.

[1] Excluding Mainland China. - [2] Former French zone only. - [3] Derived by substraction of subtotal for northwest Africa from regional total. - [4] Excluding Eritrea.

ANNEX TABLE 3A. - WORLD [1] PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
	Million metric tons									
FARM PRODUCTS										
Wheat	144.7	155.4	187.9	222.6	228.3	219.1	220.0	210.2	235.6	220.8
Barley	44.1	46.7	62.0	73.1	69.5	67.6	76.5	68.9	83.1	85.3
Oats	64.0	60.6	59.2	54.1	60.9	54.8	57.2	49.2	48.5	47.0
Maize	106.4	124.1	141.0	185.2	166.3	181.0	193.9	191.7	192.8	207.7
Rice (milled equivalent) [2]	65.7	71.3	82.7	98.4	90.8	96.2	101.3	101.9	102.0	107.8
Sugar (centrifugal)	24.9	31.9	39.9	50.1	48.8	48.6	53.8	50.4	49.2	52.2
Citrus fruit	11.1	15.2	17.8	20.4	19.7	19.7	20.4	22.3	19.8	20.5
Apples [3]	6.8	9.4	10.4	14.2	15.5	12.1	15.5	13.1	14.9	15.8
Bananas	8.1	13.7	15.7	18.7	16.8	18.3	19.1	19.5	19.8	20.4
Vegetable oils and oilseeds (oil equivalent)	10.4	12.9	15.6	18.2	17.5	16.9	18.3	19.4	19.0	20.0
Coffee	2.41	2.24	2.69	4.12	3.51	4.63	3.96	4.41	4.09	3.95
Cocoa	0.74	0.76	0.81	1.10	0.92	1.01	1.21	1.17	1.17	1.24
Tea	0.47	0.58	0.71	0.83	0.79	0.80	0.81	0.87	0.87	0.87
Wine	20.3	18.9	21.5	24.8	23.9	24.6	24.4	22.4	28.5	25.1
Tobacco	2.29	2.71	3.15	3.32	3.12	3.58	3.24	3.16	3.48	3.63
Cotton (lint)	5.99	6.78	7.99	8.78	7.90	8.52	8.91	8.95	9.63	9.85
Jute [4]	1.51	2.00	1.94	2.59	2.52	2.25	2.33	3 28	2 60	2.86
Wool (greasy)	1.61	1.79	2.12	2.46	2.35	2.47	2.46	2.51	2.51	2.55
Rubber (natural)	1.00	1.74	1.89	2.06	1.97	2.07	2.02	2.12	2.14	2.09
Milk (total)	221.0	261.3	301.5	344.0	331.9	338.0	345.3	350.3	354.7	350.9
Meat [5]	29.4	36.46	45.0	51.6	49.0	50.4	50.9	52.8	54.9	56.5
Eggs	6.32	8.77	10.64	12.58	11.8	12.2	12.5	13.1	13.3	13.4
	Indices, average 1952/53-1956/57 = 100									
Index of all farm products	77	89	103	119	113	116	119	120	124	126

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Million cubic meters										
FOREST PRODUCTS											
Fuelwood [6]	667	714	801	795	808	796	803	786	780	772	770
Roundwood [6]	774	839	927	951	940	942	1 004	1 024	1 016	1 040	1 065
Sawn softwood [6]	216.4	222.4	237.8	238.7	237.3	247.9	266.4	265.6	265.2	267.6	274.4
Sawn hardwood [6]	55.1	57.2	61.7	64.4	62.7	65.6	68.0	71.0	72.9	74.2	77.0
Plywood [6]	8.3	9.0	10.9	11.3	11.8	13.1	14.9	15.4	16.8	17.9	19.3
	Million metric tons										
Fibreboard	2.4	2.8	3.2	3.3	3.4	3.6	4.1	4.3	4.5	4.8	5.1
Wood pulp	39.1	42.5	46.4	49.5	50.1	49.9	54.9	59.1	62.6	64.8	68.4
Newsprint [6]	9.8	10.4	11.2	12.0	12.3	12.1	13.1	14.0	14.4	14.6	15.0
Other paper and board [6]	38 6	41.1	45.5	48.2	49.2	50.5	55.8	59.7	63.2	66.3	70.1

[1] Excluding Mainland China, except for forest products. - [2] Paddy converted at 65 percent. - [3] Excluding U.S.S.R. as well as Mainland China. - [4] Including allied fibers. - [5] Beef and veal, mutton and lamb, pork. - [6] Pre-1955 data are not strictly comparable with those for 1955 and after.

ANNEX TABLE 3B. - WORLD [1] EXPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
					Million metric tons					
FARM PRODUCTS										
Wheat and wheat flour (wheat equivalent)	15.35	24.92	27.80	33.59	27.66	29.36	33.23	40.78	36.90	45.19
Barley	1.76	3.23	5.92	5.87	6.50	6.18	4.93	6.16	5.59	5.07
Oats	0.72	1.23	1.42	1.34	1.46	1.40	1.29	1.21	1.34	1.20
Maize	9.33	4.35	5.56	11.98	8.80	10.00	11.13	12.48	17.50	18.23
Rice (milled equivalent)	9.67	4.40	4.85	5.31	4.95	4.80	5.52	5.73	5.55	5.80
Sugar (raw equivalent) [2]	9.63	10.75	13.32	15.32	14.35	13.33	16.06	17.20	15.68	14.63
Citrus fruit [3]	1.86	1.88	2.63	3.21	2.78	3.10	3.38	3.25	3.55	3.11
Apples	0.69	0.57	0.89	1.24	0.85	1.29	1.22	1.36	1.49	1.15
Bananas	2.48	2.34	3.04	3.79	3.53	3.67	3.88	3.98	3.87	4.02
Vegetable oils and oilseeds (oil equivalent) [4]	4.20	3.63	4.65	5.52	4.94	5.26	5.57	5.55	6.29	6.38
Coffee	1.64	1.93	2.10	2.56	2.19	2.55	2.61	2.68	2.79	2.91
Cocoa beans	0.68	0.67	0.73	0.86	0.64	0.75	0.88	1.01	1.03	0.99
Tea	0.36	0.41	0.47	0.51	0.52	0.50	0.49	0.52	0.54	0.55
Wine	1.93	1.61	2.39	2.60	2.75	2.38	2.60	2.60	2.69	2.14
Tobacco	0.48	0.54	0.63	0.70	0.66	0.64	0.68	0.76	0.77	0.79
Cotton (lint)	2.88	2.37	2.67	3.02	2.65	2.79	3.50	3.28	2.86	3.16
Jute	0.79	0.85	0.91	0.89	0.95	0.89	0.83	0.75	1.01	0.84
Wool (actual weight)	0.96	1.05	1.15	1.34	1.15	1.38	1.32	1.42	1.42	1.42
Rubber (natural) [5]	0.98	1.67	1.89	2.19	1.97	2.27	2.01	2.21	2.50	2.28
Meat (fresh, chilled, and frozen) [6]	1.14	0.94	1.20	1.65	1.48	1.56	1.56	1.62	2.01	2.25
Eggs (in the shell)	0.26	0.24	0.34	0.39	0.39	0.43	0.42	0.39	0.34	0.29
					Million cubic meters					
FOREST PRODUCTS										
Pulpwood	...	9.3	[8] 10.2	10.8	8.4	9.0	10.9	13.1	12.4	11.8
Logs [7]	...	5.2	[8] 8.2	15.9	10.6	13.6	16.4	19.0	20.0	23.6
Sawn softwood	...	23.4	[8] 29.9	34.6	29.7	32.3	36.3	36.4	38.5	41.1
Sawn hardwood	...	2.5	[8] 3.5	4.1	3.6	3.9	4.5	4.2	4.3	4.5
Plywood	...	0.5	[8] 1.2	1.9	1.5	2.0	1.8	1.9	2.2	2.4
					Million metric tons					
Fibreboard	...	0.3	[8] 0.6	0.8	0.7	0.8	0.8	0.9	0.9	1.0
Wood pulp	...	5.4	[8] 7.6	9.2	7.7	8.6	9.7	9.8	10.1	11.3
Newsprint	...	5.4	[8] 6.7	7.3	6.8	7.0	7.5	7.7	7.5	7.7
Other paper and board	...	2.0	[8] 3.2	4.4	3.4	3.9	4.5	5.0	5.2	5.9

[1] Including exports from the rest of the world to the U.S.S.R., eastern Europe, and Mainland China, but excluding exports from these countries, except for forest products. - [2] Excluding United States trade with its territories. - [3] Oranges and lemons only. - [4] Excluding re-exports of copra from Malaya and Singapore, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaya, Singapore and Sabah. - [5] Excluding imports into Malaya and Singapore for re-export and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaya and Singapore. - [6] Beef and veal, mutton and lamb, pork. - [7] Sawlogs, veneer logs and logs for sleepers. - [8] Average 1954-57.

ANNEX TABLE 4A. - WESTERN EUROPE: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS				*Million metric tons*						
Wheat	31.07	30.32	36.23	41.38	39.09	42.66	39.62	37.67	47.89	40.80
Rye	7.49	6.65	7.09	6.54	7.01	7.17	7.04	5.43	6.04	5.81
Barley	9.08	10.93	15.77	21.76	17.73	20.35	22.14	22.60	25.98	28.57
Oats	16.44	14.84	14.85	12.85	12.91	12.58	13.30	12.93	12.54	12.53
Maize	9.73	7.18	10.04	13.16	11.08	14.32	14.83	13.17	12.43	15.04
Sugar (centrifugal)	4.02	5.13	6.81	8.11	8.19	7.32	9.93	7.80	7.33	8.54
Potatoes	69.87	76.32	79.06	74.47	72.39	72.52	79.71	74.06	73.67	80.02
Citrus fruit	1.99	2.10	2.43	3.30	2.91	3.28	3.26	3.90	3.16	3.91
Apples	3.16	4.68	4.95	7.09	7.99	5.60	8.23	6.20	7.46	8.08
Olive oil	0.81	0.83	0.90	0.99	0.80	1.07	1.10	1.21	0.79	1.57
Wine	14.13	13.09	14.87	16.67	16.02	16.66	16.63	14.21	19.85	16.24
Tobacco	0.19	0.25	0.31	0.27	0.30	0.32	0.26	0.20	0.25	0.32
Milk (total)	77.02	76.64	91.16	102.40	97.66	98.09	103.05	105.72	107.50	107.59
Meat [1]	8.56	7.43	10.42	12.37	11.26	11.65	12.25	12.94	13.63	13.88
Eggs	1.95	2.13	2.73	3.34	3.11	3.27	3.33	3.45	3.57	3.68
				Indices, average 1952/53-1956/57 = 100						
Index of all farm products	82	87	103	116	109	113	118	117	123	125

	Prewar average	Average 1948-52	Average 1954-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
FOREST PRODUCTS [2]				*Million cubic meters*						
Fuelwood	127.3	114.7	104.4	102.3	105.1	105.4	100.7	101.6	98.7	100.0
Logs [3]	...	95.5	111.3	117.7	114.3	109.8	119.3	121.9	123.2	121.0
Other industrial roundwood	...	78.4	88.0	95.3	88.0	87.7	94.7	102.0	104.3	101.0
Sawn softwood	47.84	47.65	52.93	54.18	52.56	51.39	55.69	55.94	55.33	54.40
Sawn hardwood	9.07	9.35	11.01	13.04	12.07	12.22	12.96	13.91	14.02	14.11
Plywood	1.09	1.27	1.99	2.57	2.18	2.35	2.67	2.74	2.92	3.17
				Million metric tons						
Fibreboard, particle board	0.17	0.67	1.55	2.98	2.08	2.44	3.04	3.45	3.91	4.35
Wood pulp	10.62	9.42	13.31	16.64	14.28	15.34	17.06	18.10	18.40	19.65
Newsprint	2.80	2.33	3.23	4.04	3.52	3.81	4.22	4.36	4.30	4.42
Printing and writing paper	7.77	2.30	3.62	4.79	4.08	4.30	4.87	5.28	5.40	5.80
Other paper and paperboard		6.83	9.80	13.03	11.11	11.96	13.38	14.07	14.62	15.70

[1] Beef and veal, mutton and lamb, pork. - [2] Including eastern Europe. - [3] Sawlogs, veneer logs and logs for sleepers.

ANNEX TABLE 4B. - WESTERN EUROPE: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS					*Million metric tons*					
Wheat and wheat flour (wheat equivalent)	1.44	0.75	2.43	3.55	3.88	3.77	3.33	3.15	3.66	4.82
Sugar (raw equivalent)	0.86	1.37	1.71	1.40	1.37	1.34	1.57	1.47	1.24	1.58
Citrus fruit [1]	0.97	0.91	1.18	1.45	1.20	1.35	1.48	1.49	1.73	1.19
Apples	0.19	0.31	0.56	0.71	0.38	0.79	0.71	0.82	0.85	0.54
Wine	0.50	0.48	0.82	0.95	1.15	0.73	0.88	1.01	0.98	1.24
Bacon, ham, and salted pork	0.26	0.14	0.28	0.34	0.30	0.31	0.37	0.36	0.37	0.36
Eggs (in the shell)	0.20	0.17	0.27	0.31	0.31	0.34	0.32	0.29	0.28	0.24
Wool (actual weight)	0.12	0.05	0.07	0.10	0.08	0.11	0.11	0.11	0.11	0.13
					Million cubic meters					
Logs [2,3]	2.89	2.13	[4] 1.43	2.06	1.51	1.77	2.33	2.44	2.24	2.20
Pulpwood [3]	3.03	3.53	[4] 5.05	5.49	4.13	4.70	5.99	7.04	5.57	5.00
Pitprops [3]	3.16	3.00	[4] 2.90	2.03	2.62	2.10	1.85	2.06	1.53	1.26
Sawn softwood [3]	13.86	12.64	[4] 14.68	15.70	13.52	15.10	17.24	16.28	16.35	16.75
Plywood and veneers [3]	0.36	0.30	[4] 0.55	0.68	0.51	0.64	0.76	0.73	0.77	0.85
					Million metric tons					
Fibreboard [3]	...	..	[4] 0.46	0.71	0.57	0.67	0.75	0.77	0.81	0.85
Wood pulp [3]	4.54	3.51	[4] 4.74	5.50	4.83	5.34	5.90	5.61	5.82	6.47
Newsprint [3]	0.92	0.87	[4] 1.18	1.44	1.34	1.36	1.16	1.66	1.67	1.75
Other paper and paperboard [3]	1.20	1.49	[4] 2.45	3.29	2.59	2.94	3.36	3.68	3.86	4.35
GROSS IMPORTS										
Wheat and wheat flour (wheat equivalent)	11.98	14.46	13.87	12.96	12.34	12.88	11.16	15.11	13.32	10.71
Barley	2.41	2.53	4.19	4.52	4.69	4.75	4.27	4.19	4.72	3.60
Maize	8.46	4.03	4.57	9.05	6.32	7.65	8.93	9.43	12.91	13.78
Rice (milled equivalent)	1.17	0.33	0.46	0.57	0.51	0.61	0.64	0.54	0.58	0.59
Sugar (raw equivalent)	3.47	4.26	4.58	4.48	4.87	4.61	4.62	4.10	4.22	5.36
Vegetable oils and oilseeds (oil equivalent)	3.00	2.50	3.17	3.50	3.30	3.42	3.68	3.55	3.54	3.70
Oranges	1.28	1.32	1.91	2.37	2.10	2.24	2.47	2.40	2.64	2.40
Coffee	0.67	0.48	0.67	0.92	0.79	0.87	0.93	0.99	1.03	1.11
Cocoa beans	0.35	0.33	0.40	0.46	0.38	0.42	0.46	0.52	0.53	0.53
Tea	0.23	0.22	0.26	0.27	0.29	0.25	0.26	0.28	0.28	0.28
Wine	1.68	1.39	2.13	2.45	2.67	2.23	2.51	2.34	2.54	1.90
Tobacco	0.37	0.33	0.39	0.45	0.41	0.39	0.46	0.48	0.51	0.51
Cotton (lint)	1.67	1.40	1.52	1.51	1.42	1.43	1.69	1.57	1.45	1.45
Rubber (natural)	0.30	0.52	0.66	0.61	0.59	0.60	0.61	0.61	0.62	0.64
Meat (fresh, chilled, frozen) [5]	1.12	0.81	0.97	1.11	1.11	1.07	1.18	1.04	1.18	1.48
Canned meat	0.08	0.18	0.20	0.24	0.24	0.24	0.23	0.24	0.23	0.23
Bacon, ham, and salted pork	0.39	0.21	0.32	0.39	0.35	0.36	0.41	0.40	0.42	0.40
Butter	0.57	0.39	0.39	0.47	0.46	0.47	0.48	0.47	0.49	0.51
Cheese	0.23	0.27	0.29	0.35	0.33	0.34	0.34	0.36	0.39	0.42
Eggs (in the shell)	0.31	0.21	0.30	0.40	0.36	0.41	0.43	0.42	0.38	0.31
					Million cubic meters					
Pulpwood	6.38	3.73	[4] 5.75	7.30	5.13	5.61	7.50	9.62	8.63	8.05
Logs [2]	4.62	5.10	[4] 4.34	7.32	5.51	6.31	8.14	8.39	8.24	8.99
Sawn softwood	19.66	11.21	[4] 16.55	20.09	16.48	18.36	21.79	21.45	22.39	23.80
Plywood	0.57	0.34	[4] 0.62	0.90	0.68	0.79	1.01	0.97	1.04	1.14
					Million metric tons					
Fibreboard	0.03	0.04	[4] 0.34	0.54	0.42	0.50	0.57	0.58	0.63	0.70
Woodpulp	3.14	2.94	[4] 4.67	5.78	4.85	5.24	6.32	6.24	6.24	7.13
Newsprint	0.65	0.40	[4] 0.96	1.34	1.18	1.14	1.37	1.48	1.55	1.60
Other paper and paperboard	0.78	0.84	[4] 1.60	2.66	1.92	2.20	2.72	3.12	3.36	3.84

[1] Oranges and lemons only. - [2] Sawlogs, veneer logs and logs for sleepers. - [3] Including eastern Europe. - [4] Average 1954-57. - [5] Beef and veal, mutton and lamb, pork.

