F.A.O.—THE BACKGROUND.

By

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(This is the first of a series of three articles dealing with the Food and Agriculture Organisation of the United Nations.)

Shortage of food has always been a critical element in human history. From earliest times man has engaged in a constant struggle to wrest from the earth the essentials for survival. Different peoples have faced the problem with varying degrees of success, dependent upon their initiative, their advance in technique

U.N.R.R.A. Doctor at Work.
(By Courtesy of the Canadian National Film Board.)

and methods of organisation. All have fared well at some periods and badly at others. Some have fared very badly most of the time.

The modern world is no exception to the familiar pattern. On the one hand we have the object lesson of advanced, technically efficient agricultural systems producing an abundance, in contrast to the picture of backward, primitive agricultural systems producing relatively so very little. And, as if this situation was not itself sufficiently bad, we know all too well the effects of climatic peculiarities and disease movements on the work of even the advanced agricultural nations. It does not seem appropriate

to make value judgments on the efforts of those who sought ways and means to raise living standards and effect general improvements during the interval between the two World Wars. Let us look at our post-war efforts, regarding them as a fresh start to a solution of a series of old and vital problems.

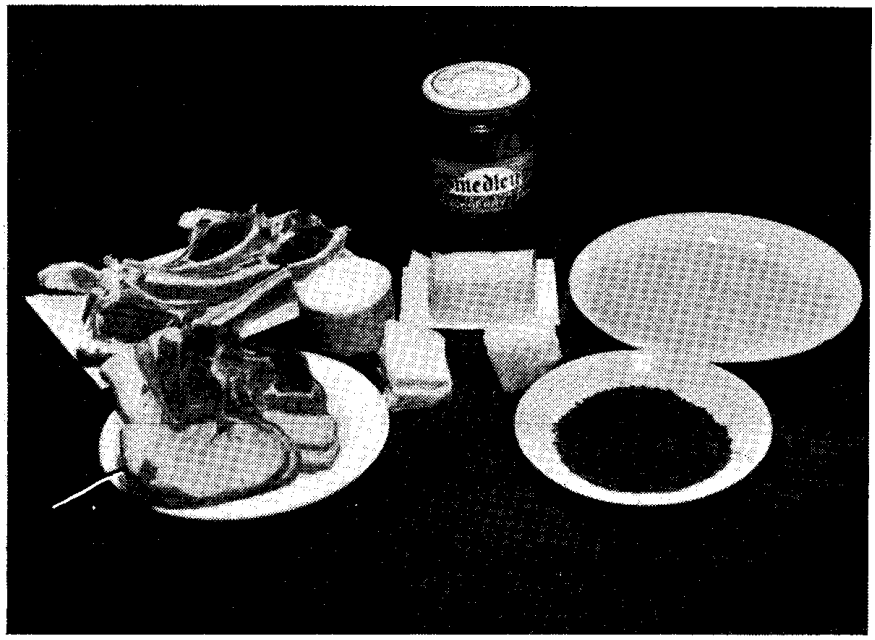
It seems inevitable that the Allied Nations, confident of victory, should have turned attention to world food problems. In any programme of reorganisation and reconstruction after the cessation of hostilities, food would be a vital matter. In May, 1943, the representatives of forty-four countries were invited, on the initiative of the late President Roosevelt, to the United Nations Conference on Food and Agriculture at Hot Springs, Virginia, U.S.A. The Food and Agriculture Organisation (F.A.O.)

Scene in U.N.R.R.A. Relief Depot.
(By Courtesy of the Canadian National Film Board.)

officially came into being with the signing of its Constitution at Quebec on 16th October, 1945. What is the purpose of F.A.O.? Briefly, it aims at increased world production, accompanied by improvements in distribution in order that the levels of consumption of those without adequate food may be progressively raised.

F.A.O. is essentially a planning body. Its problems, while specifically centred on food production and distribution, are related to general long-term economic trends. In this wide field of inquiry, the economist, the sociologist, the lawyer and the

scientist will all find ample scope for their observations. In the present instance it is proposed to examine the basic factors operating to bring about world food shortages, but, in doing so, many of the hazards of generalisation cannot be avoided. For example, much will have to be said about nutrition, and yet only the scientist could correctly assess the nutritional standing of even one human being, let alone an aggregate of millions. In spite of these difficulties, it is possible to show major causes and trends with sufficient accuracy to throw into sharp relief the stark reality of a world short of food.



Rationed Items of British Food per person per week (before recent further cuts).

The object of this article is to relate food shortages to the individual's actual intake of food. The method used is firstly to consider some standards of human requirements, and then to compare these standards with real intake both before the recent war and since that time. Food consumption presupposes dealing with world production trends. This leads logically to a consideration of future nutritional levels.

STANDARDS OF HUMAN REQUIREMENTS.

One of the main lessons to be gained from a study of nutrition is that the average human being's food has to satisfy two different sets of requirements. Firstly, food must provide for energy requirements. It must supply enough calories for a man to perform his work. Secondly, food must contain protective elements including proteins, calcium, iron, vitamins, which, although needed in only small quantities, keep the body in repair and control certain

bodily processes. The absence of any of these protective elements from the diet leads to the development of such "deficiency" diseases as scurvy, beri-beri and rickets, and most important of all, allows for the lowering of resistance to other general diseases attacking human health. Most foods satisfy both energy and protective requirements, but most are more important for one requirement than for the other. Bread, potatoes and sugar are chiefly energy foods; eggs, milk, fish and fresh vegetables and fruit are important mainly as protective foods.

Typical Food Queue in Great Britain.

Energy requirements.—These are not difficult to estimate. The estimation is easiest when the subject is an adult performing uniform work, and, most complicated in the case of a growing child. The calculation of the energy requirements of an adult is made easier because a large quantity can be arrived at straight away. This is the amount of energy expended in a day in just keeping alive and is called the Basal Metabolism. The Basal Metabolism is approximately proportional to the area of the surface of the body, actually about 920 calories to the square metre. This ratio changes slightly as age advances, because body surface area tends to move to one of the two extremes of thinness or superfluous flesh. Formulas have now been worked out giving the Basal Metabolism corresponding to any height, weight, sex and age. Experiments show variations to be less than 10 per cent. from the formula figures.

We have now to consider the extra energy expended in the various activities of life, work and recreation over and above the Basal Metabolism. Experts have arrived at estimates of the additional calories used up in various occupations, but all these estimates are only average. Dr. J. R. Marrack, in his book "Food and Planning" gives the following table:—

TABLE 1.—Calories Expended per Hour, Over and Above the Basal Metabolism, in Various Activities.

General and Recreation.		*Domestic.*	
Sitting at rest	30	Sewing	40
Standing	40	Dish-washing	70
Dressing and undressing	50	Sweeping floor	100
Walking 2.6 miles per hour	140	Peeling potatoes	40
Walking at 3.75 miles per hour	240	*Employments.*	
Walking at 5.3 miles per hour	580	Typewriting, ordinary	16–40
Running	500	Typewriting, rapidly	70
Swimming, 2 miles per hour	550	Writing	10–30
Cycling	175	Tailoring	75–84
Boxing	800	Painting furniture	100
Dancing, foxtrot	240	Carpentry	137–176
Dancing, waltzing	200	Metal work	180
Driving car	60	Blacksmith	276–351
Playing piano	55	Stone-masonry	330
Playing piano (Liszt)	140	Sawing wood	400
		Laundress	124–214
		Coal-mining	114
		Coal-mining, cutting	103–138
		Coal-mining, timbering	205

TABLE 2.—Examples of Energy Expenditure per Day.

He proceeds from these figures to give examples of energy expenditure per day:—

Clerk.		*Metal Worker.*	
Age	30	Age	45
Height, cm.	175	Height, cm.	165
Weight, kgm.	75	Weight, kgm.	65
Basal Metabolism, 24 hours	1,800	Basal Metabolism, 24 hours	1.600
Dressing and undressing, 1 hour	50	Dressing and undressing, 1 hour	50
Meals, 1½ hours	40	Meals, 1½ hours	40
Walking, 1 hour	240	Walking, 1 hour	240
Clerical work, 8 hours	240	Work, 8 hours	1.440
Sitting, 2½ hours	75	Sitting, 4½ hours	125
Cycling, 2 hours	400		
	2,845		3.495

Again it must be emphasised that these estimates can only be regarded as averages. The energy expended by two men of the same age, height and weight, engaged in exactly the same daily activities, could differ by as much as 400 calories.

If the calories in a person's food are less than the number required for energy purposes, he will have to use up the constituents of his own body for food, and his weight will fall. The requirements of energy for Basal Metabolism and exertion can be transposed into actual food quantities. After allowances are made for food which is not absorbed and protein which is not completely burnt, the difference between food bought and food eaten may amount to about 10 per cent. So in calculating the amount of food that must be bought, 10 per cent. must be added to the total calculated. The following table of Dr. Marrack's classifies various activities according to the severity of the exertion involved and the supplementary calories that should be added to a basic 2,400 for each hour of employment in these activities:—

TABLE III.