ANNEX TABLE 5A. - EASTERN EUROPE AND U.S.S.R.: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	..... *Million metric tons*										
EASTERN EUROPE [1]											
Wheat	11.8	9.6	11.9	10.7	13.2	11.8	13.8	12.9	13.5	13.8	13.4
Rye	10.9	9.8	11.2	10.7	11.4	11.2	11.9	11.4	11.3	9.7	10.0
Barley	4.4	4.3	5.2	4.6	5.3	4.8	5.6	6.3	5.9	6.4	6.2
Oats	5.2	4.7	5.3	5.1	5.3	5.3	5.2	5.5	5.4	5.1	5.1
Maize	5.8	8.9	10.7	7.4	11.5	7.9	11.3	11.1	10.4	10.2	11.4
Potatoes	56.0	64.2	51.6	66.2	64.5	58.5	60.2	63.9	63.9	60.9	67.3
Tomatoes	0.9	0.9	1.0	1.0	1.2	1.2	1.3	1.5	1.6	1.6	...
Onions	0.6	0.7	0.6	0.5	0.6	0.6	0.8	0.8	0.6	0.6	...
Apples	0.9	1.2	1.0	1.6	0.8	2.2	1.1	2.3	1.3	1.4	...
Plums	0.6	0.6	0.8	0.6	0.6	1.1	1.4	1.2	1.6	0.8	...
Grapes	1.7	1.5	2.3	1.4	2.1	3.0	2.3	2.0	2.0	2.6	...
Sugar beet	20.8	23.5	24.0	19.4	25.9	27.0	23.2	33.9	29.8	26.8	30.9
Sunflowerseed	0.6	0.7	0.7	0.6	0.6	0.6	0.9	0.9	0.9	0.9	...
Tobacco	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	...
Milk	20.6	22.5	23.6	24.0	25.6	27.2	27.7	28.3	28.7	27.9	...
Eggs [2]	9.6	10.6	11.5	12.7	13.6	14.3	15.4	16.8	18.0	17.3	...
U.S.S.R.											
Total grain	80.9	85.6	106.8	127.6	105.0	141.2	125.9	134.4	138.0	148.2	...
Wheat	34.5	42.4	47.3	67.4	58.1	76.6	69.1	64.3	66.5	70.8	...
Rye	17.1	15.6	16.5	14.1	14.5	15.7	16.9	16.3	16.7	17.0	...
Barley	7.1	7.8	10.3	12.9	8.5	13.0	10.2	16.0	13.3	19.5	...
Oats	11.6	10.8	11.8	13.2	12.7	13.4	13.5	12.0	8.9	5.7	...
Maize	5.3	3.4	14.7	12.5	7.0	16.7	12.0	18.7	24.3	23.5	...
Millet	2.0	3.0	3.0	4.6	1.6	2.9	1.3	3.2	2.9	2.8	...
Rice	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	...
Pulses (for food and feed)	1.6	...	...	...	...	1.8	2.1	2.7	4.0	7.6	...
Potatoes	75.7	75.0	71.8	96.0	87.8	86.5	86.6	84.4	84.3	69.7	...
Other vegetables	10.0	11.9	14.1	14.3	14.8	14.9	14.8	16.6	16.2	16.0	...
Fruit	[3] 2.2	...	...	...	...	3.1	3.2	3.1	2.8	3.0	...
Grapes	[3] 1.0	...	...	1.2	1.4	1.7	1.7	1.9	2.2	3.0	...
Sugar beet	21.1	19.8	31.0	32.5	39.7	54.4	43.9	57.7	50.9	47.4	...
Oilseeds	2.5	...	...	4.4	3.2	5.1	3.4	4.3	5.3	5.5	...
Sunflowerseed	2.0	1.9	3.8	3.9	2.8	4.6	3.0	4.0	4.7	4.8	...
Tobacco	[3] 0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	...	...
Milk	35.7	38.2	43.0	49.1	54.7	58.7	61.7	61.7	62.6	63.9	61.2
Butter	[3] 0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Beef and veal	[3] 2.1	2.1	2.2	2.3	2.4	2.7	3.2	3.3	2.9	3.3	3.7
Pig	[3] 2.3	2.7	2.5	2.7	3.3	3.3	3.6	3.3	3.7	4.0	4.2
Mutton and lamb	[3] 0.7	0.7	0.8	0.8	0.8	0.9	1.1	1.0	1.0	1.1	1.2
Poultry	[3] 0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.8	0.8
Eggs [2]	12.9	17.2	18.5	19.5	22.3	23.0	25.6	27.5	29.3	30.1	28.8
Flax	0.2	0.2	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	...
Cotton (lint)	3.5	4.2	3.9	4.3	4.2	4.3	4.6	4.3	4.5	4.3	5.2
Wool	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4

[1] Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania. - [2] Thousand million units. - [3] 1953.

ANNEX TABLE 5B. - EASTERN EUROPE AND U.S.S.R.: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	U.S.S.R.						Eastern Europe[1]					
	1957	1958	1959	1960	1961	1962	1957	1958	1959	1960	1961	1962
GROSS EXPORTS	*Thousand metric tons*											
Wheat and wheat flour (wheat equivalent)	5 450.8	3 878.7	6 166.6	5 676.8	5 149.5	5 114.4	83.8	141.1	175.2	185.8	149.3	80.0
Rye	440.6	461.0	548.9	682.5	1 088.0	1 300.3	8.6	5.3	3.1	24.0	42.7	32.0
Barley	1 214.0	278.3	121.6	324.0	1 006.8	466.8	111.7	99.7	64.8	107.6	177.1	140.6
Oats	223.5	261.1	131.4	41.5	179.9	25.3	–	0.1	1.5	–	–	2.1
Maize	84.6	220.5	154.9	122.2	405.6	1 256.7	174.3	508.7	112.8	471.3	785.9	633.5
Meat (fresh)[2,3]	74.4	33.4	173.6	68.0	60.2	105.6	22.5	32.8	31.9	36.0	88.2	112.4
Butter	49.1	24.7	80.3	37.2	55.6	69.7	5.1	32.5	31.4	37.9	33.8	35.4
Cheese	7.9	0.4	1.0	2.6	3.9	4.8	6.8	8.6	19.5	23.4	26.2	23.2
Eggs	–	–	–	–	–	–	43.9	59.0	72.8	98.0	131.9	106.4
Cattle[4]	–	–	–	–	–	–	86.5	94.5	104.8	186.3	121.0	124.1
Pigs[4]	25.0	58.0	54.7	54.5	91.4	...	195.8	641.5	660.0	562.1	891.6	674.0
Tobacco	6.0	6.2	7.1	1.6	2.9	1.8	61.2	56.2	76.0	90.6	80.6	78.8
Cotton (lint)	318.7	310.9	344.5	390.9	382.6	343.6	4.3	5.3	1.6	3.2	4.2	7.6
Wool[6]	13.8	17.0	16.8	17.8	28.0	24.1	0.7	1.2	2.7	3.5	3.9	3.3
Flax	44.7	43.3	77.5	65.2	42.6	45.4	6.3	7.8	11.1	8.7	24.5	17.7
Oilseeds	49.8	47.1	83.3	110.4	120.7	112.7	[7] 46.4	34.6	47.9	73.7	75.7	120.3
Vegetable oils	47.8	52.2	82.5	91.8	121.8	152 5						
Sugar (raw equivalent)	213.7	221.2	217.3	267.8	954.1	904.7	409.5	879.6	1 139.0	1 064.1	2 252.7	2 275.5
GROSS IMPORTS												
Wheat and wheat flour (wheat equivalent)	122.1	323.3	289.7	130.6	687.2	75.8	4 941.9	3 296.8	4 300.4	4 971.7	4 652.0	4 238.4
Rye	–	–	–	–	–	–	403.2	485.2	405.0	536.2	758.7	867.3
Barley	–	176.4	1.0	21.8	–	–	1 103.0	436.3	477.9	412.3	691.7	672.3
Oats	–	31.0	8.5	3.2	–	–	178.4	143.2	64.5	60.0	125.8	7.9
Maize	30.3	261.5	–	117.2	22.6	–	118.7	425.6	386.9	508.8	567.9	1 342.4
Rice	370.5	500.5	689.1	501.1	19.9	337.5	245.3	262.2	414.8	430.5	225.4	215.6
Meat (fresh)[2,5]	90.2	119.3	89.0	50.0	84.3	158.8	70.3	90.6	164.0	161.9	121.4	112.7
Butter	8.2	25.2	13.6	4.0	7.8	3.3	60.1	30.8	84.3	61.2	73.0	75.2
Cheese	0.3	–	3.1	2.1	3.1	1.8	17.8	12.4	15.4	23.5	22.9	19.4
Eggs	12.5	20.7	6.1	6.3	8.9	3.7	18.6	8.8	11.0	8.1	7.0	6.0
Cattle[4]	136.2	121.1	142.3	158.0	138.1	135.8	9.1	18.5	17.1	10.1	9.4	5.9
Pigs[4]	–	58.0	54.7	54.5	300.4	147.5	64.8	172.5	120.1	85.0	138.6	...
Citrus fruit[5]	108.5	132.6	103.9	120.4	100.5	104.6	94.0	114.2	159.6	113.1	131.9	139.4
Coffee	5.1	4.1	13.3	19.1	29.7	22.6	21.1	24.3	43.8	39.2	48.5	50.5
Tea	21.0	25.7	29.8	22.6	14.9	16.1	7.4	6.8	9.4	6.8	5.9	8.0
Cocoa beans	44.1	10.4	39.8	58.1	20.6	48.7	27.2	31.3	40.4	43.4	44.6	47.9
Cotton (lint)	108.8	142.1	190.3	193.1	141.6	150.2	392.1	402.5	431.8	481.2	514.1	399.1
Wool[6]	57.0	54.7	57.2	61.0	54.7	48.1	56.9	61.3	68.4	73.4	69.4	63.5
Flax	–	–	–	–	–	–	19.8	21.6	26.3	29.1	17.0	23.0
Jute	16.4	23.0	22.0	16.9	14.5	14.3	46.0	53.1	48.4	50.5	53.7	58.4
Oilseeds	716.0	551.7	715.2	418.5	90.2	57.3	[7] 198.3	169.2	228.5	251.2	304.1	310.7
Vegetable oils	45.6	73.3	71.6	59.3	54.4	15.1						
Rubber (natural)	145.5	258.7	242.1	190.9	360.3	361.7	111.8	123.7	110.1	146.0	157.2	124.5
Sugar (raw equivalent)	671.0	394.6	334.8	1 717.3	3 596.9	2 485.8	88.9	94.9	122.7	309.9	618.2	931.0
Tobacco	91.1	84.3	96.6	74.2	57.8	66.6	60.6	59.2	58.5	59.1	61.7	60.1

[1] Albania, Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania. - [2] Beef and veal, mutton and lamb, pork. - [3] Including other fresh and chilled meats for U.S.S.R. only. - [4] Thousand units. - [5] Oranges and lemons only. - [6] Clean basis for U.S.S.R. and actual weight for eastern Europe. - [7] All years, oils and oilseeds in oil equivalent

ANNEX TABLE 5C. - U.S.S.R.: PRODUCTION AND EXPORTS OF FOREST PRODUCTS

	Average 1948-52	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Million cubic meters										
PRODUCTION											
Fuelwood	111.8	123.1	121.8	120.2	123.6	124.1	127.7	108.0	97.7	97.0	96.0
Industrial roundwood	162.8	205.8	218.1	222.1	237.3	250.9	270.3	261.5	253.3	255.7	265.0
Sawn softwood	41.11	58.65	64.26	65.11	69.40	69.60	88.40	89.76	88.66	88.82	91.10
Sawn hardwood	7.24	10.35	11.34	11.49	12.20	14.10	15.60	15.84	15.64	15.68	16.08
Plywood	0.66	1.02	1.05	1.12	1.15	1.23	1.30	1.35	1.58	1.65	1.77
	Million metric tons										
Fibreboard	0.02	0.05	0.05	0.07	0.09	0.11	0.16	0.21	0.28	0.31	0.35
Woodpulp	1.51	2.34	2.46	2.62	2.75	2.90	3.02	3.21	3.44	3.69	3.92
Newsprint	0.24	0.32	0.36	0.36	0.38	0.39	0.40	0.43	0.49	0.54	0.58
Other paper and paperboard	1.20	1.95	2.04	2.22	2.41	2.57	2.69	2.79	2.95	3.13	3.28
	Million cubic meters										
EXPORTS											
Pulpwood	0.06	—	0.55	0.53	0.59	0.82	1.18	1.60	2.33	3.26	3.60
Coniferous logs[1]	0.09	0.06	0.12	0.24	0.65	0.99	1.14	1.50	1.83	2.45	2.70
Sawn softwood	0.82	1.74	2.33	2.21	3.46	3.63	4.38	4.99	5.20	6.00	6.20
Plywood	0.05	0.06	0.09	0.05	0.10	0.11	0.12	0.13	0.13	0.14	0.15
	Million metric tons										
Chemical woodpulp	0.06	0.10	0.14	0.15	0.15	0.22	0.20	0.24	0.27	0.27	0.27

[1] Sawlogs, veneer logs and logs for sleepers.

ANNEX TABLE 6A. - NORTH AMERICA: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS				*Million metric tons*						
Wheat	26.65	44.51	40.86	46.13	50.50	42.63	51.05	41.32	45.16	50.65
Oats	18.99	25.29	24.72	22.13	25.68	20.58	22.91	19.06	22.43	21.23
Maize	53.20	74.70	74.76	93.98	86.01	97.93	99.93	92.83	93.19	104.50
Rice (milled equivalent) [1]	0.62	1.25	1.56	1.61	1.32	1.58	1.61	1.60	1.95	2.07
Potatoes	11.94	12.48	12.41	13.98	13.92	12.78	13.63	15.33	14.24	14.56
Citrus fruit	3.62	6.41	7.24	7.02	7.35	7.20	6.85	7.80	5.88	5.70
Vegetable oils and oilseeds (oil equivalent)	1.19	2.66	3.17	4.10	4.00	3.71	3.99	4.39	4.43	4.66
Tobacco	3.62	1.02	1.01	0.98	0.88	0.89	0.98	1.03	1.14	1.15
Cotton (lint)	2.81	3.11	3.01	3.03	2.51	3.17	3.11	3.12	3.24	3.34
Milk (total)	54.44	59.55	63.48	64.70	64.15	63.65	64.16	65.64	66.89	65.43
Meat [2]	8.09	10.91	12.94	13.70	12.74	13.56	13.90	14.06	14.23	14.97
Eggs	2.42	3.93	4.09	4.13	4.16	4.24	4.09	4.06	4.09	4.05
				Indices, average 1952/53-1956/57 = 100						
Index of all farm products	68	93	100	109	106	108	109	108	112	116

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
FOREST PRODUCTS				*Million cubic meters*						
Coniferous logs [3]	...	157.7	[4] 181.1	182.1	166.0	193.8	188.5	176.6	185.7	194.0
Broadleaved logs [3]	...	39.1	[4] 41.2	35.7	37.9	36.7	34.8	33.4	35.7	38.0
Other industrial	...	105.4	[4] 121.0	124.8	111.9	123.6	132.7	125.0	130.8	136.0
Sawn softwood	55.4	84.8	[4] 86.8	82.8	80.8	89.4	80.9	79.5	83.2	87.1
Sawn hardwood	12.1	18.1	[4] 17.8	15.4	14.1	16.0	15.8	15.1	15.9	17.2
Plywood	0.8	3.5	[4] 6.2	9.1	7.6	8.8	8.9	9.7	10.5	11.3
				Million metric tons						
Fibreboard	0.64	1.21	[4] 1.63	1.87	1.71	1.97	1.81	1.87	1.97	2.13
Woodpulp	8.64	20.91	[4] 28.11	32.99	28.97	31.90	33.36	34.63	36.07	37.67
Newsprint	3.38	5.74	[4] 7.04	7.67	7.04	7.51	7.89	7.96	7.95	7.94
Printing and writing paper	...	4.26	[4] 5.20	6.14	5.38	6.03	6.24	6.36	6.71	6.94
Other paper and paperboard	...	16.24	[4] 20.52	23.56	21.14	23.14	23.44	24.27	25.79	26.80

[1] Paddy converted at 65 percent. - [2] Beef and veal, mutton and lamb, pork. - [3] Sawlogs, veneer logs and logs for sleepers. - [4] Average 1954-57.