Supplement.	Light. Up to 75.	Moderate. 75–150.	Hard. 150–300.	Very Hard. 300 and over.
Women—				
Household ...	Writing Sewing. Ironing. Dish-washing.	Sweeping Dusting. Ironing. Washing.	Polishing	
Industrial ...	Typing. Bookbinding.	Laundress. Charwoman.		
General ...	Playing musical instruments.	Walking.	Walking. Dancing.	Lacrosse. Hockey.
Men—				
Industrial ...	Tailor. Lithographer. Bookbinder.		Smith.	Coal-miner. Stone-mason. Wood-cutter.
		Joiner. Carpenter. Metal-worker.		
Exercise ...	Playing musical instruments.	Walking slowly. Cycling slowly.	Walking. Rowing. Cycling. Swimming. Climbing. Dancing.	Walking fast. Running.

What happens if food intake does not meet necessary requirements? It is known that first of all the body burns up any stores of carbohydrates, then stores of fat, and finally stores of protein when the other constituents have been dissipated. Until recent times the effects of a shortage of calories had been confused with the effects of more serious deficiencies of vitamins and proteins.

Protein Requirements.

The estimation of protein requirements is more difficult than in the case of calories, because there is some doubt as to the purpose for which the protein of food is needed. In discussing

protein requirements it must be remembered that it is actually the amino-acids of these proteins with which we are concerned. Over 60 years ago Voit set 118 gm. of protein per day as a standard, but it is now doubtful whether it is possible to be so precise and yet make an accurate estimate of requirements. The amino-acids of food protein are required to replace the "wear and tear" of body use. By far the greatest part of the nitrogen in the body, and in food, is in the form of protein. If more nitrogen is being excreted than is taken in in the form of food, it must come from the disintegration of body protein which is not being replaced. If food supplies sufficient amino-acids to replace those lost in the processes of body use, the amount of nitrogen leaving the body would be equal to that received in food. The body is then said to be in a state of nitrogen equilibrium. Therefore, the minimum protein requirement of a person who is not growing should, on the "wear and tear" theory, be the least amount that will maintain nitrogen equilibrium. Proteins contain amino-acids in varying proportions. For example, the amounts of the essential amino-acids, lysine, arginine and histidine in the protein of human muscle, the caseinogen of cow's milk, egg albumin and the protein gliadin and glutelin of wheat-flour are:—

	Human Muscle Protein.	Caseinogen.	Egg Albumin.	Gliadin.	Glutelin.
Lysine	6.6	7.6	5.0	0.2	1.9
Arginine ...	8.8	3.7	5.6	2.6	4.7
Histidine ...	2.4	2.5	1.5	1.8	0.6

The highest estimate of protein requirement is around 65 gm. per day. The average lies under 50 and does not necessarily include a large proportion of animal protein. As opposed to the "wear and tear" theory, it seems likely that in order to maintain health and vigour over long periods, it is necessary to secure amounts of food protein in excess of those required to maintain nitrogen equilibrium. Latest research indicates that the amino-acids of food are used in a continual chain of renewal of body tissues. What are the effects of low protein intake on health? Famine usually means a double deficiency of both protein and calories. The protein in the plasma, the liquid part of the blood, falls. This protein is needed in order to prevent water of the plasma passing out through the walls of the blood vessels. When it falls below a certain level, fluid escapes and swells the tissues with water, resulting in dropsy or oedema. The victim, although actually emaciated, may have the outward appearance of normality.

Fat Requirements.

Fat is a compact store of energy. However, fat can be made in the body from carbohydrates and amino-acids, and assuming these two constituents to be present, it is not necessary to have large quantities of fat in the diet. It seems probable that fat is either not essential or is needed in small amounts only. But the

vitamins A and D are soluble in fat and are found in animal fats. The elimination of animal fat from the body reduces the scanty, daily intake of vitamin D to nil, vitamin A being available in vegetables. There is some evidence that carotene, for example, is difficult to absorb when fat is absent from the diet. The importance of fats seems to lie, therefore, not so much in their value as nutrients, but in their function as vehicles of fat soluble vitamins.

Carbohydrate Requirements.

All carbohydrates are broken down to their basic form, *i.e.*, glucose, before they are burnt in the body. The practical differences between the various carbohydrates is the time lag between their being swallowed and their use. It is likely that the carbohydrates are burnt in the muscles where they are carried from the liver. Sugar is the most readily available form of carbohydrate.

Vitamins.

Vitamins were first defined as substances in the absence of which certain diseases occur. Modern research has indicated clearly that they provide an essential contribution to normal health.

Vitamin A.—The disease in human beings due to the lack of Vitamin A is xerophthalmia. This condition was common in Britain before the 1914-18 war. In India, it is said to be the commonest cause of preventable blindness. In the first stages of xerophthalmia the membranes over the front of the eyes become dry and wrinkled. Actually it is an indication of a general change of the cells lining the various surfaces of the body and occurs in the ducts of hair follicles and sweat glands. Obstructed ducts form small round lumps. Another result of the lack of Vitamin A is night-blindness. Vision in a dim light depends on the action of light on a visual purple pigment in the retina, which is formed from Vitamin A. It is broken down when exposed to light and some of it is destroyed. If supplies of Vitamin A are short, this regeneration of visual purple is extremely slow and adaptation to the dark is said to be impaired. It has been estimated that from 25 to 55 I.U. per kgm. of bodyweight are required to maintain normal adaptation.

Vitamin B1.—Deficiency of Vitamin B1 is responsible for the disease beri-beri, and is found mainly amongst rice-eating peoples. The greater part of the Vitamin B1 of both rice and other grains is in the pericarp and the germ of the seed. But rice does not keep very well unless the outer layers are removed. This is done either by steaming and boiling, in which case some of the vitamin soaks into the inner part of the seed, or by a method in which no preliminary boiling takes place, where the outer layers are completely removed, taking with them the greater part of the vitamin. Beri-beri is almost confined to those areas where polished rice is eaten. The amount of Vitamin B1 required depends on the amount of food burnt in the natural state. Rice and grain contain enough B1 to balance the non-fat calories; when the outer part of the grain is removed, this balance is lost. The disease of beri-beri begins with digestive disturbances, heaviness of the stomach, and in

typical cases, nervous symptoms follow. Sudden death from heart failure may often occur. Although there are variations in human requirements of Vitamin B1, some 250 units a day are required by a man taking about 3,000 calories in his food.

Riboflavin.—This is another member of the B complex and has only recently been separated as a pure substance. It is probable that the stimulating effect of the B complex in the growth of children is due to the riboflavin factor. Lack of riboflavin may produce raw lips, cracks and sores in the corners of the mouth, an increase of the visible blood-vessels in the cornea and retina, and roughness of the inner surface of the eye-lids.

Nicotinic Acid.—The disease of pellagra, so common in Western Europe in previous years, usually appears in the spring after the monotonous diet of late winter. The tongue becomes glazed, and resistance to sunburn is low. The hands become scaley and dark red. The patient's mental condition deteriorates, and unless treatment is forthcoming he dies in anything from two to fifteen years. It has long been recognised that this disease occurs almost exclusively amongst people who eat maize. It has recently been discovered that the pellagra-preventing factor is a water-soluble vitamin which is more stable than Vitamin B1. Nicotinic acid has proved outstandingly successful in combating the disease. The diets of people who have developed pellagra have contained little meat, which is one of the richest sources of nicotinic acid. Symptoms of the disease in the early stages are abdominal pains, indigestion, nervous and mental depression. Although no final results of recent research are available, it has been approximately estimated that ten mgm. per day is the optimum intake of nicotinic acid.

The Vitamin B Complex.—The members of the Vitamin B complex are found together in food, and the absence of one indicates, generally, the absence of the other members. B complex vitamins are found useful in the treatment of disorders of the digestive system.

Vitamin C—Ascorbic Acid.—This is the least stable of the vitamins and was often destroyed by most of the methods of preserving food used in previous times. As a result we have the importance of scurvy in the history of both war and exploration. Scurvy is marked by swollen and bleeding gums, skin bleeding or sub-skin bleeding, and in more serious cases, by the loosening of teeth. Lassitude and fatigue, loss of weight, anaemia, delayed healing, are further effects of this disease. It is difficult to deduce precise requirements for normal health. The Technical Commission of the League of Nations has advised that 30 mgms. per day of ascorbic acid are necessary to keep up an adequate quantity of Vitamin C in the body.