ANNEX TABLE 6B. - NORTH AMERICA: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS				*Million metric tons*						
Wheat and wheat flour (wheat equivalent)	6.08	18.39	17.16	23.38	19.18	19.64	23.29	29.84	24.98	31.11
Barley	0.50	1.44	2.80	3.21	4.25	3.83	3.01	2.40	2.58	1.62
Maize	0.80	2.31	3.13	6.79	4.57	5.59	5.61	7.35	10.81	11.12
Rice (milled equivalent)	0.07	0.54	0.67	0.79	0.57	0.68	0.87	0.80	1.05	1.20
Oranges	0.15	0.23	0.35	0.21	0.16	0.26	0.21	0.20	0.20	0.16
Vegetable oils and oilseeds (oil equivalent)	0.02	0.41	0.86	1.40	1.09	1.44	1.58	1.26	1.65	1.64
Tobacco	0.20	0.22	0.24	0.24	0.23	0.23	0.24	0.24	0.23	0.25
Cotton (lint)	1.29	1.04	0.95	1.19	1.04	0.83	1.73	1.45	0.88	0.97
				Million cubic meters						
Coniferous logs [1]	...	0.33	[2] 0.64	1.38	0.60	0.79	1.00	2.28	2.24	3.80
Plywood	...	0.05	[2] 0.15	0.21	0.13	0.22	0.19	0.21	0.29	0.31
Pulpwood	...	5.68	[2] 4.66	3.14	3.29	2.90	3.12	3.17	3.20	2.89
Sawn softwood	...	8.41	[2] 11.19	12.49	10.76	11.38	12.55	13.28	14.50	16.65
				Million metric tons						
Wood pulp	...	1.83	[2] 2.70	3.24	2.48	2.81	3.40	3.67	3.84	4.35
Newsprint	2.80	4.50	[2] 5.41	5.60	5.27	5.47	5.74	5.84	5.68	5.73
Other paper and paperboard	...	0.44	[2] 0.58	0.88	0.70	0.78	0.89	0.99	1.05	1.20
GROSS IMPORTS										
Sugar (raw equivalent) [3]	3.22	3.89	4.24	4.86	5.01	4.86	4.93	4.55	4.98	4.84
Citrus fruit [4]	0.11	0.19	0.22	0.21	0.20	0.24	0.22	0.21	0.20	0.18
Bananas	1.35	1.47	1.63	1.85	1.73	1.87	1.98	1.94	1.72	1.73
Vegetable oils and oilseeds (oil equivalent)	0.90	0.55	0.53	0.58	0.54	0.58	0.59	0.60	0.63	0.59
Coffee	0.80	1.26	1.23	1.38	1.23	1.42	1.35	1.38	1.51	1.48
Cocoa	0.25	0.27	0.24	0.27	0.20	0.22	0.26	0.36	0.30	0.29
Tea	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08
Jute	0.07	0.08	0.07	0.05	0.04	0.07	0.05	0.02	0.08	0.06
Sisal	0.13	0.16	0.15	0.12	0.13	0.13	0.10	0.11	0.12	0.11
Wool (actual weight)	0.10	0.29	0.17	0.16	0.12	0.19	0.15	0.16	0.17	0.17
Rubber (natural)	0.52	0.80	0.65	0.49	0.50	0.61	0.44	0.42	0.46	0.42
				Million cubic meters						
Coniferous logs [1]	...	0.90	[2] 0.89	0.89	0.64	0.75	0.90	0.97	1.21	1.18
Pulpwood	...	4.94	[2] 4.26	3.32	3.31	3.05	3.42	3.43	3.39	3.50
Sawn softwood	...	5.24	[2] 7.46	9.43	7.87	9.31	8.97	9.86	11.15	12.10
Plywood	...	0.11	[2] 0.43	0.76	0.55	0.90	0.66	0.73	0.96	1.02
				Million metric tons						
Woodpulp	...	1.96	[2] 2.03	2.28	1.96	2.27	2.22	2.29	2.64	2.48
Newsprint	...	4.33	[2] 4.75	4.81	4.43	4.77	4.91	4.96	4.97	4.90

[1] Sawlogs, veneer logs and logs for sleepers. - [2] Average 1954-57. - [3] Excluding United States trade with its territories. - [4] Oranges and lemons only.

ANNEX TABLE 7A. - OCEANIA: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS	*Million metric tons*									
Wheat	4.38	5.30	4.42	6.98	6.02	5.64	7.70	6.94	8.60	9.25
Sugar (centrifugal)	0.94	1.04	1.44	1.69	1.64	1.60	1.55	1.55	2.13	2.06
Wool (greasy)	0.59	0.69	0.84	1.01	0.97	1.02	1.00	1.04	1.04	1.07
Milk (total)	10.18	10.24	11.29	11.80	11.83	11.94	11.66	11.19	12.40	12.60
Meat [1]	1.42	1.60	1.88	2.24	2.21	2.17	2.08	2.27	2.45	2.52
	Indices, average 1952/53-1956/57 = 100									
Index of all farm products	78	90	101	123	117	119	123	125	131	135

	Average 1948-52	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
FOREST PRODUCTS	*Million cubic meters*										
Logs [2]	...	11.3	11.9	11.6	11.7	11.8	12.2	13.2	13.1	11.6	11.7
Sawnwood	...	4.73	4.85	4.60	4.51	4.70	4.98	5.06	4.75	4.35	4.55

[1] Beef and veal, mutton and lamb, pork. - [2] Sawlogs, veneer logs, and logs for sleepers.

ANNEX TABLE 7B. - OCEANIA: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS	*Million metric tons*									
Wheat and wheat flour (wheat equivalent)	2.80	3.09	2.69	3.78	1.42	2.68	3.60	6.41	4.79	6.69
Barley	0.07	0.26	0.57	0.59	0.32	0.88	0.38	0.95	0.40	0.28
Oats	0.01	0.19	0.15	0.28	0.07	0.38	0.22	0.47	0.27	0.31
Sugar (raw equivalent)	0.56	0.47	0.87	1.03	0.89	0.84	1.04	0.99	1.39	1.40
Copra and coconut oil (oil equivalent)	0.13	0.13	0.16	0.17	0.16	0.16	0.16	0.18	0.17	0.17
Beef	0.15	0.13	0.23	0.30	0.28	0.32	0.25	0.26	0.37	0.40
Mutton and lamb	0.27	0.30	0.32	0.39	0.34	0.39	0.42	0.41	0.41	0.43
Butter	0.24	0.21	0.22	0.25	0.24	0.28	0.22	0.25	0.24	0.27
Cheese	0.10	0.12	0.11	0.11	0.10	0.10	0.10	0.11	0.12	0.12
Wool (actual weight)	0.49	0.66	0.71	0.85	0.73	0.87	0.85	0.89	0.92	0.92
GROSS IMPORTS										
Wheat and wheat flour (wheat equivalent)	0.06	0.21	0 29	0.26	0.32	0.28	0.22	0.22	0.27	0.24
Sugar (raw equivalent)	0.09	0.11	0.11	0.14	0.13	0.12	0.13	0.16	0.14	0.13
Rubber (natural)	0.01	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04
	Million cubic meters									
Sawn softwood	...	0.66	[1] 0.68	0.68	0.65	0.55	0.83	0.73	0.62	0.60
	Million metric tons									
All paper and paperboard	...	0.32	[1] 0.36	0.38	0.33	0.34	0.38	0.50	0.35	0.41

[1] Average 1954-57.

ANNEX TABLE 8A. - LATIN AMERICA: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS	*Million metric tons*									
Wheat	8.62	7.98	10.46	9.22	10.58	9.44	7.84	8.94	9.32	11.81
Maize	18.00	15.00	18.71	23.38	21.85	22.17	23.54	24.42	24.90	23.72
Rice (milled equivalent)[1]	1.33	3.07	3.84	5.12	4.22	4.85	5.29	5.57	5.69	4.84
Sugar (centrifugal)	6.89	12.52	13.78	16.70	16.78	17.17	18.08	16.16	15.34	15.60
Citrus fruit	3.28	3.72	4.20	5.03	4.71	4.76	5.18	5.22	5.28	5.27
Bananas	4.20	8.12	10.50	12.55	11.42	12.48	12.88	12.84	13.14	13.60
Coffee	2.11	1.88	2.11	3.15	2.75	3.79	2.94	3.35	2.89	2.70
Cocoa	0.24	0.25	0.29	0.33	0.34	0.34	0.32	0.32	0.31	0.32
Tobacco	0.21	0.31	0.37	0.44	0.40	0.41	0.44	0.45	0.50	0.48
Cotton (lint)	0.59	0.86	1.16	1.44	1.27	1.20	1.44	1.53	1.74	1.70
Milk (total)	12.22	14.48	18.45	21.99	20.65	21.70	22.53	22.28	22.80	23.26
Meat[2]	5.03	6.03	6.65	7.25	7.68	7.01	6.90	7.28	7.40	7.47
Eggs	0.48	0.58	0.78	0.97	0.94	0.90	0.94	1.01	1.04	1.05
	Indices, average 1952/53-1956/57 = 100									
Index of all farm products	73	88	104	122	118	121	121	125	126	126
	Average 1948-52	Average 1954-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)	
FOREST PRODUCTS	*Million cubic meters*									
Sawn softwood	4.47	5.09	5.14	5.28	5.23	4.93	5.06	5.20	5.20	
Sawn hardwood	6.01	7.07	6.39	6.56	6.23	6.26	6.26	6.63	6.70	
Plywood	0.12	0.21	0.30	0.30	0.28	0.28	0.31	0.32	0.32	
	Million metric tons									
Wood pulp	0.23	0.32	0.59	0.43	0.50	0.50	0.76	0.77	0.82	
All paper and paperboard	0.75	1.10	1.63	1.39	1.49	1.57	1.82	1.90	1.98	

[1] Paddy converted at 65 percent. - [2] Beef and veal, mutton and lamb, pork.

ANNEX TABLE 8B. - LATIN AMERICA: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS				*Million metric tons*						
Wheat and wheat flour (wheat equivalent)	3.44	2.00	3.22	2.28	2.45	2.48	2.50	1.10	2.87	1.93
Maize	6.61	1.20	1.18	2.48	1.74	2.74	3.11	1.79	3.01	2.52
Rice (milled equivalent)	0.10	0.25	0.17	0.21	0.17	0.12	0.13	0.33	0.30	0.30
Sugar (raw equivalent) [1]	4.05	7.06	7.72	9.39	8.84	8.16	9.99	10.92	9.04	7.64
Bananas	2.04	1.92	2.37	2.98	2.79	2.93	3.11	3.08	2.98	3.13
Linseed and linseed oil (oil equivalent)	0.55	0.19	0.18	0.24	0.18	0.24	0.21	0.27	0.29	0.27
Coffee	1.40	1.61	1.58	1.80	1.56	1.87	1.85	1.83	1.90	1.98
Cocoa beans	0.21	0.18	0.25	0.19	0.19	0.17	0.23	0.19	0.15	0.17
Cotton (lint)	0.34	0.39	0.65	0.72	0.59	0.73	0.62	0.76	0.91	0.98
Wool (actual weight)	0.19	0.19	0.18	0.20	0.18	0.20	0.19	0.23	0.21	0.20
Meat (fresh, chilled and frozen) [2]	0.59	0.34	0.35	0.48	0.52	0.47	0.42	0.41	0.56	0.68
Canned meat	0.12	0.12	0.10	0.11	0.13	0.11	0.08	0.11	0.10	0.10
				Million cubic meters						
Broadleaved logs [3]	...	0.40	[4] 0.39	0.34	0.38	0.26	0.34	0.35	0.38	0.34
Sawn softwood	...	1.25	[4] 1.39	1.32	1.46	1.19	1.26	1.37	1.34	1.20
GROSS IMPORTS				*Million metric tons*						
Wheat and wheat flour (wheat equivalent)	1.67	2.80	3.41	4.06	3.40	3.89	4.22	4.15	4.65	4.61
Rice (milled equivalent)	0.39	0.36	0.28	0.32	0.40	0.34	0.25	0.31	0.28	0.30
Sugar (raw equivalent)	0.25	0.36	0.42	0.35	0.37	0.39	0.25	0.51	0.24	0.42
Potatoes	0.18	0.24	0.21	0.18	0.16	0.15	0.20	0.15	0.25	0.18
				Million cubic meters						
Broadleaved logs [3]	...	0.31	[4] 0.31	0.23	0.27	0.19	0.24	0.21	0.22	0.18
Sawn softwood	...	1.09	[4] 1.48	1.19	1.48	0.90	0.99	1.26	1.28	1.11
				Million metric tons						
Chemical woodpulp	...	0.27	[4] 0.46	0.35	0.35	0.35	0.30	0.36	0.37	0.36
All paper and paperboard	...	0.62	[4] 0.75	0.87	0.85	0.83	0.87	0.88	0.93	0.91

[1] Excluding trade between the United States and its territories. - [2] Beef and veal, mutton and lamb, pork. - [3] Sawlogs, veneer logs, and logs for sleepers. - [4] Average 1954-57.

ANNEX TABLE 9A. - FAR EAST (EXCLUDING MAINLAND CHINA): PRODUCTION OF MAJOR COMMODITIES

	Prewar Average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS					*Million metric tons*					
Wheat	12.13	11.47	13.48	15.96	13.13	15.60	16.09	16.93	18.04	16.33
Millet and sorghum	14.94	13.83	16.86	17.63	18.35	17.41	17.52	16.51	18.37	16.70
Rice (milled equivalent) [1]	60.61	62.99	72.73	86.77	80.73	84.86	89.47	90.01	88.77	95.26
Sugar (centrifugal)	4.18	3.14	4.90	6.30	5.71	6.29	6.83	6.52	6.15	6.87
Sugar (noncentrifugal)	3.67	4.03	4.60	5.60	5.61	5.38	5.76	5.56	5.49	5.46
Starchy roots	21.62	27.29	33.36	40.12	37.84	40.44	39.77	40.46	42.11	41.93
Pulses [2]	6.78	7.18	8.86	10.38	8.77	11.46	10.14	10.98	10.55	9.94
Vegetable oils and oilseeds (oil equivalent)	3.96	4.03	4.98	5.33	5.28	4.84	5.54	5.51	5.47	5.65
Tea	0.46	0.54	0.64	0.72	0.70	0.70	0.70	0.76	0.75	0.75
Tobacco	0.79	0.60	0.78	0.85	0.77	0.87	0.84	0.85	0.93	0.96
Cotton (lint)	1.22	0.90	1.25	1.28	1.23	1.07	1.36	1.27	1.47	1.49
Jute [3]	1.50	1.93	1.85	2.46	2.39	2.12	2.20	3.13	2.45	2.70
Rubber (natural)	0.97	1.65	1.76	1.89	1.82	1.90	1.84	1.95	1.97	1.91
Meat [4]	1.65	1.83	2.26	2.62	2.53	2.60	2.55	2.61	2.82	2.80
Milk (total)	23.23	25.23	27.61	28.97	28.49	28.73	28.94	29.18	29.51	29.89
					Indices, average 1952/53-1956/57 = 100					
Index of all farm products	84	87	103	93	111	115	119	122	124	126

	Average 1948-52	Average 1954-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
FOREST PRODUCTS				*Million cubic meters*					
Industrial roundwood	43.7	62.0	76.5	68.5	72.2	76.7	82.3	82.7	87.0
Sawn softwood	11.51	17.97	22.50	20.54	21.76	23.55	23.59	22.97	24.25
Sawn hardwood	5.85	9.00	11.00	9.71	9.44	11.12	12.26	12.64	13.20
Plywood	0.25	0.95	1.81	1.40	1.77	1.80	2.00	2.08	2.20
				Million metric tons					
Wood pulp	0.79	2.06	3.49	2.38	3.02	3.57	4.19	4.27	4.70
Newsprint	0.16	0.52	0.84	0.61	0.82	0.81	0.90	1.05	1.17
Other paper and board	0.90	2.31	4.40	2.90	3.70	4.46	5.37	5.58	6.39

[1] Paddy converted at 65 percent. - [2] Dry beans, dry peas, broad beans, chick-peas, lentils. - [3] Including allied fibers. - [4] Beef and veal, mutton and lamb, pork.