Vitamin D.—The most important function of Vitamin D is to promote the absorption of calcium and its deposition in the bone. At any age when the growth of bone is rapid, *i.e.*, young children, and there is a special demand for calcium, rickets or its equivalent may appear if the supply of Vitamin D is insufficient.

Calcium and Iron.—The bones of the human body are constantly being renewed. The constant intake of calcium is therefore necessary to make up for the loss occasioned by changes in bone structure, otherwise the bones may be weakened by the loss of calcium salts. The requirements of calcium can be put at approximately .5 gm. per day.

Iron is an essential element in the composition of haemoglobin, the red colouring matter of the blood. The red corpuscles in which the haemoglobin is contained are replaced about each seven weeks. It appears that 13 mgms. of iron are necessary to prevent anaemia and allow for a reserve store against loss of blood from any cause.

Roughage.—Not all food intake is absorbed by the body. A large proportion serves as roughage to stimulate the digestive and intestinal organs. Experiment has shown that sheer bulk is an important aspect of food intake, and it is in this respect that many nations suffer the greatest hardship.

CONSOLIDATED STANDARDS.

Having itemised the main constituents of food which are required to maintain an adequate standard of health, it is now necessary to synthesise this information in the form of a consolidated standard of basic human requirements. It is impossible to prescribe precise estimates of requirements, because so much variation takes place between individuals under changing circumstances. We can make lower limits of requirements, but if so, then we must ask whether we shall use as our criterion the minimum amount that is needed to prevent some obvious evidence of deficiency or some higher standard. Referring once again to Dr. Marrack, the position is put as follows: —

> "As a practical way of getting round this difficulty we can propose three levels of requirements; the lowest will prevent gross disease, the middle will prevent any obvious sign of deficiency, while the highest will ensure against any possibility of deficiency. The last is the only standard that we can choose as an ultimate goal."

Table IV has been prepared by Dr. Marrack from various individual standards of requirements.

There are certain difficulties with the standards used. Bacharach and Drummond make no distinction between carotene and Vitamin A. Standard 6, that of Stiebeling may be regarded as having been replaced by the later standard of Stiebeling and Phipard. It is the standard which was used by Sir John Orr in his assessment of the adequacy of British diet. The standard of Bacharach and Drummond for adults, and that of Stiebeling and Phipard for children, are the most modern. All the standards have much in common and can be used to assess the value of diets.

The significance of these standards of human requirements is that it becomes possible to specify the levels of diet at which the world's food and agricultural organisations should aim. The standards are the basis of food planning, and from them it is possible to judge the extent of existing food deficiency.

TABLE IV.—*Standards of Human Requirements.*

1. League of Nations, Technical Commission.
2. British Medical Association Committee.
3. Stiebeling and Phipard (1937).
4. Bacharach and Drummond; marginal.
5. Bacharach and Drummond; optimal.
6. Stiebeling (1933).

	Total Protein, gm.	Animal Protein, gm.	Fat, gm.	Calories.	Calcium, mgm.	Iron, mgm.	Vitamin A, I.U.	Vitamin B1, I.U.	Riboflavin, mgm.	Nicotinic Acid, mgm.	Ascorbic Acid, mgm.	Vitamin D, I.U.
Adult—												
1	1*a*	...	125	M. 2,400*b* F. 2,400	0.75	...	2,000— 4,000	250— 350	...	...	30	...
2	100	50	100	M. 3,400 F. 2,840	...	...	...	...	...	...	...	...
3	67	...	...	M. 3,000 F. 2,500	M.O. 68 F.O. 88	15	6,000	500	1.8	...	75	...
	50	30	30	3,000	0.75	10	3,000*d*	350	...	...	25	200
5	100	50	120	3,500	1.5	20	7,000*d*	1,000	2	10	75	500
6	M. 67 F. 75	...	...	M. 3,000*b* F. 2,500	M.O. 68 F. 1.0	15	2,400*c*	...	...	...	50*c*	...
Pregnant Woman—												
1	1.5*a*	68	125	2,400*b*	1.5	15	over 5,000	600–750	...	...	...	over 300
Nursing Woman—												
1	2*a*	68	125	3,000*b*	1.5	15	over 5,000	600–750	...	...	...	over 300
Child, 1–3 Years—												
1	3.5*a*	30	...	to 1,000	1	...	...	...	...	...	...	...
2	...	...	...	to 1,360	...	...	...	...	...	...	...	...
3	45	...	...	to 1,200	1	6	4,500	to 200	1.3	...	50	...
Child, 3–5 Years—												
1	3.0*a*	38	...	to 1,200	1	...	...	...	...	...	...	...
2	...	...	...	to 1,700	...	...	...	...	...	...	...	...
3	45–55	...	...	to 1,500	1	6–8	4,500	to 250	1.3	...	50	...

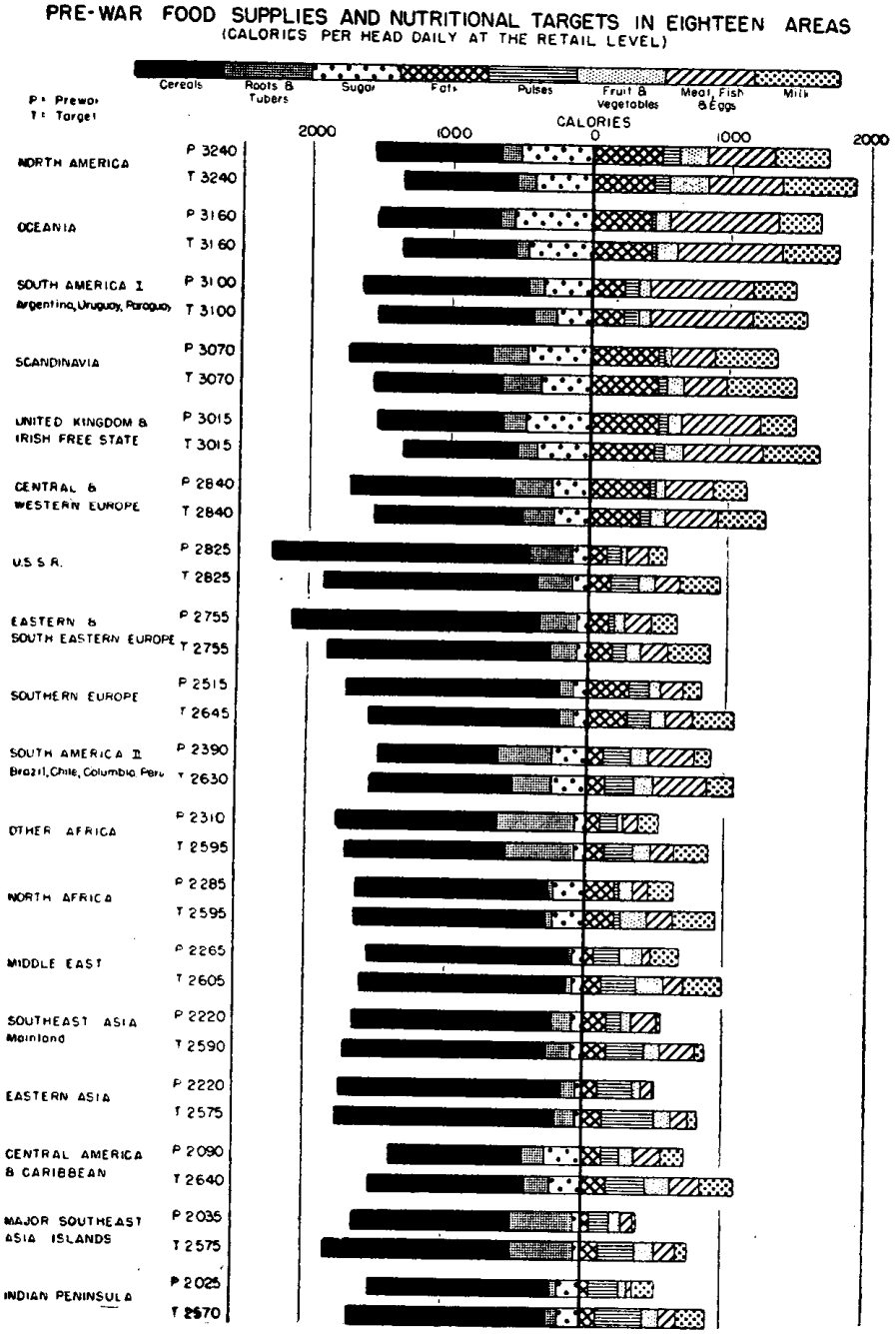
TABLE IV—*continued.*

	Total Protein, gm.	Animal Protein, gm.	Fat, gm.	Calories.	Calcium, mgm.	Iron, mgm.	Vitamin A, I.U.	Vitamin B1, I.U.	Riboflavin, mgm.	Nicotinic Acid, mgm.	Ascorbic Acid, mgm.	Vitamin D, I.U.
Child, 5–12 Years—												
1	2.5*a*	44	...	to 2,160	1	...	...	...	...	...	...	...
2	...	...	...	to 2,720	...	...	...	...	...	...	...	...
3	65–75	...	...	to 2,500	1	11–13	4,500–6,000	to 420	M. 1.8	...	50–68	...
Child, 12–15 Years—												
1	2.5*a*	56	...	to 2,400*b*	1	...	...	...	...	...	...	...
2	...	...	...	3,060	...	...	...	...	...	...	...	...
3	75	...	...	M. 3,000	1	M. 15	6,000	M. 500	1.8	...	M. 75	...
Child, 15–17 Years—												
1	2.0*a*	...	...	2,400*b*	1	...	...	...	...	...	...	...
2	...	...	...	M. 3,400 F. 2,840	...	...	...	...	...	...	...	...
3	75	...	...	M. 3,600 F. 2,500	1	M. 15 F. 13	6,000	M. 600 F. 420	1.8	...	M. 75 F. 68	...
Child, 17–21 Years—												
1	to 1.5*a*	...	...	M. 3,000 F. 2,400*b*	1	...	...	...	...	...	...	...
2	...	...	...	M. 3,400 F. 2,840	...	...	...	...	...	...	...	...
3	75	...	...	M. 3,600 F. 2,500	1	M. 15 F. 13	6,000	M. 600 F. 420	1.8	...	M. 90 F. 68	...

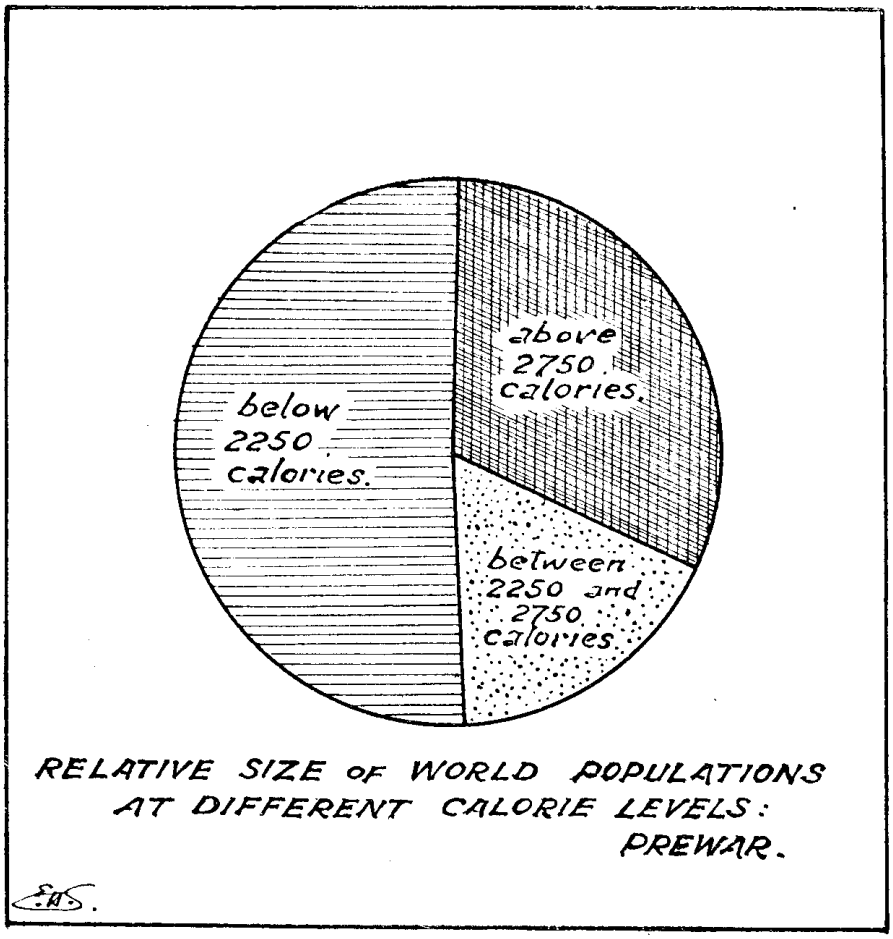
a Per kgm. of bodyweight. *b* With additions for special activities. *c* Given in Sherman units; the factor for conversion into I.U. is somewhat uncertain. *d* Either as performed vitamin A and carotene. M.—Male. F.—Female.

THE PRE-WAR FOOD POSITION.

In examining the extent by which the actual intake of food has deviated from the standards of minimum requirements, reference is made first of all to the position in regard to food supplies and distribution in the pre-war period. The results are summarised in the diagram A in terms of calories per head of population daily. Each long bar on the left of the diagram represents the total number of calories per head daily furnished by the food supplies



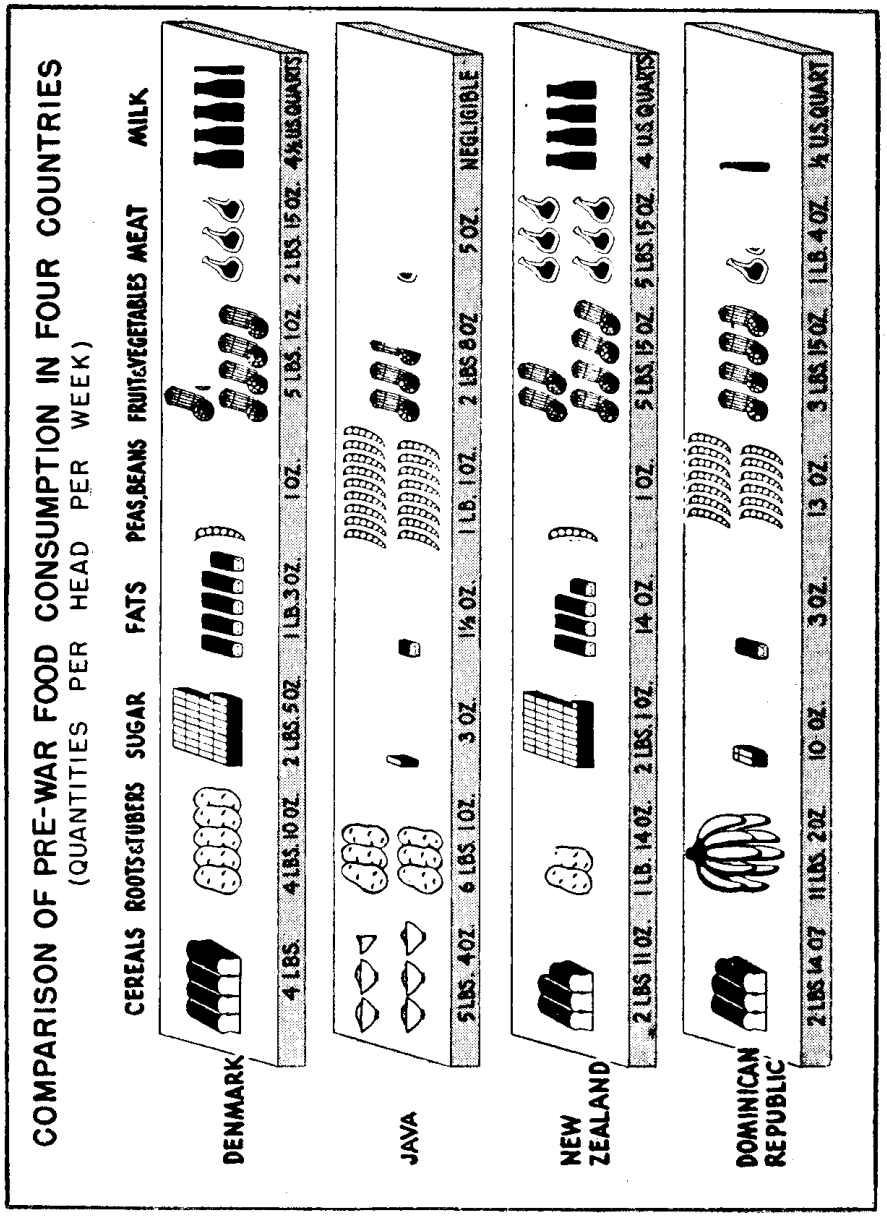
available in each country. The bars are divided to show the number of calories yielded by the different food groups. Calculations based on pre-war populations show that in the years before the war, in areas containing over half the world's population, food supplies at the retail level were sufficient to furnish an average of less than 2,250 calories per head per day. Food supplies furnishing an average of more than 2,750 calories per head per day were available in areas containing less than a third of the world's population, while in the remaining areas—about 1/6th of the world's population—food supplies were between these high and low levels. This statistic is shown graphically in Diagram B. The high calorie areas include most of the western world, all of North America and much of Europe. The medium calorie areas include most of Southern Europe, three countries in Asia, part of



the Middle East, part of Africa, and part of South America. Low calorie areas include most of Asia, part of the Middle East, all of Central America, and probably parts of South America and Africa. But mere averages do not themselves tell the whole story. Some people obtain considerably more than the average, while a large number have less. Even in the high calorie areas, a considerable proportion of the population is under-nourished.