ANNEX TABLE 9B. - FAR EAST (EXCLUDING MAINLAND CHINA): EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS				*Million metric tons*						
Rice (milled equivalent)	8.96	3.05	3.38	3.64	3.32	3.56	3.84	3.85	3.61	3.71
Sugar (raw equivalent)	3.31	1.01	1.92	2.10	1.98	1.81	2.18	2.23	2.31	2.17
Vegetable oils and oilseeds (oil equivalent)[1]	1.72	1.30	1.42	1.33	1.25	1.19	1.37	1.46	1.38	1.55
Tea	0.36	0.39	0.45	0.47	0.49	0.45	0.45	0.46	0.48	0.49
Cotton (lint)	0.65	0.27	0.25	0.14	0.18	0.13	0.14	0.11	0.15	0.19
Jute	0.79	0.84	0.91	0.88	0.94	0.89	0.83	0.75	1.00	0.83
Rubber (natural)[2]	0.95	1.61	1.78	2.04	1.83	2.12	1.85	2.06	2.34	2.13
				Million cubic meters						
Broadleaved logs[3]	...	0.76	[4] 2.72	5.96	3.82	5.35	6.11	7.01	7.52	8.95
Sawn hardwood	...	0.56	[4] 1.03	1.23	1.10	1.18	1.44	1.24	1.19	1.25
Plywood	...	0.02	[4] 0.27	0.59	0.49	0.71	0.50	0.58	0.67	0.77
				Million metric tons						
All paper and paperboard	...	...	[4] 0.13	0.20	0.12	0.15	0.20	0.28	0.24	0.26
GROSS IMPORTS				*Million metric tons*						
Wheat and wheat flour (wheat equivalent)	1.01	4.89	5.65	8 84	7.87	8.37	10.24	9.18	8.53	9.53
Rice (milled equivalent)	6.16	3.11	3.58	3.55	3.85	3.17	3.38	3.39	3.48	3.83
Barley	0.05	0.69	0.97	0.37	1.07	0.50	0.02	0.18	0.10	0.39
Maize	0.21	0.20	0.42	1.72	0.62	1.15	1.65	2.20	2.78	3.10
Sugar (raw equivalent)	1.73	1.17	2.13	2.16	2.08	1.91	2.08	2.28	2.44	2.31
Vegetable oils and oilseeds (oil equivalent)[5]	0.37	0.27	0.48	0.65	0.55	0.62	0.68	0.67	0.75	0.88
Cotton (lint)	0.89	0.52	0.77	1.02	0.75	0.90	1.15	1.26	1.04	1.14
Jute	0.04	0.27	0.24	0.16	0.14	0.12	0.21	0.15	0.18	0.16
				Million cubic meters						
Logs[3]	...	0.48	[4] 2.86	7.65	4.49	6.10	6.97	9.42	11.28	13.70
Sawn softwood	...	0.15	[4] 0.41	0.65	0.38	0.56	0.60	0.91	0.80	1.05
Sawn hardwood	...	0.17	[4] 0.14	0.20	0.21	0.12	0.09	0.13	0.43	0.46
				Million metric tons						
All paper and paperboard	...	0.32	[4] 0.54	0.58	0.46	0.55	0.60	0.63	0.65	0.69

[1] Excluding re-exports of copra from Malaya and Singapore, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaya, Singapore, and Sabah. - [2] Excluding imports into Malaya and Singapore for re-export and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaya and Singapore. - [3] Sawlogs, veneer and logs for sleepers. - [4] Average 1954-57. - [5] Excluding copra imported into Malaya and Singapore for re-export.

ANNEX TABLE 10A. - NEAR EAST: PRODUCTION OF MAJOR COMMODITIES

FARM PRODUCTS	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
	Million metric tons									
Wheat	9.50	10.95	15.30	16.62	16.67	16.34	16.37	16.70	18.02	18.90
Barley	4.24	4.77	6.34	6.36	6.47	6.00	6.12	5.99	7.21	7.69
Rice (milled equivalent) [1]	1.09	1.34	1.47	1.72	1.37	1.72	1.72	1.52	2.24	2.30
Total grains [2]	19.07	22.27	29.79	32.09	32.11	31.40	31.59	30.17	34.80	36.75
Sugar (centrifugal)	0.22	0.42	0.66	1.00	0.86	1.02	1.20	0.94	0.98	1.10
Pulses [3]	0.70	0.78	0.84	0.87	0.85	0.84	0.89	0.75	1.00	0.96
Citrus fruit	0.79	0.86	1.20	1.56	1.49	1.48	1.37	1.62	1.86	1.89
Dates	0.87	0.86	1.07	1.13	1.10	1.11	1.20	1.15	1.11	1.11
Bananas	0.05	0.07	0.10	0.14	0.14	0.14	0.14	0.15	0.16	0.17
Vegetable oils and oilseeds (oil equivalent)	0.32	0.41	0.53	0.65	0.63	0.64	0.64	0.72	0.64	0.67
Tobacco	0.09	0.12	0.15	0.15	0.14	0.16	0.17	0.14	0.12	0.17
Cotton (lint)	0.56	0.66	0.75	1.03	0.95	1.00	1.02	1.05	1.15	1.14
Milk (total)	9.70	10.45	10.89	12.51	12.31	12.73	12.58	12.41	12.52	12.55
Meat [4]	0.65	0.74	0.95	1.12	1.04	1.06	1.16	1.17	1.18	1.19
	Indices, average 1952/53-1956/57 = 100									
Index of all farm products	73	85	104	123	118	121	122	123	131	134
	Million cubic meters									
Industrial roundwood	...	1.4	[5] 6.0	7.6	7.9	7.6	7.7	7.4	7.6	7.5
Sawn wood	...	0.40	[5] 0.85	1.00	0.91	0.98	1.07	1.08	0.98	0.98

[1] Paddy converted at 65 percent. - [2] Wheat, barley, oats, maize, millet, sorghum, rice (milled equivalent), rye, mixed grain. - [3] Dry beans, dry peas, broad beans, chick-peas, lentils. - [4] Beef and veal, mutton and lamb, pork. - [5] Average 1954-57.

ANNEX TABLE 10B. - NEAR EAST: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS	*Million metric tons*									
Wheat and wheat flour (wheat equivalent) ..	0.24	0.27	0.66	0.23	0.27	0.45	0.08	0.06	0.30	0.32
Barley	0.38	0.46	0.73	0.35	0.58	0.26	0.02	0.13	0.76	0.52
Rice (milled equivalent)	0.15	0.27	0.21	0.25	0.41	0.08	0.33	0.27	0.16	0.26
Total grains [1]	0.93	1.09	1.72	0.96	1.34	0.91	0.65	0.58	1.31	1.19
Citrus fruit [2]	0.30	0.20	0.33	0.45	0.39	0.46	0.51	0.40	0.48	0.59
Tobacco	0.04	0.07	0.07	0.08	0.06	0.07	0.06	0.09	0.10	0.10
Cotton (lint)	0.47	0.47	0.56	0.67	0.54	0.76	0.72	0.66	0.67	0.72
GROSS IMPORTS										
Wheat and wheat flour (wheat equivalent) ..	0.28	1.42	1.66	3.48	2.29	2.91	3.90	4.35	3.95	3.75
Total grains [1]	0.47	1.77	2.12	4.51	2.98	3.91	4.97	5.49	5.19	5.05
Sugar (raw equivalent)	0.35	0.55	0.84	1.24	1.05	1.13	1.17	1.50	1.37	1.34
	Million cubic meters									
Sawn softwood	...	0.38	[3] 0.62	0.66	0.53	0.71	0.76	0.58	0.72	0.65
	Million metric tons									
All paper and paperboard	...	0.05	[3] 0.11	0.16	0.14	0.16	0.17	0.16	0.17	0.17

[1] Wheat and wheat flour, barley, maize, oats, sorghum, millet, rice (milled). - [2] Oranges and lemons only. - [3] Average 1954-57.

ANNEX TABLE 11A. - AFRICA: PRODUCTION OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958/59	1959/60	1960/61	1961/62	1962/63	1963/64 (Preliminary)
FARM PRODUCTS	*Million metric tons*									
Wheat	2.66	3.16	4.00	3.67	3.88	3.70	4.06	2.72	3.98	4.62
Barley	2.60	3.19	3.29	2.56	3.23	2.60	2.94	1.37	2.66	2.93
Maize	4.62	7.24	9.02	11.25	9.72	9.81	11.62	12.30	12.81	12.00
Millet and sorghum	9.31	10.66	11.66	11.19	12.16	12.83	13.05	13.15	13.81	14.13
Rice (milled equivalent) [1]	1.11	1.55	1.76	1.95	1.89	1.86	2.02	1.91	2.08	2.15
Sugar (centrifugal)	0.95	1.36	1.84	2.36	2.23	2.34	2.04	2.52	2.66	2.98
Starchy roots	35.40	47.68	52.38	55.60	54.00	56.71	55.96	56.01	55.31	56.00
Pulses [2]	1.02	1.51	1.56	1.50	1.48	1.54	1.54	1.40	1.54	1.51
Citrus fruit	0.38	0.78	1.09	1.43	1.30	1.31	1.58	1.53	1.43	1.47
Bananas	0.30	0.66	0.86	0.93	0.88	0.93	0.91	0.95	0.96	1.00
Groundnuts (oil equivalent)	0.56	0.72	0.95	1.13	1.01	1.00	1.14	1.20	1.30	1.22
Vegetable oils and oilseeds (oil equivalent)	1.73	2.20	2.61	2.82	2.82	2.67	2.90	2.80	2.89	2.85
Coffee	0.14	0.28	0.46	0.75	0.61	0.66	0.81	0.70	0.96	0.96
Cocoa	0.49	0.50	0.51	0.75	0.57	0.66	0.87	0.83	0.86	0.87
Wine	2.14	1.72	2.30	2.27	2.04	2.62	2.26	2.25	2.19	2.19
Cotton (lint)	0.14	0.23	0.28	0.30	0.31	0.32	0.33	0.24	0.31	0.32
Sisal	0.16	0.23	0.30	0.37	0.35	0.36	0.38	0.37	0.39	0.41
Milk total	6.82	9.96	10.99	11.89	11.52	11.66	11.99	12.15	12.15	12.16
Meat [3]	1.52	1.87	2.05	2.25	2.15	2.19	2.23	2.36	2.33	2.35
	Indices, average 1952/53-1956/57 = 100									
Index of all farm products	67	88	102	114	109	111	117	113	120	122

	Average 1948-52	Average 1954-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
FOREST PRODUCTS	*Million cubic meters*								
Fuelwood	88.8	141.2	163.7	155.9	160.1	164.4	170.5	167.7	168.0
Industrial roundwood	7.4	13.8	18.5	16.5	17.7	18.6	19.5	20.0	21.0
Sawn softwood	0.45	0.52	0.75	0.56	0.58	0.68	0.95	0.96	1.03
Sawn hardwood	0.85	1.35	1.61	1.52	1.56	1.58	1.72	1.66	1.73
Plywood	0.04	0.10	0.13	0.12	0.12	0.13	0.12	0.14	0.15

[1] Paddy converted at 65 percent. - [2] Dry beans, dry peas, broad beans, chick-peas, lentils. - [3] Beef and veal, mutton and lamb, pork.

ANNEX TABLE 11B. - AFRICA: EXPORTS AND IMPORTS OF MAJOR COMMODITIES

	Prewar average	Average 1948-52	Average 1953-57	Average 1958-62	1958	1959	1960	1961	1962	1963 (Preliminary)
GROSS EXPORTS				*Million metric tons*						
Wheat and wheat flour (wheat equivalent) [1]	0.57	0.31	0.43	0.25	0.36	0.26	0.34	0.12	0.16	0.20
Barley	0.21	0.55	0.44	0.14	0.25	0.25	0.16	0.04	0.01	0.30
Maize	0.66	0.36	0.95	1.50	1.56	0.83	0.87	1.54	2.68	2.92
Sugar (raw equivalent)	0.68	0.71	1.02	1.19	1.18	1.12	0.98	1.20	1.45	1.67
Oranges	0.15	0.39	0.59	0.79	0.69	0.73	0.88	0.82	0.86	0.85
Bananas	0.14	0.22	0.36	0.40	0.39	0.37	0.38	0.43	0.45	0.45
Groundnuts and groundnut oil (oil equivalent)	0.34	0.32	0.51	0.65	0.67	0.63	0.55	0.69	0.70	0.73
Palm kernels and palm kernel oil (oil equivalent)	0.30	0.34	0.36	0.36	0.39	0.38	0.36	0.36	0.33	0.32
Palm oil	0.24	0.33	0.37	0.37	0.37	0.39	0.39	0.36	0.32	0.31
Coffee	0.13	0.28	0.43	0.64	0.54	0.59	0.65	0.67	0.75	0.80
Cocoa beans	0.46	0.48	0.51	0.66	0.44	0.56	0.64	0.81	0.86	0.80
Wine	1.40	1.13	1.63	1.65	1.52	1.63	1.74	1.61	1.76	1.00
Tobacco	0.03	0.06	0.08	0.10	0.08	0.09	0.11	0.11	0.12	0.12
Cotton (lint)	0.13	0.19	0.24	0.26	0.27	0.29	0.27	0.27	0.19	0.25
Sisal	0.16	0.22	0.29	0.37	0.34	0.36	0.37	0.36	0.40	0.40
				Million cubic meters						
Broadleaved logs [2]	...	1.19	[3] 2.32	3.90	2.86	3.74	4.39	4.25	4.28	4.85
Sawn hardwood	...	0.17	[3] 0.38	0.58	0.56	0.56	0.60	0.60	0.60	0.63
				Million metric tons						
GROSS IMPORTS										
Wheat and wheat flour (wheat equivalent)	0.28	0.75	0.87	1.63	0.79	1.65	1.74	2.07	1.90	1.73
Rice (milled equivalent)	0.39	0.18	0.33	0.49	0.38	0.53	0.51	0.49	0.55	0.57
Sugar (raw equivalent)	0.41	0 55	0.90	1.10	1.01	1.08	1.12	1.16	1.11	1.08
				Million cubic meters						
Sawn softwood	...	1.47	[3] 1.39	1.29	1.43	1.19	1.28	1.36	1.21	1.25
Sawn hardwood	...	0.25	[3] 0.47	0.46	0.51	0.42	0.55	0.48	0.35	0.40
				Million metric tons						
All paper and paperboard	...	0.29	[3] 0.36	0.47	0.45	0.43	0.50	0.51	0.48	0.48

[1] Including coarse ground flour. - [2] Sawlogs, veneer and logs for sleepers. - [3] Average 1954-57.