The areas of greatest deficiency are Central America and most of Asia. Many of these low calorie countries are in the tropics and sub-tropics. It is evident that about half the world's population was subsisting before the war at a level of food consumption insufficient to maintain normal health, let alone provide for the growth of children or the supply of adequate energy for normal work. Poor nutrition is associated with high death rates and a low expectation of life, high infant mortality, increased susceptibility to disease and impaired working capacity.

Countries and areas with average calorie levels, around the 3,000 mark or better, had well-balanced national diets, *i.e.*, North America, Australia, New Zealand, Argentina, Great Britain, Scandinavia the Netherlands, Switzerland, and Germany. In all



these countries the consumption of cereals in relation to that of other foods was relatively low and averaged about 1,000 calories and about 50 gms. of protein. This general pattern conflicts sharply with that in countries where the average total of calorie supplies was round the 2,000 mark, *i.e.*, in India, Java, the Philippines, Korea, Iran, Iraq, Trans-Jordan, Mexico, El Salvador, Costa Rica and Columbia. Here the low average energy value of the diet reflected widespread poverty a large proportion of the total calories being obtained from cheap foods rich in carbohydrates, such as cereals.

F.A.O. selected four countries—New Zealand, Denmark, Java and the Dominican Republic to illustrate differences in pre-war national food supplies (see diagram C). In New Zealand with a high average food consumption, diet was well balanced. Calories from cereals amounted to less than 1,000 and consumption of meat, milk and fat was high. The supply of protein averaged 96 grams, of which 65 per cent. was of animal origin. Denmark was the highest food consumer among the Scandinavian countries. It is of interest to note that Denmark and New Zealand, though situated on opposite sides of the earth and differing in many characteristics of national life, consumed approximately similar kinds of diets. Cereal consumption was equally low and milk consumption equally high in the two countries. The main differences were that while consumption of meat, fish and eggs in Denmark was comparatively high, the consumption of these foods in New Zealand was twice as great; but on the other hand Denmark consumed half again as much fat as New Zealand. When there is abundance and variety of food and purchasing power is high, countries tend to choose a diet fully adequate for health.

Java and the Dominican Republic, by contrast, were examples of countries with low average levels of consumption. In Java, with a total calorie supply of about 2,000, the calories furnished by cereals were more than 1,000 per caput daily. Carbohydrate intake was further increased by the consumption of large quantities of cassava, so that not only was the average supply of animal protein almost negligible (4 grams) but the total protein (43 grams) was the lowest recorded in all the 70 countries surveyed. The Dominican Republic was little better off; the main difference lay in the larger intake of animal protein, accounted for by the considerably greater consumption of milk, meat, fish, and eggs. Bananas were included in the "roots and tubers" group in the case of this and other tropical countries in which they were a staple article of diet. In nutritive value they are akin to this group.

Income and Nutrition.—Poverty is the chief cause of malnutrition. In all countries in which the supply of calories per head is less than 2,250 per day pre-war, the average income was less than U.S. $100 per annum. On the other hand there were 365 million people living in countries in which the average supply of calories exceeded 2,900 per day. Of these, 342 million were in countries in which the average income exceeded $200 a year.

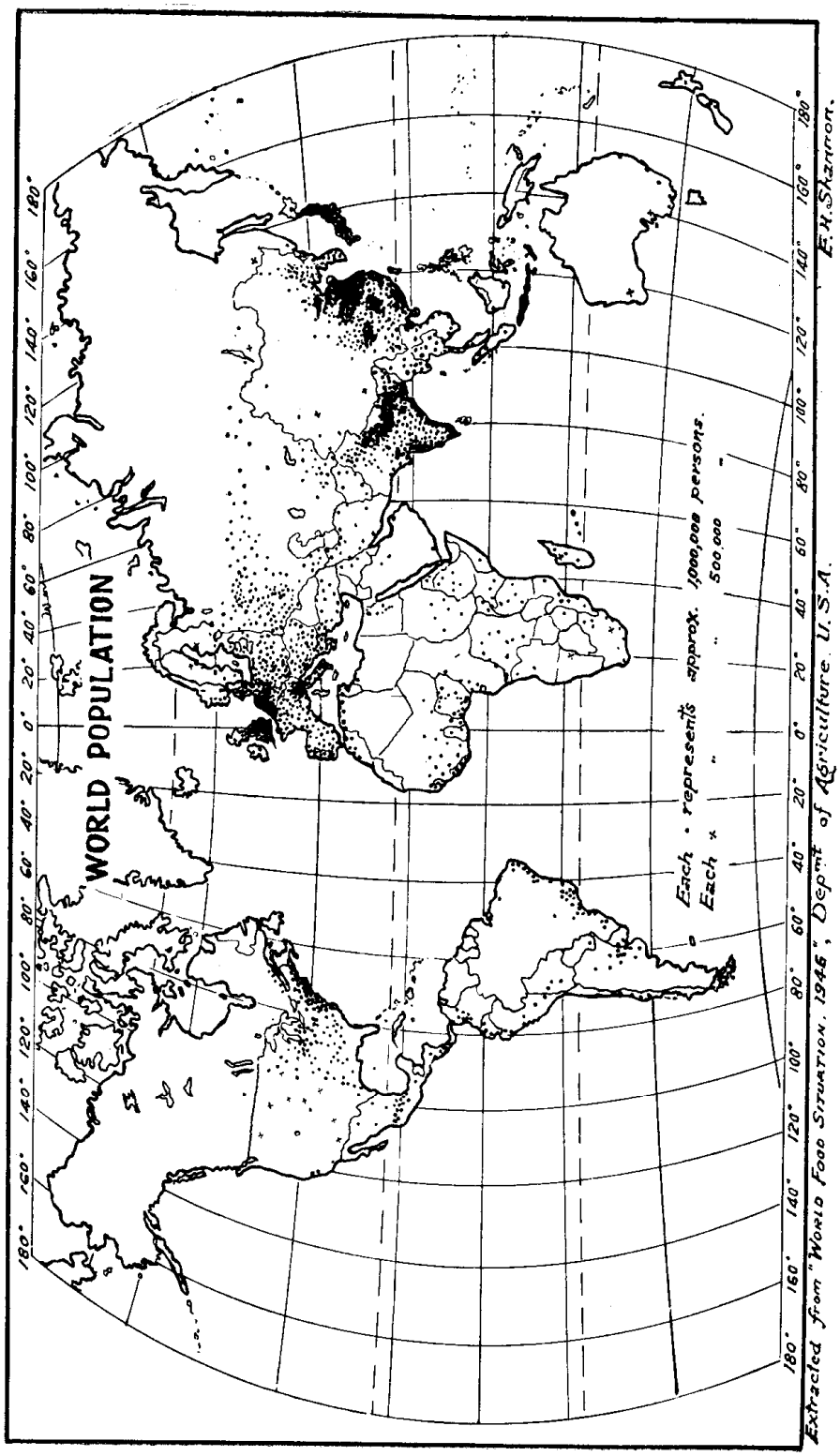
POST-WAR NUTRITIONAL LEVELS.

Before examining the position with regard to post-war nutritional levels, it is appropriate at this stage to consider some geographical factors basic to all food problems. In the first place it is most important to have before us constantly the contrasting pictures of world population and world production and distribution. The majority of the peoples of the world are found in South-East Asia, in India, Java, and the Indies, China, Japan, and the Philippines. The remainder of the world's population is scattered over Northern Asia and the other four continents with the densest concentration in Belgium and Holland. The production distribution is almost the complete reverse, the centres of productivity being North America, South America, Australia, South Africa and Europe (pre-war). The areas of densest population are the areas of lowest productivity (see map of World Population Distribution).

The recent war had enormous disruptive effects on the pattern of world food supply and distribution. Europe, which had previously been almost entirely self-supporting as far as food was concerned, suffered severely from the inroads of war, and is still struggling to rehabilitate its agriculture. The shortage of agricultural machinery, lack of capital, the disruption of manpower supplies, the shortage of fertilisers, and the absence of political stability, have all contributed to Europe's enormous food probem. The zoning of Germany and other political changes in Europe, in particular have acted as retarding influences. Into the enormous vacuum thus created by the war in Europe, the Allied Nations have poured a considerable proportion of their agricultural production and the process is still taking place. In the East the war with Japan had disastrous effects on rice production in some areas and rehabilitation is difficult.