ANNEX TABLE 12. - TOTAL CATCH (LIVE WEIGHT) OF FISH, CRUSTACEANS, AND MOLLUSKS IN SELECTED COUNTRIES [1]

	1938	1948	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)	Average 1958-62	
	Thousand metric tons											%	*Thousand metric tons*
WORLD TOTAL	20 840.0	19 410.0	28 570.0	30 160.0	31 140.0	32 460.0	35 930.0	38 230.0	41 830.0	44 850.0	46 000.0	100	38 660.0
A. 1962 catch: 1 000 000 tons and more												64.7	25 030.3
Peru	...	47.7	213.3	297.3	483.1	930.2	2 152.4	3 531.4	5 243.1	6 961.9	6 900.0	9.7	3 763.8
Japan	3 562.0	2 431.4	4 912.8	4 762.6	5 407.3	5 504.7	5 884.1	6 192.7	6 710.5	6 863.7	6 697.6	16.1	6 231.1
China (Mainland)	...	...	2 518.0	2 648.0	3 120.0	4 060.0	5 020.0	...	...	...	...	12.5	4 828.0
U.S.S.R.	1 523.0	1 485.0	2 495.0	2 616.0	2 531.0	2 621.0	2 756.0	3 051.0	3 250.0	3 620.0	...	7.9	3 059.6
United States	2 260.1	2 416.6	2 790.4	2 989.4	2 759.8	2 708.6	2 890.8	2 814.7	2 931.9	2 972.8	2 702.8	7.4	2 850.2
Norway	1 152.5	1 504.0	1 813.4	2 187.3	1 745.8	1 434.5	1 575.2	1 543.0	1 509.4	1 338.0	...	3.8	1 480.0
Canada	836.8	1 052.9	965.0	1 105.5	997.1	1 007.6	1 054.4	934.5	1 019.6	1 115.1	...	2.7	1 026.2
South Africa and South West Africa	66.7	185.9	607.1	536.4	583.6	655.7	741.6	867.6	1 010.3	1 062.7	1 132.0	2.2	867.6
Spain (incl. Ceuta and Melilla)	423.5	547.2	770.3	761.6	777.2	844.9	855.8	898.0	1 014.5	1 006.0	1 086.0	2.4	923.8
B. 1962 catch: 500 000 tons and more, but less than 1 000 000 tons												17.6	6 788.1
India	...	...	839.0	1 012.3	1 233.0	1 064.6	823.2	1 161.4	961.0	973.9	...	2.6	996.8
United Kingdom	1 198.1	1 206.1	1 100.4	1 050.4	1 014.7	999.0	988.9	923.8	902.7	944.4	...	2.5	951.8
Indonesia	472.0	...	669.8	713.9	728.0	687.0	754.1	756.7	906.8	943.0	...	2.1	809.5
Denmark and Faeroe Islands	160.1	318.2	530.9	579.3	638.9	704.8	760.9	690.6	771.0	928.4	985.0	2.0	771.1
Iceland	327.2	478.1	480.3	517.3	502.7	580.4	640.8	592.8	710.0	832.6	773.6	1.7	671.3
France	530.3	437.5	496.5	515.5	492.3	500.9	555.8	570.7	567.7	672.3	...	1.5	573.5
Chile	32.2	64.6	214.3	188.3	213.1	225.8	272.6	339.6	429.8	638.6	762.8	1.0	381.3
Germany, Fed. Rep.	776.5	408.7	814.8	800.6	791.7	743.1	768.0	674.0	618.9	632.7	650.3	1.8	687.3
Portugal	247.2	292.1	424.7	472.2	470.3	455.5	427.8	475.1	500.7	518.0	...	1.2	475.4
Philippines	80.9	195.1	385.2	416.0	407.5	447.3	457.5	465.5	475.7	504.7	564.9	1.2	470.1
C. 1962 catch: 100 000 tons and more, but less than 500 000 tons												12.6	4 860.2
Korea, Rep. of	844.2	293.8	265.9	346.6	409.3	403.3	392.1	357.2	424.5	467.6	443.8	1.1	408.9
Brazil	103.3	144.8	190.3	208.0	212.2	211.9	239.1	251.0	275.1	379.4	...	0.7	271.3
Burma	...	...	...	360.0	360.0	360.0	360.0	360.0	360.0	360.0	...	0.9	360.0
Thailand	161.0	161.0	213.0	217.9	234.5	196.3	204.7	220.9	305.6	339.7	...	0.7	253.4
Pakistan	...	...	270.9	277.0	282.8	283.7	290.1	304.5	319.1	330.5	345.0	0.8	305.6
China (Taiwan)	89.5	83.5	180.3	193.2	208.0	229.7	246.3	259.1	312.4	327.0	350.7	0.7	274.9
Netherlands	256.2	294.1	319.5	298.1	300.8	313.8	319.6	314.7	346.1	321.9	361.0	0.8	323.2
Korea, North	925.2	...	312.0	...	291.5	...	...	...	...	...	...	0.8	300.0
Sweden	129.2	193.9	219.5	197.4	222.1	238.0	268.0	254.3	267.3	290.9	339.8	0.7	263.7
Angola	26.2	113.2	290.4	420.5	395.5	278.2	267.4	252.0	241.5	269.3	...	0.7	261.7
Viet-Nam, Rep. of	180.0	...	120.0	130.0	135.0	143.0	153.5	240.0	250.0	255.0	332.0	0.5	208.3
Italy	181.2	156.6	218.0	219.6	212.3	211.0	214.9	213.3	239.6	220.7	231.6	0.6	219.9
Mexico	17.1	68.4	105.8	144.8	117.5	163.9	192.4	197.9	225.4	218.6	...	0.5	199.6
Malaysia: Malaya	...	139.0	136.8	138.5	138.3	139.5	145.9	167.1	178.4	198.4	...	0.4	165.9
Poland	12.5	47.1	126.9	139.3	138.8	145.1	162.2	183.9	185.5	179.6	226.7	0.4	171.3
Morocco	43.7	68.6	94.3	108.2	145.1	161.7	144.4	154.1	164.9	162.9	178.7	0.4	157.6
Congo (Leopoldville)	0.9	17.5	86.1	96.2	122.4	136.6	153.4	...	...	...	...	0.4	145.0
Cambodia	...	...	150.0	150.0	...	...	...	...	...	145.8	...	0.4	145.8
Senegal	...	...	...	...	75.6	85.9	99.8	122.1	126.9	133.4	...	0.3	113.6
Germany, Eastern	...	...	68.6	74.9	96.5	93.2	105.6	114.4	130.1	...	...	0.3	117.7
United Arab Republic	38.1	42.8	63.4	70.3	75.2	80.0	85.6	88.5	92.0	118.0	...	0.2	92.8
Muscat and Oman	...	...	...	...	...	...	...	...	...	...	...	0.3	100.0

ANNEX TABLE 12. - TOTAL CATCH (LIVE WEIGHT) OF FISH, CRUSTACEANS, AND MOLLUSKS IN SELECTED COUNTRIES [1] (*concluded*)

	1938	1948	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Prelim-inary)	Average 1958-62	
	Thousand metric tons											%	*Thousand metric tons*
D. 1962 catch: 50 000 tons and more, but less than 100 000 tons												2.2	852.4
Venezuela	21.7	92.3	69.6	61.3	83.7	78.3	83.3	84.7	83.7	94.9	97.2	0.2	85.0
Argentina	55.3	71.2	79.0	75.4	81.6	82.4	88.7	101.0	93.8	94.1	124.0	0.2	92.0
Ceylon	...	24.0	31.3	40.3	38.5	40.7	48.3	57.8	74.0	83.9	92.6	0.2	60.9
Turkey	76.0	...	111.5	139.5	116.7	101.3	96.7	89.4	82.3	...	...	0.2	92.4
Greece	25.0	33.6	60.0	65.0	75.0	80.0	82.0	...	...	...	...	0.2	81.0
Hong Kong	...	34.3	57.5	57.2	67.2	69.5	67.0	62.3	63.6	70.8	75.1	0.2	66.6
Australia	33.5	38.9	52.5	49.9	55.3	54.3	58.8	61.0	61.1	66.0	...	0.2	60.2
Finland	44.4	46.1	63.3	60.2	64.5	61.5	67.4	66.0	67.1	64.7	...	0.2	65.3
Uganda	...	11.0	34.9	45.7	57.4	53.4	55.6	62.6	61.2	64.5	69.6	0.2	59.5
Tanganyika	16.0	22.0	52.4	55.0	55.0	55.0	60.0	60.0	60.7	60.2	74.0	0.2	59.2
Belgium	42.8	71.1	80.0	69.1	62.9	64.3	57.5	63.7	61.7	59.9	...	0.2	61.4
Aden	...	20.0	34.8	21.8	22.6	21.5	24.4	22.3	47.4	53.8	55.4	0.1	33.9
Colombia	10.0	15.0	18.0	21.2	30.1	25.0	21.1	29.7	47.5	51.7	47.4	0.1	35.0
E. 1962 catch: less than 50 000 tons												1.1	441.0
Ecuador	1.8	3.4	15.0	21.8	26.4	31.1	35.9	44.3	40.4	44.5	52.2	0.1	39.2
Greenland	4.7	21.0	25.8	25.8	30.8	32.0	33.2	34.6	41.8	43.3	33.3	0.1	37.0
Ghana	...	20.0	25.3	26.3	28.4	30.9	36.0	31.8	34.5	42.4	...	0.1	35.1
New Zealand	27.0	35.7	39.2	38.4	39.0	39.3	41.5	44.3	43.1	41.3	...	0.1	41.9
Cuba	10.0	8.3	12.8	15.6	22.0	21.9	28.2	31.2	31.1	35.9	...	0.1	29.7
Yugoslavia	16.8	21.2	22.6	28.4	30.7	31.4	29.4	30.9	37.3	30.3	34.4	0.1	31.9
Ireland	12.8	25.8	23.6	30.5	36.6	37.5	38.6	42.8	32.2	29.0	27.6	0.1	36.0
Algeria	...	30.0	26.2	27.3	22.2	18.8	22.5	25.6	...	...	...	0.1	22.3
Hungary	...	...	...	...	12.3	13.0	14.4	14.9	19.3	21.0	21.0	—	16.5
Sudan	8.8	11.4	13.6	13.5	9.9	19.2	16.2	16.5	17.3	18.6	...	—	17.6
Kenya	...	...	...	...	25.5	22.0	22.6	12.6	13.5	18.4	20.1	—	17.8
Ryukyu Islands	12.0	7.7	13.6	13.7	13.1	16.6	21.4	14.4	16.0	17.8	17.4	—	17.2
Israel	1.7	2.5	10.7	10.3	11.6	12.6	13.2	13.8	14.9	16.4	17.5	—	14.2
Tunisia	9.6	12.2	10.8	11.9	14.0	15.2	14.8	16.3	...	...	...	—	15.4
Ethiopia	...	...	6.2	11.0	13.5	27.9	34.7	19.1	17.2	14.0	...	0.1	22.6
Malaysia: Singapore	1.5	2.3	6.2	9.6	13.8	12.3	11.5	9.2	9.7	11.5	...	—	10.8
Bulgaria	...	...	4.5	5.7	5.1	6.1	6.1	8.7	8.1	9.6	7.5	—	7.7
St. Pierre and Miquelon	1.9	2.2	6.8	9.3	7.9	8.3	9.4	10.3	13.6	8.0	...	—	9.9
Rwanda and Burundi	...	2.3	5.6	5.4	9.7	11.5	11.0	9.2	5.3	7.2	10.6	—	8.8
Uruguay	3.6	3.5	4.9	5.4	6.9	5.4	5.9	8.0	8.8	5.9	3.4	—	6.8
Malta and Gozo	1.1	1.5	0.8	0.8	1.0	1.1	1.1	1.2	1.3	1.3	...	—	1.2
Mauritius	2.0	1.6	1.7	1.7	1.7	1.6	1.3	1.4	1.5	1.2	1.4	—	1.4
F. 1962 catch: less than 50 000 tons												1.8	688.0
120 countries not specified [2]	...	...	...	...	...	...	...	...	...	...	...	1.8	688.0

[1] Countries arranged in order of 1962 catch. - [2] These countries do not publish regular annual fish catch statistics.

ANNEX TABLE 13. - UNITED STATES COMMODITY CREDIT CORPORATION: QUANTITY AND VALUE OF INVESTMENT [1]

	Quantity (30 April)											Value (30 April)										
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1954	1955	1956	1957	1958	1959	1960	1961 [2]	1962	1963	1964
	Thousand metric tons											*Million dollars*										
Wheat	24 208	28 156	29 073	24 453	24 174	33 937	35 512	37 888	34 209	34 057	26 815	2 155	2 633	2 795	2 411	2 402	3 105	3 253	3 389	(7 772)	2 459	2 499	1 987
Rice	58	763	1 322	804	732	535	455	240	34	73	96	6	98	232	107	104	81	65	27	(26)	5	9	11
Barley	622	2 044	1 987	1 774	2 698	3 242	3 383	2 184	1 344	1 468	1 235	34	107	92	87	114	155	113	100	(85)	52	56	48
Oats	589	1 052	1 222	650	732	1 376	646	598	557	688	1 026	32	58	60	32	32	57	27	24	(21)	21	26	40
Maize	20 568	22 255	29 192	34 801	37 211	39 206	45 291	45 012	43 587	40 036	39 167	1 296	1 437	1 926	2 289	2 414	2 486	2 786	3 091	(2 688)	1 952	1 818	1 766
Grain sorghum	1 029	2 927	2 887	2 040	8 295	13 498	14 964	18 784	19 070	18 618	17 667	60	167	128	105	393	706	833	1 048	(797)	810	800	765
Butter	165	149	34	16	45	20	27	40	144	176	80	245	212	44	21	60	26	35	54	(53)	191	227	103
Cheese	164	176	139	87	74	5	4	—	38	30	10	146	156	111	73	62	4	3	–	–	32	25	8
Dried milk	298	101	81	65	70	59	108	117	217	311	147	109	38	30	24	26	20	34	37	(35)	80	102	48
Soybeans	101	876	270	1 223	1 746	3 255	1 598	89	2 565	1 567	1 588	10	70	20	95	131	247	114	6	(6)	214	129	130
Linseed	382	201	41	351	59	279	18	6	5	141	346	56	25	5	42	7	31	2	1	(1)	1	16	39
Linseed oil	31	27	26	—	—	—	14	—	—	—	–	13	14	9	–	–	–	4	–	–	–	–	–
Cottonseed oil	469	170	5	—	—	27	—	—	—	4	5	185	64	2	–	–	7	–	–	–	–	1	1
Cotton linters	279	318	141	20	—	—	—	—	—	—	–	58	67	31	5	–	–	–	–	–	–	–	–
Cotton, upland	1 674	1 817	2 839	2 056	973	1 628	1 179	565	1 203	2 214	2 579	1 268	1 439	2 268	1 580	642	1 260	947	431	(410)	894	1 600	1 842
Wool	55	70	54	24	—	—	—	—	—	—	–	81	103	82	35	–	–	–	–	–	–	–	–
Tobacco	281	366	402	451	427	414	317	280	211	285	432	270	406	535	609	590	594	441	393	(393)	321	461	679
Other commodities												165	167	263	301	274	154	176	147	(141)	152	191	160
TOTAL												6 189	7 261	8 633	7 816	7 251	8 933	8 833	8 748	(7 428)	7 184	7 960	7 627
												Percentage										
Change from previous year												+ 97	+ 17	+ 19	— 9	— 7	+ 23	— 1	— 1		— 3	+ 11	— 4

SOURCE: United States Department of Agriculture, Commodity Credit Corporation. *Report of financial conditions and operations, 30 April 1955 - 30 April 1964.*

[1] Stocks pledged for outstanding loans and stocks in price support inventory. - [2] Figures in brackets, revised in accordance with the change in accounting policy adopted by the CCC as of 30 June 1961, are for comparison with 1962-64.

ANNEX TABLE 14A. - FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES

	Period	Cereals [1]	Starchy roots [2]	Sugar [3]	Pulses and nuts [4]	Vege-tables [5]	Meat [6]	Eggs [7]	Fish [8]	Milk [9]		Fats (fat content)
										Fat	Protein	
		Kilograms per caput per year										
WESTERN EUROPE												
Austria	1957/58–1959/60	114	92	34	3	65	52	10	3	7	8	18
	1960/61–1962/63	104	84	37	4	62	60	12	4	7	7	18
	1962/63	102	80	38	4	55	62	12	4	7	7	18
Belgium-Luxembourg	1957/58–1959/60	92	144	32	4	69	58	15	6	5	7	21
	1960/61–1962/63	88	122	31	4	73	60	13	5	5	6	27
	1962/63	81	123	28	4	76	64	12	5	5	6	30
Denmark	1957/58–1959/60	82	128	46	4	66	65	9	15	9	8	28
	1961/62	80	118	46	6	65	69	11	16	9	9	28
Finland	1957/58–1959/60	114	98	40	2	21	32	6	11	12	12	18
	1961/62	110	111	39	2	17	35	8	12	12	12	20
France	1957/58–1959/60	106	107	30	6	127	74	11	6	6	7	17
	1960/61	99	104	29	7	105	74	11	...	6	7	...
Germany, Federal Republic	1957/58–1959/60	88	143	28	3	46	54	12	7	6	7	25
	1960/61–1962/63	80	131	30	4	49	59	13	7	6	7	26
	1962/63	78	128	30	4	47	61	13	7	6	7	26
Greece	1957–59	168	44	12	14	118	22	6	8	5	5	18
	1960–62	159	39	13	13	121	26	6	9	5	5	18
	1962	155	41	14	11	118	27	6	10	5	5	19
Ireland	1957–59	117	142	45	2	63	58	18	4	8	9	19
	1960–62	106	141	48	3	65	64	16	4	8	9	19
Italy	1957/58–1959/60	138	49	19	11	128	25	8	5	4	4	15
	1960/61–1962/63	134	53	23	9	141	30	9	5	4	4	18
	1962–63	134	52	[2] 4	8	140	31	9	5	4	4	17
Netherlands	1957/58–1959/60	85	91	40	4	66	44	12	4	8	9	25
	1960/61–1962/63	82	98	42	4	70	48	12	5	8	9	28
	1962/63	83	96	42	4	69	50	12	4	8	9	28
Norway	1957/58–1959/60	84	104	38	3	36	38	8	18	12	9	25
	1960/61–1962/63	78	98	39	4	36	39	9	20	11	8	24
	1962/63	77	95	39	4	33	39	9	20	11	8	25
Portugal	1957–59	122	103	17	9	105	18	3	20	1	1	16
	1960–62	126	99	19	9	106	19	4	20	1	1	16
	1962	130	88	19	8	105	20	4	21	2	1	17
Spain	1957/58–1959/60	112	115	15	16	114	16	5	11	2	3	18
	1961/62	111	125	18	17	134	21	8	11	2	3	20
Sweden	1957/58–1959/60	74	92	41	3	25	50	12	18	10	9	21
	1960/61–1962/63	72	84	41	3	30	51	12	20	10	9	23
	1962/63	72	84	41	4	31	52	12	21	10	9	23
Switzerland	1957/58–1959/60	97	73	39	8	76	55	10	3	10	10	19
	1960/61–1962/63	100	67	42	8	75	60	10	4	10	9	20
	1962/63	101	66	41	9	76	63	10	4	10	9	21
United Kingdom	1957/58–1959/60	84	95	49	6	60	71	15	10	7	7	22
	1960/61–1962/63	81	98	48	6	58	75	15	10	8	8	23
	1962/63	81	94	47	6	56	77	15	10	7	8	23
Yugoslavia	1957–59	187	67	14	10	50	24	3	2	4	5	10
	1960–62	184	67	17	11	55	29	3	1	3	4	11
	1962	185	64	18	11	55	28	3	1	3	4	10

ANNEX TABLE 14A. - FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*continued*)

	Period	Cereals [1]	Starchy roots [2]	Sugar [3]	Pulses and nuts [4]	Vege-tables [5]	Meat [6]	Eggs [7]	Fish [8]	Milk [9]		Fats (fat content)
										Fat	Protein	
		Kilograms per caput per year										
NORTH AMERICA												
Canada	1957/58–1959/60	70	66	44	5	77	78	17	7	8	9	19
	1960/61–1962/63	67	66	45	5	76	74	16	8	8	9	19
	1962/63	63	59	46	6	81	78	15	8	8	9	20
United States	1957–59	67	48	42	7	96	92	20	5	9	9	21
	1960–62	66	47	41	7	94	96	19	5	8	9	21
	1962	65	47	41	7	96	97	19	5	8	8	21
LATIN AMERICA												
Argentina	1957–59	116	70	34	2	44	109	7	2	4	4	16
	1961	89	106	36	3	50	103	9	2	4	4	15
Brazil	1957–59	96	145	38	25	7	30	3	2	2	2	7
	1961	105	160	41	27	7	27	3	3	2	2	7
Chile	1957–59	127	79	23	8	72	33	3	11	3	4	10
	1961	118	77	...	9	81	35	3	9	3	3	9
Colombia	1957–59	66	[10] 114	48	6	13	38	3	1	2	2	5
	1961	70	[10] 116	51	7	14	33	3	2	2	2	5
Ecuador	1957–59	70	[10] 121	20	9	25	14	4	3	3	3	5
	1961	75	[10] 133	26	9	31	14	4	5	3	3	5
Honduras	1962	132	11	22	11	...	13	4	1	1	3	6
Mexico	1957–59	122	[10] 14	32	21	24	22	6	2	3	3	9
	1961	136	[10] 17	30	23	...	23	6	3	4	4	11
Paraguay	1957–59	75	267	16	15	36	...	1	—	3	2	4
	1961	68	257	17	13	...	44	1	—	2	2	5
Peru	1957–59	83	136	23	9	80	17	1	5	1	1	8
	1961	100	147	24	9	77	17	1	8	1	1	7
Surinam	1959–61	110	[10] 29	28	9	13	9	3	12	1	2	10
Uruguay	1957–59	92	65	32	2	48	111	7	1	6	6	21
	1961	90	70	33	4	39	101	7	2	7	7	17
Venezuela	1957–59	83	[10] 88	33	16	13	24	4	8	3	3	8
	1961	96	[10] 111	34	12	15	26	3	6	3	3	10
FAR EAST												
Ceylon	1957–59	126	22	18	30	43	3	1	6	1	1	4
	1960–62	127	34	19	30	42	2	1	6	1	1	4
	1962	119	32	18	29	43	2	1	6	1	1	4
China: Taiwan	1957–59	156	72	9	[11] 10	60	18	2	11	—	—	4
	1960–62	160	64	9	[11] 10	58	16	2	13	—	—	5
	1962	157	58	9	[11] 10	56	16	2	14	—	—	4
India	1957/58–1959/60	131	11	14	23	...	2	—	1	[12] 3	[12] 2	[13] 4
	1961/62	139	11	18	22	...	2	—	1	[12] 3	[12] 2	[13] 4
Japan	1957–59	154	67	13	[14] 17	75	6	4	25	1	1	3
	1960–62	149	69	16	[14] 18	90	8	6	27	1	1	5
	1962	149	68	17	[14] 16	97	9	7	27	1	1	5
Pakistan	1957/58–1959/60	153	4	15	7	18	4	—	2	[12] 2	[12] 2	[13] 3
	1961/62	155	4	13	5	16	4	—	2	[12] 2	[12] 2	[13] 4
Philippines [15]	1957–59	115	43	12	4	31	16	3	10	—	—	2
	1960–62	116	42	13	7	29	15	3	11	—	—	3
	1962	114	40	15	7	29	14	3	10	—	—	3

ANNEX TABLE 14A. - FOOD SUPPLIES AVAILABLE FOR HUMAN CONSUMPTION IN SELECTED COUNTRIES (*concluded*)

	Period	Cereals [1]	Starchy roots [2]	Sugar [3]	Pulses and nuts [4]	Vege-tables [5]	Meat [6]	Eggs [7]	Fish [8]	Milk [9]		Fats (fat content)
										Fat	Protein	
		Kilograms per caput per year										
NEAR EAST												
Israel	1957/58–1959/60	123	41	29	7	117	30	19	7	4	5	16
	1961/62	117	36	32	8	110	41	20	7	4	5	18
Jordan	1957–59	124	12	21	12	87	8	1	1	2	2	7
	1960–62	113	11	22	8	168	10	2	1	1	1	9
	1962	96	9	26	9	152	10	3	1	1	1	5
Lebanon	1960/61	122	15	19	12	100	14	2	2	2	3	12
Syria	1957	162	10	11	11	59	12	1	1	1	4	6
Turkey	1957/58–1959/60	200	40	9	14	78	13	2	2	3	3	8
	1960/61	223	38	17	13	105	14	2	2	4	4	8
United Arab Republic	1957/58–1959/60	184	9	12	10	80	13	1	5	[11] 3	[12] 2	[12] 5
	1961/62	198	10	10	8	91	12	1	5	[11] 3	[12] 2	[12] 4
AFRICA												
Libya	1959	115	17	28	7	57	10	2	1	2	2	8
Mauritius	1957–59	131	16	37	11	29	5	1	6	1	2	10
	1960–62	130	13	38	11	32	6	2	6	2	2	12
	1962	136	12	38	12	44	6	2	6	2	2	12
South Africa	1957–59	145	17	45	4	37	44	3	7	3	3	6
	1960/61	166	14	41	4	36	44	3	9	3	3	5
Southern Rhodesia	1951–53	184	12	13	14	26	30	1	2	1	1	2
	1953	201	10	12	16	26	29	1	2	1	1	2
OCEANIA												
Australia	1957/58–1959/60	86	53	51	4	63	115	11	5	7	7	16
	1961/62	84	44	50	4	64	109	12	5	7	7	14
New Zealand	1957–59	86	57	42	3	69	106	15	7	11	10	20
	1960–62	86	59	41	4	77	110	19	7	11	11	20
	1962	86	62	40	4	86	113	21	6	11	11	20

[1] In terms of flour and milled rice. - [2] Including sweet potatoes, cassava, and other starchy roots. - [3] In terms of refined sugar; raw sugar included on the basis of its calorie content; excluding syrup and honey. - [4] Shelled equivalent of nuts: including cocoa beans. - [5] In terms of fresh equivalent but including also minor quantities of processed vegetables in terms of product weight. - [6] Including poultry, offal, and game; expressed in terms of carcass weight, excluding slaughter fats. - [7] Fresh egg equivalent. - [8] Estimated edible weight. - [9] Milk and milk products, excluding butter, expressed in terms of fat and proteins. - [10] Including plantains. - [11] Including soybean curd in terms of soybeans. - [12] Including milk for butter-making. - [13] Excluding butter. - [14] Including "miso" and "shoyu" (soybean preparations) in terms of soybeans. - [15] Series subject to revision.

ANNEX TABLE 14B. - CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES IN SELECTED COUNTRIES

	Period	Calories	Total protein (grams)	Animal protein (grams)
		Per caput per day		
WESTERN EUROPE				
Austria	1957/58–1959/60	2 980	87	45
	1960/61–1962/63	2 970	87	48
	1962/63	2 970	86	48
Belgium-Luxembourg	1957/58–1959/60	2 930	88	47
	1960/61–1962/63	2 950	85	45
	1962/63	2 950	83	46
Denmark	1957/58–1959/60	3 360	91	55
	1961/62	3 370	94	58
Finland	1957/58–1959/60	3 110	94	53
	1961/62	3 140	95	55
France	1957/58–1959/60	2 940	98	52
	1960/61	...	...	...
Germany, Federal Republic	1957/58–1959/60	2 940	79	46
	1960/61–1962/63	2 960	80	48
	1962/63	2 950	80	49
Greece	1957–59	2 990	96	27
	1960–62	2 940	95	31
	1962	2 910	94	32
Ireland	1957–59	3 420	91	51
	1960–62	3 450	91	55
	1962	3 430	90	55
Italy	1957/58–1959/60	2 630	77	26
	1960/61–1962/63	2 740	79	30
	1962/63	2 750	79	30
Netherlands	1957/58–1959/60	2 950	79	44
	1960/61–1962/63	3 020	81	46
	1962/63	3 020	81	46
Norway	1957/58–1959/60	3 010	84	49
	1960/61–1962/63	2 940	81	49
	1962/63	2 930	80	48
Portugal	1957–59	2 470	72	27
	1960–62	2 560	72	27
	1962	2 610	72	27
Spain	1957/58–1959/60	2 590	71	20
	1961/62	2 790	76	22
Sweden	1957/58–1959/60	2 930	81	52
	1960/61–1962/63	2 980	83	55
	1962/63	2 990	84	56
Switzerland	1957/58–1959/60	3 120	90	51
	1960/61–1962/63	3 250	91	51
	1962/63	3 280	91	52
United Kingdom	1957/58–1959/60	3 280	86	51
	1960/61–1962/63	3 270	89	53
	1962/63	3 270	90	54
Yugoslavia	1957–59	2 920	96	26
	1960–62	2 980	97	25
	1962	2 940	99	24

ANNEX TABLE 14B. - CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES IN SELECTED COUNTRIES (*continued*)

	Period	Calories	Total protein (grams)	Animal protein (grams)
		Per caput per day		
NORTH AMERICA				
Canada	1957/58–1959/60	3 110	95	63
	1960/61–1962/63	3 090	95	64
	1962/63	3 060	92	64
United States	1957–59	3 100	92	65
	1960–62	3 100	92	65
	1962	3 090	91	65
LATIN AMERICA				
Argentina	1957–59	3 090	98	57
	1961	2 860	84	54
Brazil	1957–59	2 580	61	19
	1961	2 790	65	18
Chile	1957–59	2 440	80	29
	1961	2 420	77	28
Colombia	1957–59	2 010	46	22
	1961	2 070	46	20
Ecuador	1957–59	1 780	45	15
	1961	1 970	50	16
Honduras	1962	2 340	58	15
Mexico	1957–59	2 410	67	20
	1961	2 650	75	24
Paraguay	1957–59	2 400	64	24
	1961	2 440	60	24
Peru	1957–59	1 960	49	12
	1961	2 170	54	12
Surinam	1959–61	2 040	48	16
Uruguay	1957–59	3 020	95	62
	1961	2 980	95	62
Venezuela	1957–59	2 170	61	24
	1961	2 340	60	22
FAR EAST				
Ceylon	1957–59	2 030	45	9
	1960–62	2 080	44	8
	1962	1 990	42	7
China: Taiwan	1957–59	2 330	57	14
	1960–62	2 350	58	15
	1962	2 290	58	16
India	1957/58–1959/60	1 910	51	6
	1961/62	2 000	51	6
Japan	1957–59	2 230	68	18
	1960/62	2 270	69	21
	1962	2 280	70	23
Pakistan	1957/58–1959/60	1 980	46	7
	1961/62	1 980	44	7
Philippines[15]	1957–59	1 760	44	15
	1960–62	1 810	43	14
	1962	1 800	42	14

ANNEX TABLE 14B. - CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES IN SELECTED COUNTRIES (*concluded*)

	Period	Calories	Total protein (grams)	Animal protein (grams)
		Per caput per day		
NEAR EAST				
Israel	1957/58-1959/60	2 780	84	33
	1961/62	2 850	87	36
Jordan	1957-59	2 110	59	10
	1960-62	2 050	55	9
	1962	1 830	50	9
Lebanon	1960/61	2 320	63	14
Syria	1957	2 330	78	17
Turkey	1957/58-1959/60	2 820	90	15
	1960/61	3 110	98	16
United Arab Republic	1957/58-1959/60	2 530	73	12
	1961/62	2 620	77	12
AFRICA				
Libya	1959	2 100	53	10
Mauritius	1957-59	2 270	46	11
	1960-62	2 370	47	12
	1962	2 430	49	12
South Africa	1957-59	2 660	74	30
	1960/61	2 820	80	32
Southern Rhodesia	1951-53	2 450	75	16
	1953	2 630	81	16
OCEANIA				
Australia	1957/58-1959/60	3 210	91	61
	1961/62	3 140	90	60
New Zealand	1957-59	3 430	105	72
	1960-62	3 500	110	76
	1962	3 510	112	77

ANNEX TABLE 15A. - REGIONAL AND WORLD [1] INDICES OF VOLUME AND VALUE OF AGRICULTURAL IMPORTS, BY COMMODITY GROUPS

	Prewar average	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Indices, average 1952-53 = 100												
Import volume													
WESTERN EUROPE													
Food and feed	112	96	103	103	112	127	127	129	138	141	144	155	155
Beverages and tobacco	109	91	104	113	121	123	132	134	133	146	152	160	158
Raw materials	110	96	108	109	109	113	124	106	114	119	116	115	114
All agricultural products	111	95	105	107	113	122	127	123	130	135	137	144	143
NORTH AMERICA													
Food and feed	89	92	99	94	96	99	108	125	123	122	128	141	138
Beverages and tobacco	67	99	102	85	95	103	100	97	110	107	114	120	118
Raw materials	95	110	92	76	86	82	73	64	83	66	68	72	68
All agricultural products	81	100	98	85	93	96	95	96	107	101	106	113	110
LATIN AMERICA													
Food and feed	58	88	102	102	104	99	117	123	119	121	123	128	128
Beverages and tobacco	82	111	105	110	103	102	116	120	84	102	117	107	102
Raw materials	32	94	95	130	120	114	124	119	112	123	129	120	118
All agricultural products	57	91	102	106	106	101	118	122	114	119	123	125	125
FAR EAST [2]													
Food and feed	99	82	98	95	98	114	126	124	119	139	136	141	158
Beverages and tobacco	91	91	97	103	119	137	132	121	127	141	193	203	208
Raw materials	121	75	102	103	101	129	133	117	144	177	199	172	185
All agricultural products	106	80	99	98	99	120	128	122	127	152	158	153	168
NEAR EAST													
Food and feed	44	89	98	90	118	150	165	169	204	234	262	259	254
Beverages and tobacco	69	100	104	102	117	108	118	119	129	125	137	144	143
Raw materials	34	80	104	143	106	107	127	144	166	162	190	216	212
All agricultural products	50	91	100	96	117	137	151	155	183	202	226	228	224
AFRICA													
Food and feed	72	85	104	108	121	133	143	135	167	182	201	197	194
Beverages and tobacco	61	87	103	108	113	132	119	115	114	125	132	125	131
Raw materials	33	88	110	136	136	134	151	148	138	175	190	197	187
All agricultural products	66	86	104	110	120	133	137	130	150	165	181	177	176
OCEANIA													
Food and feed	58	89	96	106	114	123	131	138	127	126	131	137	132
Beverages and tobacco	72	96	107	115	120	115	125	125	125	131	132	120	121
Raw materials	68	116	111	153	157	136	133	154	138	137	111	110	110
All agricultural products	66	99	104	122	128	123	129	138	129	131	126	123	122
WORLD [1]													
Food and feed	100	92	102	100	108	120	126	129	135	141	145	154	156
Beverages and tobacco	87	95	103	100	109	114	117	116	121	127	134	140	139
Raw materials	107	95	103	102	104	110	116	101	113	119	122	117	118
All agricultural products	99	94	102	101	107	116	121	118	126	132	136	141	142