Nutrition and health are little better this year than in 1945-46, in some countries worse. Many people have been living for five or six years on a subnormal diet and the cumulative effects are now becoming apparent. Surveys among certain groups have shown increasing incidence of hunger oedema, anaemia, and vitamin deficiency diseases. Infant mortality rates remain high and tuberculosis has become more prevalent.

Average intake of calories continues to be most seriously low in the Orient and Continental Europe. In parts of China there are large groups, substantially larger than pre-war, which obtain less than 1,000 calories daily. In Germany where the national average is now about 2,000 calories, a substantial number of people, without access to supplementing supplies through the black market and elsewhere, subsisted until November on a diet of 1,200-1,300 calories and are now obtaining about 1,600 calories.


WORLD POPULATION
Each • represents approx. 1,000,000 persons.
Each × " " 500,000 "
E.H. Shannon.
Extracted from "World Food Situation, 1946", Dep^mt of Agriculture, U.S.A.

How has the recent war affected nutritional levels? The following table, prepared by F.A.O., shows the estimated calorie consumption levels, 1946-47, in relation to pre-war levels:—

TABLE V.

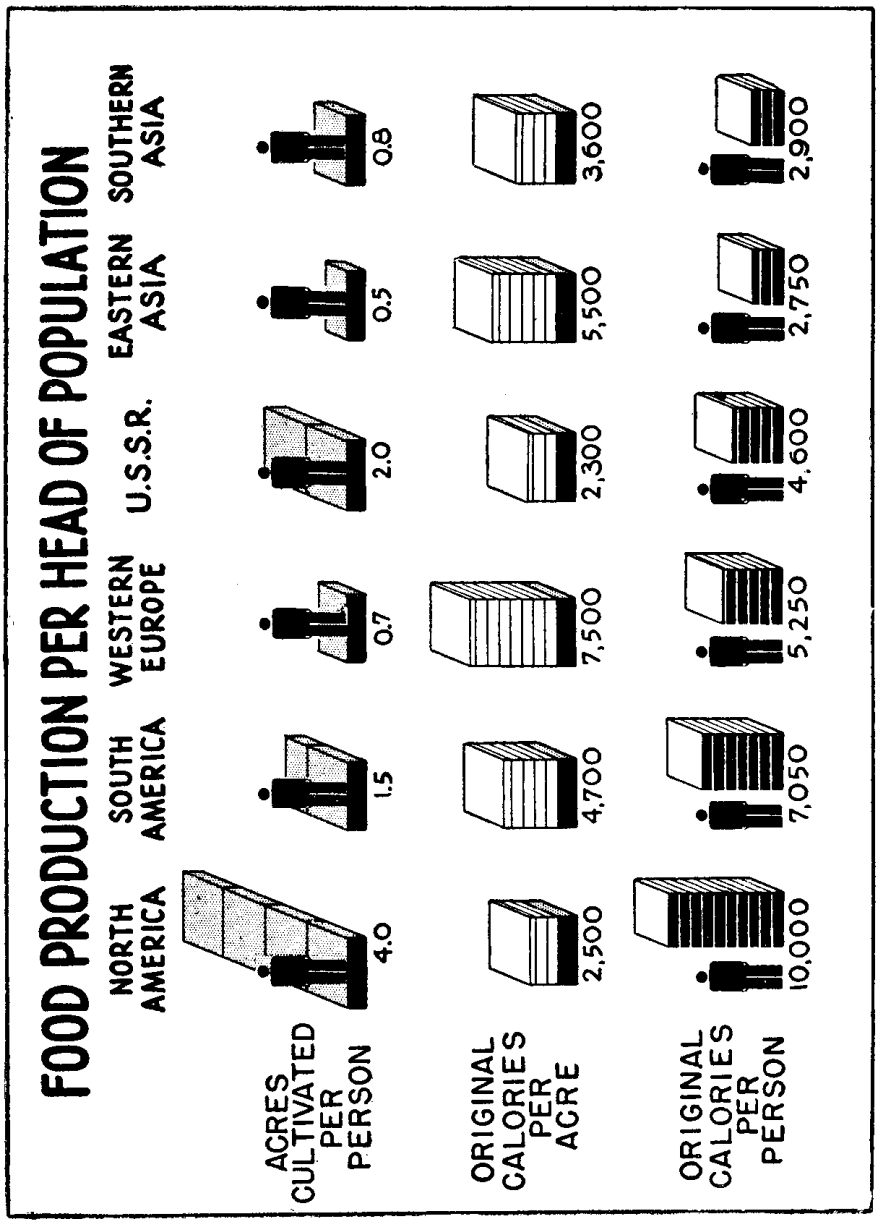
Estimated Pre-war Consumption (Calories per Caput Daily).	Estimated 1946–47 Consumption Levels.*		
	Countries with less than 80% of Pre-war Diet.	Countries with 80–95% of Pre-war Diet.	Countries with over 95% of Pre-war Diet.
1,800 to 2,100 ...	India (parts of).	Korea. Philippines. India (parts of). Java.	Mexico. Colombia. Iraq. Iran. Central America Peru.
2,100 to 2,400 ...	China (parts of). Malaya.	China (parts of). Algeria. Tunisia. Portugal.	Indo-China. Siam. Caribbean area. Egypt. Tropical Africa. Burma. South Africa. Syria and Lebanon.
2,400 to 2,700 ...	Manchuria (parts of).	French Morocco. Greece. Manchuria (parts of). Italy. Poland. Spain.	Chile. Brazil. Palestine. Turkey.
2,700 to 3,000 ...	Rumania. Austria. Germany.	Hungary. U.S.S.R. Bulgaria. Yugoslavia. Belgium. Uruguay. Cuba. Finland. Netherlands.	Czechoslovakia. Paraguay.
3,000 to 3,300 ...	.....	United Kingdom. France. Switzerland. Norway.	Sweden. Canada. Australia. Ireland. Denmark. United States. Argentina. New Zealand.

* Countries are arranged in order of their relative pre-war food consumption in terms of calories.

A fall of 30-40 per cent. in available calories is bad under any circumstances. It is worse when the pre-war calorie level was less than 2,200 calories per person as in several Oriental countries. Estimated average calorie consumption levels this year in parts of India are less than 80 per cent. of the pre-war range of 1,800 to 2,100 calories in these areas. Similarly, in other parts of India and in Korea, the Philippines, and Java, where the pre-war range of calorie consumption was 1,800-2,000, estimated gains stand at 80-95 per cent. of pre-war.

The quality as well as the quantity of national diets varies more widely than before the war. The best fed people are taking a high proportion of their calories in the form of fats and animal products, especially meat and milk, although their consumption of these was already high. But the people in the deficit countries of Europe are getting a smaller proportion of these products than before the war, while in the Orient consumption of animal products was so infinitesimal that there has been little room for significant shifts.

Although the world food situation is slightly better in 1946-47 than it was in 1945-46, grave contrasts still persist between the favoured and the disadvantaged countries (see diagram D). On the one hand, most of the Western Hemisphere food exporting



countries continue to consume more than before the war and, in particular, per caput consumption in the United States surpassed the 1945-46 figure. On the other hand, there are countries in which calories available per caput are about 60 per cent. of pre-war and some in which many people this year, as last year, obtain less than 1,000 calories per caput daily.

The evidence of malnutrition is striking. In Austria in 1945, the average birth-weight of infants was reported to be .5 kilogram below normal. In Germany, children between seven and fourteen years of age are badly nourished. In Yugoslavia, infant mortality is said to be 370 per thousand live births, compared with 170 before the war; in Greece it is estimated to be 185. In both countries tuberculosis has greatly increased. Such conditions as these can only be expected, in view of the prevailing ration levels of 1,100 to 1,500 calories among large groups. The degree of malnutrition depends not only on the calorie levels, but on the length of time that the individual has had an inadequate diet. For example, many city-dwellers in the former Nazi occupied countries —Poland, France and Belgium—subsisted for five years on a diet of about 1,700 calories or less. Although the situation has improved, some of them are still experiencing the physiological consequences of prolonged under-nourishment. There is no doubt, however, that with the exception of Germany and Austria, the state of nutrition in Continental Europe is just a little better than in 1945-46.

The latter half of 1946 was a period of great privation in many areas of the Orient. Evidence of nutritional status is scanty. In 1946, in one area of China, 32 per cent. of the population was suffering from famine oedema. In some districts the average calorie intake was reported to be below 500 per head daily. The people were eating grass and weeds. In many districts of Northern China malaria was endemic, and relapsing fever, dysentery, some malaria, and many other diseases were present. An observer commented:—

> "Weakened by hunger, these mal-nourished people are subject to any infection."