ANNEX TABLE 15A. - REGIONAL AND WORLD [1] INDICES OF VOLUME AND VALUE OF AGRICULTURAL IMPORTS, BY COMMODITY GROUPS (*concluded*)

	Prewar average	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Indices, average 1952-53 = 100												
Import value													
WESTERN EUROPE													
Food and feed	44	98	99	95	104	121	122	114	121	124	124	135	150
Beverages and tobacco	39	82	105	135	131	126	139	146	128	136	135	140	139
Raw materials	36	99	99	98	101	99	112	82	83	94	89	86	90
All agricultural products	41	96	100	103	108	115	122	110	111	117	116	122	130
NORTH AMERICA													
Food and feed	35	92	101	95	92	96	107	126	129	121	126	138	156
Beverages and tobacco	13	79	103	110	99	101	97	85	83	77	76	75	74
Raw materials	35	111	79	62	86	78	69	51	72	63	54	57	55
All agricultural products	25	91	96	93	94	94	93	89	94	87	85	89	94
LATIN AMERICA													
Food and feed	18	87	100	94	92	84	98	99	95	95	99	105	109
Beverages and tobacco	20	83	108	140	105	95	112	118	85	81	84	80	83
Raw materials	17	98	84	111	122	106	112	98	97	119	107	98	97
All agricultural products	18	88	99	100	96	87	101	101	94	97	99	102	106
FAR EAST [2]													
Food and feed	23	79	96	83	80	91	107	98	92	105	100	107	118
Beverages and tobacco	37	78	97	104	115	111	105	107	111	106	135	150	160
Raw materials	38	84	91	95	96	115	117	92	102	136	152	131	141
All agricultural products	28	81	95	87	86	99	110	96	96	114	117	116	127
NEAR EAST													
Food and feed	14	89	91	71	88	110	130	116	133	148	171	169	192
Beverages and tobacco	23	99	103	129	149	117	133	124	127	119	126	123	127
Raw materials	10	83	98	139	106	102	125	122	136	156	175	188	190
All agricultural products	16	91	94	87	102	111	131	118	132	142	161	160	178
AFRICA													
Food and feed	23	83	101	98	106	119	126	116	132	141	154	152	161
Beverages and tobacco	22	81	105	115	112	118	114	120	101	104	106	102	109
Raw materials	13	96	94	107	137	120	132	105	105	149	149	149	141
All agricultural products	22	83	102	103	109	119	123	116	123	133	142	139	147
OCEANIA													
Food and feed	20	90	95	98	102	111	121	120	109	106	110	115	122
Beverages and tobacco	31	97	105	139	148	118	131	135	128	120	111	98	99
Raw materials	24	130	94	118	149	128	116	117	112	129	90	84	88
All agricultural products	26	103	99	120	133	118	124	125	117	118	105	100	104
WORLD [1]													
Food and feed	35	92	99	92	97	109	116	111	116	119	121	130	144
Beverages and tobacco	26	81	104	122	115	113	117	115	105	105	105	107	106
Raw materials	35	99	93	91	98	98	104	78	84	96	93	88	92
All agricultural products	33	92	98	98	101	107	113	103	105	110	110	114	122

[1] Excluding the U.S.S.R., eastern Europe, and Mainland China. - [2] Excluding Mainland China.

ANNEX TABLE 15B. - REGIONAL AND WORLD [1] INDICES OF VOLUME AND VALUE OF AGRICULTURAL EXPORTS, BY COMMODITY GROUPS

	Prewar average	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Indices, average 1952-53 = 100												
Export volume													
WESTERN EUROPE													
Food and feed	90	79	104	119	129	124	142	142	146	161	174	170	176
Beverages and tobacco	78	71	108	109	115	131	135	163	116	133	149	136	160
Raw materials	204	87	108	99	138	166	154	149	194	177	192	213	217
All agricultural products	95	79	105	117	129	127	142	144	146	159	173	170	177
NORTH AMERICA													
Food and feed	33	94	93	77	90	125	119	121	135	146	161	169	194
Beverages and tobacco	93	100	111	100	120	111	110	105	104	110	111	107	112
Raw materials	158	131	83	130	79	139	211	138	113	222	187	115	126
All agricultural products	61	102	92	89	90	126	136	123	128	158	162	154	175
LATIN AMERICA													
Food and feed	128	108	112	116	118	127	136	146	140	154	150	162	145
Beverages and tobacco	87	98	104	85	97	105	93	97	113	114	113	116	122
Raw materials	108	90	120	124	118	126	94	111	134	116	144	157	163
All agricultural products	105	100	110	103	108	117	111	117	126	129	132	140	138
FAR EAST [2]													
Food and feed	249	96	98	105	123	123	128	113	119	133	138	133	140
Beverages and tobacco	109	92	105	116	99	123	122	128	118	119	141	143	141
Raw materials	113	95	109	96	111	102	98	98	107	96	100	116	107
All agricultural products	159	95	100	102	113	113	112	108	113	113	120	127	124
NEAR EAST													
Food and feed	86	81	111	140	101	124	127	127	106	131	127	157	156
Beverages and tobacco	53	95	108	103	96	99	140	95	102	91	123	131	129
Raw materials	87	87	116	95	107	96	102	99	142	132	119	121	129
All agricultural products	83	86	114	108	104	104	113	106	128	127	122	132	138
AFRICA													
Food and feed	84	90	105	122	122	129	127	143	134	125	143	157	166
Beverages and tobacco	74	92	103	109	126	133	141	128	146	163	174	190	179
Raw materials	69	87	101	106	111	116	112	116	131	125	127	115	125
All agricultural products	76	90	103	113	121	128	130	130	138	141	153	162	163
OCEANIA													
Food and feed	86	95	106	95	106	115	108	98	121	116	145	137	157
Beverages and tobacco	127	86	113	104	115	130	148	141	183	214	271	292	304
Raw materials	72	99	100	92	105	106	118	108	128	125	132	136	138
All agricultural products	79	97	103	94	105	110	113	103	125	121	139	137	148
WORLD [1]													
Food and feed	97	93	102	102	111	124	127	128	134	143	155	159	169
Beverages and tobacco	86	95	104	97	107	116	115	112	121	127	134	138	140
Raw materials	106	98	103	105	107	114	120	111	124	130	132	129	131
All agricultural products	97	95	103	102	109	119	122	120	128	136	144	146	152

ANNEX TABLE 15B. - REGIONAL AND WORLD [1] INDICES OF VOLUME AND VALUE OF AGRICULTURAL EXPORTS, BY COMMODITY GROUPS (*concluded*)

	Prewar average	Average 1948-52	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Indices, average 1952-53 = 100												
Export value													
WESTERN EUROPE													
Food and feed	38	82	101	111	118	118	135	127	131	147	152	155	174
Beverages and tobacco	51	84	104	103	118	125	142	165	124	139	156	165	208
Raw materials	66	92	109	96	128	153	158	117	145	141	150	160	175
All agricultural products	41	83	102	109	119	121	137	131	131	145	152	156	177
NORTH AMERICA													
Food and feed	15	98	91	72	80	109	105	103	110	117	133	139	161
Beverages and tobacco	45	87	114	104	123	113	122	120	120	130	134	131	138
Raw materials	47	128	76	118	74	113	161	100	72	145	130	81	85
All agricultural products	24	102	90	84	82	110	117	104	103	124	133	127	145
LATIN AMERICA													
Food and feed	37	112	108	105	106	109	130	124	119	128	138	146	160
Beverages and tobacco	14	75	105	110	97	102	93	84	80	81	76	75	78
Raw materials	34	98	112	119	109	109	84	85	89	89	111	115	122
All agricultural products	26	92	108	110	102	105	105	98	95	98	104	107	114
FAR EAST [2]													
Food and feed	59	93	102	96	95	96	102	93	97	101	106	105	124
Beverages and tobacco	46	98	108	149	129	139	136	141	128	127	131	131	138
Raw materials	40	109	84	79	121	104	99	85	114	115	100	103	90
All agricultural products	47	102	94	96	114	107	106	97	111	112	107	108	109
NEAR EAST													
Food and feed	33	80	103	123	89	118	118	111	98	114	114	145	157
Beverages and tobacco	30	93	113	121	120	130	188	122	120	90	112	122	162
Raw materials	29	104	99	95	100	96	106	90	105	113	99	91	96
All agricultural products	30	97	101	105	100	105	117	98	105	111	104	107	118
AFRICA													
Food and feed	28	85	103	115	110	120	119	123	117	111	122	131	167
Beverages and tobacco	20	84	102	133	124	118	126	141	131	132	131	137	131
Raw materials	21	90	92	89	93	97	95	83	93	99	96	86	103
All agricultural products	23	86	100	116	112	114	116	121	117	117	120	123	138
OCEANIA													
Food and feed	38	91	108	94	102	107	102	96	125	116	135	134	161
Beverages and tobacco	40	81	112	140	124	116	131	164	174	176	191	198	217
Raw materials	22	97	107	92	94	96	122	79	91	94	96	100	116
All agricultural products	29	95	107	93	97	101	113	87	107	104	114	116	137
WORLD [1]													
Food and feed	32	94	100	96	99	110	116	112	116	123	134	139	160
Beverages and tobacco	24	81	106	119	111	113	113	111	103	105	105	106	111
Raw materials	34	105	95	96	102	104	112	87	98	110	106	99	103
All agricultural products	31	94	100	101	103	109	114	105	108	115	119	120	133

[1] Excluding the U.S.S.R., eastern Europe and Mainland China. - [2] Excluding Mainland China.

ANNEX TABLE 16A. - WORLD AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL PRODUCTS

	Prewar average	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	Indices, average 1952-53 = 100																
All agricultural products	34.0	98.8	89.4	92.7	116.7	102.7	97.3	99.4	94.2	91.7	93.8	87.4	84.7	85.3	83.1	82.3	88.9
Food and feed	37.0	116.4	100.8	89.8	101.7	101.5	98.5	93.0	89.0	89.4	91.3	87.4	87.4	85.7	86.0	87.8	97.9
Cereals	33.0	124.2	100.2	84.7	92.0	101.0	99.0	84.4	79.5	76.4	75.2	74.0	72.8	71.6	72.1	76.6	76.1
Edible oils and oilseeds	29.2	127.1	106.2	95.1	123.2	98.2	101.8	96.8	86.8	90.8	90.4	90.1	97.8	92.4	85.9	83.2	88.8
Meat	41.6	82.1	86.7	81.1	93.9	99.5	100.5	102.5	101.8	101.2	100.5	104.2	105.7	109.1	107.6	103.8	111.6
Dairy products	43.5	115.1	108.5	83.7	92.9	101.4	98.6	95.5	95.4	96.7	90.8	80.6	91.9	90.4	84.8	84.4	90.3
Beverages and tobacco	27.9	75.4	72.3	88.7	98.6	98.8	101.2	123.2	104.6	97.7	98.1	98.7	86.7	83.4	78.8	77.1	80.7
Agricultural raw materials	33.5	86.0	82.5	100.8	157.3	107.9	92.1	92.2	95.5	91.0	94.8	78.8	78.2	85.9	81.1	76.8	79.4
	U.S.$ per metric ton																
Wheat	31.1	106.1	88.5	71.5	74.1	78.6	79.7	68.2	65.8	62.8	63.5	62.6	62.2	61.9	63.3	66.1	64.4
Wheat flour	44.4	139.8	116.1	96.8	105.5	112.4	111.8	103.0	92.6	86.8	85.8	81.6	77.6	75.3	78.2	81.2	80.9
Barley	25.8	105.4	64.9	59.1	71.9	77.4	62.9	53.1	55.7	55.1	50.9	51.3	52.6	52.7	47.1	57.4	54.8
Maize	18.8	93.2	64.2	60.4	77.7	85.3	69.7	60.8	61.5	59.9	55.1	50.6	50.2	50.1	48.5	47.7	53.6
Rice (milled)	29.2	164.1	152.2	126.9	135.1	167.1	183.5	146.9	117.7	115.5	115.5	120.1	110.3	101.5	108.0	119.3	118.3
Sugar (raw)	38.3	99.0	98.5	104.0	116.1	110.0	97.4	99.0	95.1	95.4	116.5	99.8	94.5	89.5	104.8	109.4	168.2
Apples	66.3	118.4	78.6	98.6	101.3	112.8	103.6	120.6	97.5	123.1	136.8	155.3	111.6	140.8	127.1	141.5	146.4
Bananas	30.6	100.0	105.0	103.7	100.6	97.2	99.9	99.9	100.1	102.8	102.4	93.1	87.0	81.6	83.5	82.8	90.6
Oranges and tangerines	56.5	115.8	126.1	107.7	102.9	102.7	95.9	105.1	102.1	124.5	134.8	127.9	104.9	110.4	118.5	116.7	133.1
Raisins	123.3	260.7	242.1	226.8	270.6	229.4	201.6	207.2	240.6	274.5	280.2	327.2	316.8	265.1	280.3	264.2	263.7
Copra	45.4	252.1	170.0	195.4	219.1	144.3	191.4	172.6	149.6	142.5	139.4	167.7	203.3	173.8	143.5	144.9	159.4
Palm kernels	37.0	132.1	148.1	120.2	173.1	155.7	152.0	136.3	121.6	123.5	120.5	125.1	159.4	156.8	125.9	118.6	132.2
Soybeans	37.7	134.0	100.6	95.1	122.1	114.4	108.3	113.3	94.9	96.0	91.1	86.6	84.4	83.3	94.3	93.0	99.1
Groundnuts (shelled)	50.6	214.2	209.5	149.3	210.0	225.4	210.3	210.2	185.7	195.0	203.8	171.7	164.4	182.5	180.2	168.9	166.3
Olive oil	258.8	950.4	738.7	547.5	783.2	584.1	586.0	529.0	560.9	719.5	664.5	598.2	510.3	518.0	533.3	583.0	787.1
Coconut oil	83.9	413.4	343.3	333.2	394.2	258.9	306.7	289.0	237.6	232.9	241.3	277.8	349.0	288.9	233.1	221.6	240.9
Palm oil	61.2	279.5	254.1	206.0	309.6	243.9	188.5	184.6	200.0	217.4	220.9	200.4	204.2	191.4	203.7	191.4	189.5
Palm kernel oil	108.4	360.8	373.8	293.9	366.0	250.1	295.7	265.9	240.3	236.5	242.4	253.3	316.6	296.7	230.6	220.0	249.3
Soybean oil	120.3	539.1	340.0	320.4	461.5	307.7	309.9	317.1	321.7	343.3	338.4	303.3	254.3	233.6	285.4	246.4	242.1
Groundnut oil	129.4	489.1	482.3	388.0	495.3	394.9	419.7	404.4	319.4	397.8	405.7	361.8	326.5	353.8	352.8	331.6	304.1
Cattle (per head)	36.3	116.3	114.7	121.6	132.8	110.8	117.6	129.6	125.2	124.8	125.7	135.9	144.8	137.0	129.9	122.3	127.4
Beef and veal	121.3	312.7	362.1	353.7	459.2	500.3	439.8	464.7	451.1	417.9	437.7	502.0	577.2	597.8	563.3	519.6	555.7
Mutton and lamb	213.7	287.0	314.7	245.2	268.5	291.4	325.1	386.2	417.4	415.6	449.8	414.5	365.9	387.4	364.4	353.0	383.9
Bacon, ham, salted pork	409.0	776.2	751.6	612.5	650.1	711.8	674.1	666.0	663.6	722.7	679.2	706.3	667.5	681.8	660.5	666.7	719.3
Canned meat	270.0	593.4	639.5	733.3	846.1	858.9	954.9	906.0	873.9	869.2	826.7	854.3	889.0	905.8	941.8	911.6	966.3
Cheese	323.5	766.0	749.7	583.2	630.2	686.1	658.6	648.6	674.9	742.3	709.3	636.5	741.1	724.0	721.4	701.0	709.4
Butter	424.6	1 109.6	1 078.5	816.0	883.9	957.4	963.1	970.6	951.5	927.0	784.5	641.2	897.4	831.3	715.5	762.3	827.7
Eggs (in the shell)	283.4	776.1	730.5	584.1	631.0	689.1	686.6	628.4	649.9	642.0	608.4	596.3	536.9	560.6	556.2	528.6	659.5