An expert nutrition committee convened by F.A.O. at the end of 1946, advised that an intake of 1,900 calories a head daily would represent a *minimum subsistence level* in European countries "needed to prevent the most serious undernutrition and the danger of civil unrest." This conclusion was based on both nutritional principles and recent experience. This intake level was equivalent to about 2,000 calories at the retail stage, but owing to inequalities in food distribution—for example, differences in consumption in rural and urban areas—the calorie intake of some sections of the population was likely to fall below the danger point if the national average supply of calories per caput were less than 2,200 at the retail level. Every effort would therefore have to be made, on nutritional grounds, to provide sufficient food imports to raise the national average number of calories available per caput to 2,200 in countries whose indigenous food supplies were inadequate for this purpose.

The nutrition experts also advised that calorie intake per caput for subsistence might be somewhat lower than 1,900 calories a day in eastern and tropical countries generally. This conclusion was based on the smaller average size of the people in those countries, differences in age distribution and in climate, and various other circumstances. The subsistence level of calorie intake suggested was 1,500-1,600 a head daily. With comparatively good distribution, the national average figure that would have to be reached to prevent sections of the population falling below the subsistence point would have to be about 1,900 calories at the retail stage. If total food supplies were to be sufficient to maintain the national average figure at this level, substantial food imports would have to move into a number of the smaller countries or areas in the Far East. Disparities in consumption in India and China were great because of their large area, differences in regional dietary habits, transport difficulties, etc.; hence, even though daily calories available per caput at the retail level were in the neighbourhood of 1,900 or above, these countries would probably still need considerable help in order to satisfy the urgent needs of various areas. The populations of India and China together amounted to perhaps 850 million people.

A *temporary maintenance level* of calorie intake of 2,200 a head daily in European countries was put forward by the nutrition committee. Here again allowance was made for "spread," and unless the national average at the retail stage was at least 300 calories above this, the intake of considerable sections of the population was likely to be below 2,200. At this level of consumption, consideration would have to be given to the question of increasing protein intake. While "temporary maintenance" consumption was far from satisfactory, it would, in comparison with "emergency subsistence" consumption, allow for better growth of children, improvement in general health, and an increased output of work.

The nutrition committee was strongly of the opinion that consideration should be given to the nutrition requirements of countries in allocating food supplies, and it suggested methods which would facilitate the application of nutritional principles in deciding allocation policies.

Thus far we have considered the standards of human requirements and proceeded to discuss pre-war and post-war nutritional levels in relation to these scientific standards. The most compelling and startling fact which emerges from the discussions so far is that present nutritional levels in many countries are far below the standards of human requirements as opposed to emergency standards. F.A.O. is constantly concerning itself with this very problem, and no doubt it sets the major task for the new World Food Council. Having thus set world nutritional levels into some reasonable perspective, it is now necessary to relate these facts to trends in the production, consumption and distribution of agricultural production. This can be done in two stages:—(*a*) Firstly we will take our absolute standards, keeping in mind present

nutritional levels, and examine the targets of production and consumption which must be met if the level of subsistence is progressively to be raised. (*b*) The most recent trends in production and consumption will be observed in order that it may be possible to ascertain the extent by which our expected efforts will reach towards the optimum targets.

NUTRITIONAL AND PRODUCTION TARGETS.

Where the food consumption is already adequate in the quantitive sense, the optimum standard can be applied to determine the changes in food supply necessary to improve the quality of national diet. But in many of the countries with a medium calorie intake and those with a low intake, consumption goals must be set considerably below the optimum if they are to be attained in any reasonable time. Early in 1946, F.A.O. convened a small group of nutrition experts to consider the question of targets with the estimates of pre-war food supplies as the starting point. It was agreed that the target should call for modification of existing diets rather than revolutionary changes. A group of experts suggested the following principles and methods to approach the problem:—

(1) A per head calorie intake of 2,500-2,650 to be taken as the minimum level to which intake should be raised in the low calorie countries.

(2) If calories from cereals fell between 1,200 and 1,800 no change should generally be recommended. If they fell below 1,200, and if the total calories were below 2,600, increase in cereal intake was recommended.

(3) No increase in the intake of sugar was recommended.

(4) Calorie intake from fats should be at least 100, preferably 150 to 200.

(5) Calories from pulses should reach 250 to 300 daily.

(6) Calories from fruit and vegetables should be at least 100 per head daily.

(7) Not less than 100 calories per head daily, preferably 150 to 200, should be derived from meat, fish and eggs.

(8) An intake of 300-400 calories per head daily was considered the desirable minimum level of consumption of milk and milk products.

Diagram A shows how the targets were set up in eighteen areas in terms of total calories and calories from various food groups, together with pre-war consumption levels for purposes of comparison.

In nearly all the groups of countries at the low calorie level an increase of cereal consumption was advocated to raise the total calorie intake. A substantial increase in the consumption of fats, pulses, fruit and vegetables, milk, meat, fish and eggs was called for.

TABLE 6.

Pre-war Food Supplies (P) and Percentages Changes Required to meet Nutrition Targets by 1960 (T) for Four Areas.

(Amounts in 1,000 metric tons—Changes as per cent. of pre-war supply.)

Category.		China—22 Provinces (15% increase in population by 1960).		India (25% increase in population by 1960).	
		Amount.	Change.	Amount.	Change.
Cereals (whole grain) ...	P	89,760		64,800	
	T	103,220	+ 15	90,000	+ 39
Roots and tubers (fresh)	P	17,700		6,780	
	T	29,380	+ 66	13,760	+103
Sugar	P	610		5,540	
	T	700	+ 15	6,925	+ 25
Fats and oils	P	2,290		1,070	
	T	3,620	+ 58	2,280	+113
Pulses, nuts, and cocoa ...	P	11,300		8,550	
	T	11,970	+ 59	15,730	+ 84
Fruits and vegetables ...	P	18,300		13,540	
	T	78,140	+327	58,220	+330
Meat, fish and eggs ...	P	6,015		3,000	
	T	8,720	+ 45	12,150	+305
Milk, fluid equivalent ...	P	20		23,500	
	T	1,150	+ 5,650	37,600	+ 60

Category.		South-eastern Europe (10.4% increase in population by 1960).		South America (48.6% increase in population by 1960).	
		Amount.	Change.	Amount.	Change.
Cereals (whole grain) ...	P	11,430		7,110	
	T	11,100	— 3	12,090	+ 70
Roots and tubers (fresh)	P	2,215		10,720	
	T	2,790	+ 26	13,080	+ 22
Sugar	P	280		1,220	
	T	310	+ 10	1,815	+ 49
Fats and oils	P	270		330	
	T	350	+ 31	545	+ 65
Pulses, nuts, and cocoa...	P	315		1,115	
	T	610	+ 93	1,900	+ 70
Fruits and vegetables ...	P	5,000		9,770	
	T	8,900	+ 78	16,940	+ 73
Meat, fish and eggs ...	P	1,370		3,130	
	T	1,520	+ 11	4,975	+ 59
Milk, fluid equivalent ...	P	6,020		3,980	
	T	10,650	+ 77	11,300	+184

In the case of medium and high calorie countries, the targets for Eastern and Southern Europe and for the U.S.S.R. call for increase in the consumption of fruit and vegetables and milk, with some reduction in cereals. Targets for North America, the

British Isles, Scandinavia, Central and Western Europe and Oceania represent adjustments within high calorie intake rather than an increase in total consumption.

What would the attainment of these targets require in terms of actual quantities of the different foods? The targets indicate desirable improvements in diets, but they do not indicate the objectives to be reached within any specific period of time. This time requirements which depends on the whole economic welfare of the countries concerned and the degree of international co-operation, will have to be determined at a later stage when governments consider the measures they are going to take to achieve satisfactory food consumption goals. Table 6 shows the food supply requirements for a number of countries that were at low or medium calorie levels before the war, with 1960 as the assumed date for reaching the targets.

Table 7 shows in percentages the order of increases and supplies required for seventy countries included in the F.A.O. survey, assuming that the targets were reached by 1960 and that world population has risen 25 per cent. by that date.

TABLE 7.

World Food Needs in 1960.

(Approximate per cent. increase over pre-war supplies required to meet targets, assuming a 25 per cent. increase in world population.)

Commodity.	Per cent.
Cereals	21
Roots and tubers	27
Sugar	12
Fats	34
Pulses	80
Fruits and vegetables ..	163
Meat	46
Milk	100

Countries with inadequate food supplies must obtain the additional food needed to raise nutritional levels by importing from other countries, by producing more themselves, or by a combination of both. Although international trade in food will be likely to increase, the greater part of the additional supplies required by the low calorie countries to reach the consumption goals suggested will have to be obtained by an expansion of domestic production. The food supplies of most of the least developed countries consist largely of cereals and other foods of plant origin. In general, the targets are diets containing more foods of animal origin. The pre-war North American diet contained about 2,200 calories per head daily from food of plant origin, and about 870 calories from livestock products. In South-east Asia the diet contained about 1,940 calories from plant products, and only 100 from livestock products. To expand consumption in the less developed countries large increases of imports may be needed in addition to local production. Great improvements in farming efficiency must be effected. In the case of India it has been estimated that per acre yields of grain could be increased by 30 per

cent. in ten years—5 per cent. by use of improved varieties, 20 per cent. by manuring, and 5 per cent. by protection against pests. Similarly, improvements can be made in the case of livestock production. Major changes in land use pattern must take place.