ANNEX TABLE 16A. - WORLD AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL PRODUCTS (*concluded*)

	Prewar average	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
	U.S.$ per metric ton																
Milk, condensed and evaporated	134.5	379.9	347.2	287.0	329.2	352.1	327.2	310.6	310.1	317.5	330.1	311.2	307.9	308.8	307.4	299.7	305.7
Milk, powdered	191.7	604.4	486.2	334.5	445.2	514.8	458.9	410.9	377.2	375.0	437.4	372.8	356.7	401.9	361.6	332.3	298.5
Potatoes	31.8	59.1	47.9	46.2	53.9	59.6	57.6	51.7	46.9	59.7	52.2	59.7	57.6	61.2	51.5	71.9	59.0
Oilseed cake and meal	23.6	92.0	62.2	58.2	74.1	75.5	72.6	71.9	73.3	67.7	61.8	54.7	67.9	67.9	63.6	69.1	72.8
Coffee	182.3	510.3	580.5	959.2	1 075.0	1 104.4	1 141.3	1 401.0	1 075.8	1 048.2	1 024.7	918.4	747.0	720.4	679.3	656.9	655.6
Cocoa	117.4	707.3	461.4	558.0	711.2	688.2	660.5	1 070.2	818.0	580.8	563.0	844.6	738.7	593.7	474.8	453.3	471.8
Tea	515.8	1 200.5	1 112.3	986.2	1 043.1	947.6	998.2	1 327.3	1 413.6	1 255.0	1 228.3	1 208.5	1 194.2	1 214.4	1 193.2	1 145.9	1 198.0
Wine	86.9	241.1	206.1	164.8	180.8	171.4	165.1	147.3	143.0	155.4	169.8	216.1	174.3	178.7	181.3	188.3	213.2
Tobacco (unmanufactured)	566.1	1 114.8	1 118.5	1 096.7	1 126.3	1 163.8	1 229.5	1 224.7	1 267.4	1 227.6	1 338.1	1 280.3	1 291.7	1 291.6	1 249.7	1 241.2	1 369.4
Linseed	44.9	222.0	180.0	148.9	166.8	170.4	129.0	112.7	130.3	143.5	115.5	123.9	130.4	128.8	124.9	132.3	121.5
Linseed oil	105.3	561.2	370.6	318.3	390.3	397.5	231.1	166.9	205.4	313.4	245.8	250.7	212.5	246.8	254.0	229.9	205.2
Cotton	261.2	856.4	797.6	837.7	1 169.9	1 002.5	771.5	828.2	805.0	739.8	741.7	680.5	593.1	630.3	646.8	621.3	606.2
Jute	63.9	327.6	301.1	243.6	327.6	250.2	175.9	185.1	189.4	184.0	209.5	195.2	177.6	223.1	310.4	219.4	205.1
Sisal	76.6	299.3	291.8	272.4	423.5	374.6	204.7	176.7	157.3	158.9	141.5	145.2	173.1	214.7	193.4	194.7	267.7
Wool (greasy)	446.0	1 027.8	1 164.1	1 527.5	2 589.8	1 413.1	1 593.4	1 549.2	1 357.3	1 379.6	1 600.3	1 133.8	1 085.0	1 164.0	1 145.0	1 135.3	1 309.1
Rubber (natural)	282.7	414.4	342.2	662.8	1 090.1	670.9	484.0	450.1	701.8	634.0	603.5	519.3	661.7	745.2	546.6	500.9	481.9

ANNEX TABLE 16B. - WORLD AVERAGE EXPORT UNIT VALUES OF FOREST PRODUCTS

	Unit	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963 (Preliminary)
		U.S.$ per unit										
Fuelwood	m³	8.2	8.2	9.1	9.5	9.5	9.0	8.4	8.3	9.3	9.4	9.4
Charcoal	M.T.	28.9	23.4	26.3	26.2	28.3	26.1	25.1	28.5	28.6	32.7	31.0
Coniferous logs	m³	15.8	16.1	16.4	16.0	17.3	16.4	16.5	17.0	18.0	19.1	19.9
Broadleaved logs	,,	25.3	25.1	24.8	22.9	21.6	21.6	21.9	24.9	24.2	24.9	25.9
Pulpwood	,,	12.7	11.6	12.7	12.2	12.4	11.7	10.6	10.5	12.0	11.6	11.3
Pitprops	,,	14.3	12.8	14.1	13.6	14.6	14.0	13.1	12.0	13.0	13.1	13.1
Poles, pilings, posts	,,	34.4	31.2	30.0	32.1	32.8	27.3	24.5	24.2	22.5	24.5	24.5
Coniferous sawnwood	,,	37.2	37.5	40.4	39.5	39.1	36.9	35.5	36.8	36.5	35.3	36.1
Broadleaved sawnwood	,,	59.6	61.2	62.8	65.6	63.0	62.4	62.4	62.0	65.0	63.4	62.6
Sleepers	,,	36.3	34.4	35.2	39.2	42.4	39.8	41.5	37.6	36.5	38.4	38.5
Veneer sheets	,,	266.0	298.0	282.9	287.6	313.6	254.4	262.2	367.4	359.0	370.9	372.0
Plywood	,,	142.4	152.3	167.1	154.2	149.0	139.8	139.2	138.6	132.8	136.3	136.5
Particle board	M.T.	—	—	138.8	125.9	110.7	116.4	112.0	111.8	111.1	109.2	108.1
Fibreboard	,,	93.7	89.2	93.5	91.5	91.2	86.6	84.6	84.0	81.8	80.8	81.1
Mechanical pulpwood	,,	67.9	68.8	70.2	76.6	77.1	70.5	67.4	66.5	66.1	65.6	65.7
Chemical pulpwood	,,	134.0	141.1	143.5	147.8	150.0	140.4	133.9	132.8	131.7	124.9	126.5
Newsprint	,,	128.6	130.2	130.5	135.3	140.8	138.2	139.8	134.6	128.8	126.8	126.8
Printing and writing paper	,,	230.5	248.2	251.9	259.7	265.5	245.8	234.2	233.7	227.3	224.6	225 0

ANNEX TABLE 17. - CALCULATION OF THE TARGET PROTEIN SUPPLY FOR A HYPOTHETICAL COUNTRY

NPU of dietary proteins, 65
Duration of lactation for mothers, 8 months
108,000 infants of 0-12 months (4.4 percent of the total population)

Population groups			Reference protein requirements		
Age and stage of development	Thousands	Average body weight (kg)	Grams per kilogram body weight per day [1]	Grams per person per day	Kilograms per population group per day
Infants 0-1 year, breast fed [2]	72	...	...	15	1 080
Infants 0-1 year, not breast fed	36	9	[3] 1.7	15.3	551
Children 1-3 years, not breast fed	231	12	1.1	13.2	3 049
Children 4-6 years	200.2	18	1.0	18.0	3 604
Children 7-9 years	184	27	0.9	24.3	4 471
Children 10-12 years	160.8	35	0.9	31.5	5 065
Male adolescents 13-15 years	83.6	49	0.8	39.2	3 277
Male adolescents 16-19 years	113.6	63	0.8	50.4	5 725
Female adolescents 13-15 years	84.6	46	0.8	36.8	3 113
Female adolescents 16-19 years	132	54	0.8	43.2	5 702
Adult men	670	65	0.7	45.5	30 485
Adult women	705	55	0.7	38.5	27 143
Extra allowance for 59,400 pregnant women [4]	...	...	...	6	356
TOTAL	2 672.8	...	...	...	93 621

$\frac{93,621}{2,672.8}$ = 35.0 grams per day, reference protein, per caput.

Correction for protein quality (NPU = 65)

$93,621 \times \frac{100}{65}$ = 144,032 kilograms per day, protein of the country, for the total population.

$\frac{144,032}{2,672.8}$ = 53.9 grams per day, protein of the country, per caput.

Correction for retail level (10 percent retail allowance)

144,032 × 1.1 = 158,435 kilograms per day, at retail level, protein of the country, for the total population.

$\frac{158,435}{2,672.8}$ = 59.3 grams per day, at retail level, protein of the country, per caput.

[1] From Column III of Table III-1. - [2] Equals extra allowance for lactating women. Number of lactating women estimated on basis of number of infants of 0-12 months and average duration of lactation. - [3] Average of four figures from Table III-1. - [4] Number of pregnant women estimated as 10 percent more than number of infants 0-12 months.

ANNEX TABLE 18. - PER CAPUT PROTEIN SUPPLIES IN SELECTED COUNTRIES, AVERAGE 1957-59

Country	Total protein	Animal protein	Grains	Starchy roots	Pulses, oilseeds and nuts	Vegetables	Fruit	Meat and poultry	Eggs	Fish	Milk and products
WESTERN EUROPE											
Austria											
Grams per day	87	45	33	4	1	3	1	19	3	2	21
Percent of total protein		51	38	5	1	3	1	22	3	2	24
Belgium-Luxembourg											
Grams per day	88	47	29	7	1	3	1	21	5	3	18
Percent of total protein		53	33	8	1	3	1	24	6	3	20
Denmark											
Grams per day	92	56	25	6	2	2	1	22	3	8	23
Percent of total protein		61	27	7	2	2	1	24	3	9	25
Finland											
Grams per day	94	53	34	5	1	1	–	12	2	6	33
Percent of total protein		56	36	5	1	1	–	13	2	6	35
France											
Grams per day	96	50	33	5	2	5	1	26	3	3	18
Percent of total protein		52	35	5	2	5	1	27	3	3	19
Germany, Fed. Rep.											
Grams per day	79	46	22	7	1	2	1	19	4	4	19
Percent of total protein		58	28	9	1	3	1	24	5	5	24
Greece											
Grams per day	94	27	52	2	8	4	2	8	2	4	13
Percent of total protein		28	55	2	8	4	2	8	2	4	14
Ireland											
Grams per day	96	57	29	7	1	2	–	20	5	2	30
Percent of total protein		59	30	7	1	2	–	21	5	2	31
Italy											
Grams per day	78	26	39	2	5	4	1	10	2	3	11
Percent of total protein		34	51	3	6	5	1	13	3	4	14
Netherlands											
Grams per day	77	44	25	4	1	3	–	15	4	2	23
Percent of total protein		57	32	5	1	4	–	19	5	3	30
Norway											
Grams per day	84	49	26	5	2	1	1	13	2	9	25
Percent of total protein		59	31	6	2	1	1	15	2	11	30
Portugal											
Grams per day	72	26	29	6	4	5	1	6	1	16	3
Percent of total protein		37	41	8	6	7	1	8	1	23	4
Spain											
Grams per day	71	20	32	6	7	5	1	6	2	5	7
Percent of total protein		28	45	8	10	7	2	8	3	7	10
Sweden											
Grams per day	61	52	22	4	1	1	1	17	4	7	24
Percent of total protein		64	27	5	1	1	1	21	5	9	30
Switzerland											
Grams per day	90	51	29	3	3	3	1	19	3	2	27
Percent of total protein		56	32	3	3	3	1	22	3	2	30
United Kingdom											
Grams per day	86	51	25	4	3	2	1	22	4	5	20
Percent of total protein		59	29	5	3	2	1	26	5	6	23
Yugoslavia											
Grams per day	96	26	57	4	6	2	1	10	1	1	14
Percent of total protein		27	59	4	6	2	1	10	1	1	15

ANNEX TABLE 18. - PER CAPUT PROTEIN SUPPLIES IN SELECTED COUNTRIES, AVERAGE 1957-59 (*continued*)

Country	Total protein	Animal protein	Grains	Starchy roots	Pulses, oilseeds and nuts	Vegetables	Fruit	Meat and poultry	Eggs	Fish	Milk and products
NORTH AMERICA											
Canada											
Grams per day	95	63	23	3	3	2	1	29	5	4	25
Percent of total protein		66	24	3	3	2	1	31	5	4	26
United States											
Grams per day	92	65	15	2	5	4	1	32	6	3	24
Percent of total protein		70	16	2	5	4	1	35	7	3	26
OCEANIA											
Australia											
Grams per day	92	61	23	3	2	2	1	37	3	3	18
Percent of total protein		67	25	3	2	2	1	40	3	3	20
New Zealand											
Grams per day	105	72	25	3	2	2	1	36	5	3	28
Percent of total protein		68	24	3	2	2	1	34	5	3	27
LATIN AMERICA											
Argentina											
Grams per day	98	57	34	3	1	2	1	43	2	1	11
Percent of total protein		58	35	3	1	2	1	44	2	1	11
Brazil											
Grams per day	61	19	24	2	14	–	2	11	1	2	5
Percent of total protein		31	39	3	23	–	3	18	2	3	8
Chile											
Grams per day	77	27	38	4	5	3	1	12	1	5	8
Percent of total protein		34	49	5	6	4	1	16	1	6	11
Colombia											
Grams per day	48	23	15	2	5	1	2	15	1	–	7
Percent of total protein		48	31	4	10	2	4	31	2	–	15
Mexico											
Grams per day	68	20	33	–	13	1	1	9	2	1	8
Percent of total protein		30	49	–	19	1	1	13	3	1	12
Paraguay											
Grams per day	68	26	22	6	10	8	2	19	–	–	7
Percent of total protein		39	32	9	15	3	3	28	–	–	10
Peru											
Grams per day	49	12	22	6	5	3	1	6	–	3	3
Percent of total protein		24	45	12	10	6	2	12	–	6	6
Surinam											
Grams per day	48	17	25	1	4	1	1	4	1	7	4
Percent of total protein		35	53	2	9	1	1	9	2	14	9
Venezuela											
Grams per day	61	24	21	3	10	1	2	10	1	5	8
Percent of total protein		40	35	5	16	2	3	16	2	8	13
FAR EAST											
Ceylon											
Grams per day	45	9	27	1	7	2	–	1	–	6	2
Percent of total protein		20	60	2	16	4	–	2	–	13	4
China (Taiwan)											
Grams per day	57	14	31	3	7	2	–	6	–	7	1
Percent of total protein		25	54	5	12	4	–	11	–	12	2

ANNEX TABLE 18. - PER CAPUT PROTEIN SUPPLIES IN SELECTED COUNTRIES, AVERAGE 1957-59 (*concluded*)

Country	Total protein	Animal protein	Grains	Starchy roots	Pulses, oilseeds and nuts	Vegetables	Fruit	Meat and poultry	Eggs	Fish	Milk and products
India											
Grams per day	51	6	30	–	14	1	–	1	–	–	5
Percent of total protein		12	59	–	27	2	–	2	–	–	10
Japan											
Grams per day	67	17	31	2	13	4	–	3	1	12	1
Percent of total protein		26	46	3	19	6	–	5	1	18	1
Pakistan											
Grams per day	[1] 46	7	33	–	4	1	–	1	–	1	5
Percent of total protein		16	72	–	9	2	–	2	–	2	11
Philippines											
Grams per day	47	13	26	2	2	3	1	4	1	7	1
Percent of total protein		28	55	4	4	6	2	9	2	15	2
NEAR EAST											
Israel											
Grams per day	84	33	39	2	4	3	2	10	6	3	14
Percent of total protein		40	47	2	5	4	2	12	7	4	17
Libya											
Grams per day	53	10	34	1	4	2	2	4	–	1	5
Percent of total protein		20	64	2	7	4	4	8	–	2	9
Syria											
Grams per day	78	17	50	–	7	2	2	4	1	–	12
Percent of total protein		22	64	–	9	3	3	5	1	–	15
Turkey											
Grams per day	91	15	61	2	7	3	2	5	–	1	9
Percent of total protein		17	68	2	8	3	2	6	–	1	10
United Arab Republic											
Grams per day	76	13	51	–	7	3	2	5	1	3	4
Percent of total protein		17	67	–	9	4	3	7	1	4	5
AFRICA											
Mauritius											
Grams per day	46	11	27	1	6	1	–	2	1	4	4
Percent of total protein		23	59	2	13	2	–	4	2	9	9
South Africa											
Grams per day	73	30	37	1	3	1	1	16	1	5	8
Percent of total protein		41	51	1	4	1	1	22	1	7	11

[1] Miscellaneous foodstuffs included in total protein figure.

TIPOGRAFIA SQUARCI - ROMA

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