The heart of the problem is to increase individual productivity. The degree to which a country suffers from over-population depends upon the extent to which its people are fully and productively employed. In some countries one-fifth of the population produces a national diet and can supply up to 8,000 "original" calories per person per day. In contrast with many of the less developed countries two-thirds or more of the population produces an inferior diet of 2,800 to 3,000 "original" calories for the country as a whole. This output of food per man is ten times greater in the advanced than in the poorer countries. "The conclusion is inescapable," says F.A.O., "that food for the world can be produced in much greater abundance by fewer hands."

TRENDS IN PRODUCTION.

To what extent is production approaching the targets previously discussed?

The demand for agricultural production depends upon buying power. Consumers of farm products had unusually large amounts of money to spend in 1946 and in the first half of 1947. Economic conditions have naturally varied materially between countries. Many undamaged countries—U.S., Canada, Australia and Sweden, —had expanding domestic incomes and consumer-buying power. While there were large amounts of money to spend, supplies of goods were relatively short. Judging from recent developments, it appears that employment and consumers' incomes will generally continue high during the rest of 1947 and in 1948. The same factors which have been causing high money incomes—reconstruction and rehabilitation activities, investment programmes, export surpluses in some countries, and public deficits—seem likely to continue to operate in 1947-48. In many countries, however, purchasing power seems likely to continue to outrun supplies. Although the value of trade in 1946 was above pre-war the amount was actually less, being only about 85 per cent. of the pre-war average. The war and post-war developments have made a big difference both in the origin and destination of goods, which is shown in the folllowing table:—

TABLE 8.

Physical Volume of Total Exports, by Groups of Countries in Proportion to Pre-war World Total.

	Pre-war. (1936–38.)	Post-war. (1946.)
	Per cent. of 1936–38 Average.	
Damaged Countries—		
Reconstruction countries	25	3
Rehabilitation countries	30	19
Undamaged Countries—		
Under-developed countries	15	14
Industrially-developed countries	30	49
All Countries	100	85

The badly damaged countries such as Greece, Poland, Italy and China exported only one-third as much in 1946 as pre-war. The less severely damaged group, including the United Kingdom, Belgium, France, the Netherlands, exported 65 per cent. of pre-war, while the industrially-advanced undamaged group, including U.S., Canada and Australia, was the only group which exported a larger physical volume of goods in 1946 than pre-war.

The principal cause of the continuation of the world's food crisis has been the difficulty in recovering from the sharp wartime decline in agricultural production in Europe, Asia, and the areas occupied by Japan. Agricultural rehabilitation has begun and improvements have been made, but full recovery will be a long and difficult process. Food output expanded during the war in several exporting countries, notably those of the Western Hemisphere. The present level of world exports of the principal foodstuffs can be compared with pre-war as follows:—

TABLE 9.

Supplies of Major Foodstuffs Entering World Trade Pre-war, 1945-46, *and* 1946-47.

Commodity.	Pre-war.	1945–46.	1946–47 (estimate).
	(Million metric tons.)		
Cereals (excluding rice)	29.4	26.0	25–26
Rice (milled)	7.8	2.0	2.7
Fats and oilseeds (fat content)	5.9	2.7	2.8–3.0
Sugar (raw basis)	11.5	7.3	8.0
Meat	1.9	2.8	1.8–2.0

Except in the case of meat, the volume of world exports is much less than pre-war. Production in 1946-47 showed an improvement over the very low levels of 1945-46.

Europe.

Estimated 1946-47 calorie supplies per person in the worst areas of Europe—Germany and Austria—are about 2,000, or about 30 per cent. below pre-war. In the Scandinavian countries conditions are most favourable. There the decline is 7 to 8 per cent. For Continental Europe as a whole the calorie supplies per person are about 15 per cent. below pre-war.

Europe's 1946 harvest showed some improvement over 1945. Wheat and rye were 80 per cent. of pre-war compared with 60 per cent. in 1945, potatoes 73 per cent. compared with 62 per cent. in 1945, beet sugar about two-thirds compared with one-half in 1945. There was a major failure in maize in South-west Europe, the result of prolonged drought in the growing season. Milk cow numbers, except in Germany and Austria are now about 80-90 per cent. of pre-war in Western Europe, 50 per cent. in the East.

While European food production is trending slowly upward, imports remain approximately the same, with a slight decline in meat, a slight increase in sugar and fats, and no change in grains. The gradual suspension of U.N.R.R.A. assistance during the first half of 1947 will seriously reduce the food supply and retard economic recovery, especially in Poland, Yugoslavia, Greece, Italy, and Austria. Total indigenous production in the 1946-47 consumption year is estimated as sufficient to supply 2,100 calories per head daily at the retail stage. For Continental Europe as a whole, such a food output may be estimated at around 90 per cent. of the pre-war, in terms of calories, compared with about 80 per cent. produced in 1945-46.

Preliminary estimates are:—

Countries.	Indigenous Production, 1946–47. Calories per person per day.
Denmark, Sweden, Hungary-Yugoslavia-Roumania	Above 2,800
Czechoslovakia, Bulgaria, Poland ..	2,400-2,800
France, Spain, Switzerland, Finland ..	2,000-2,200
French North Africa, Italy, Portugal, Netherlands, Norway, Germany ..	1,600-1,950
Greece, Austria, Belgium	Below 1,600

As the basis for comparison, pre-war consumption is estimated to have averaged about 2,500 calories a head daily in Mediterranean Europe, 2,700 in the Danube Basin and Poland, and 2,850 in the rest of Continental Europe, or an average of 2,750. Should the production estimates given be realised, imports of foodstuffs equivalent to about 16 million metric tons of wheat would be required to bring the average consumption of Continental Europe to about 90 per cent. of the pre-war level. Most European countries are attempting to restore production of bread grains to the point where the import requirements of cereals would be at a minimum. In a few European countries grain production is at or near pre-war levels. Prospect for the 1947 harvest have been impaired by bad weather conditions during the winter, resulting in a great deal of damage to crops. There has been a considerable amount of re-seeding. The problem of increased livestock production has been confronted and there is an indication that livestock numbers are on the increase.

The Orient.

The latter half of 1946 saw great privation in the Orient, but the early crops of 1947 were expected to bring substantial relief and improvements in diets. Famine conditions prevailed in South China and were prevented in India only by a national system of procurement and rationing. Cereal ration reduction in many districts of India was about 360 calories below the national average of a mere 2,020 calories. In Japan considerable imports were found to be needed to bring consumption to the minimum sustenance level of 1,400 to 1,500 calories. Maize and rice were short in the Philippines and in Malaya. The 1946 rice crop of

South-east Asia showed a slight improvement on the 1945 figure. Wheat production in Northern India and Northern China also improved. The after-effects of war had made rehabilitation particularly difficult in such areas as Manchuria, Korea and Formosa. In the rice-exporting countries of Burma, Siam, Indo-China, rice acreage is still below pre-war and only small surpluses are available for export. The available supplies of wheat and rice indicate a probable reduction in the average calorie level for the Orient as a whole of some 12 to 14 per cent. below pre-war, and it must be remembered that even the pre-war figure was often around the bare sustenance minimum. Attempts to calculate food deficits or shortages for this particular area which accounts for over 50 per cent. of the world's population, or some 1,150 million people, are hazardous. The additional bread grain which is expected to be needed up to the middle of 1947 was estimated at about 10 million metric tons, or 375 million bushels. These estimates are not "statements of requirements" or forecasts of effective demand, but rather are indications of the imports which would be needed to offset about one-half of the difference between indigenous grain supplies and the amount required to bring per head grain consumption back to the pre-war level. Shortages of machinery and fertilisers have retarded recovery. The areas sown to rice in Asia in 1946-47 was approximately 77.3 million hectares as compared with the pre-war average of 79.7 million. With the restoration of production facilities, the 1947-48 output in many commodities may be larger than that of 1946-47, but the total will be appreciably below the inadequate pre-war level.

Other Regions.

Most of the other regions of the world enjoy a food supply relatively unimpaired by the war or already recovering from war-time conditions. This applies to the Middle East, Africa, North and South America and Oceania. In French North Africa, the Union of South Africa, and some parts of the Middle East, the purchasing power of the local population has increased and in spite of higher food prices diets are better than they were before the war. Australia, New Zealand and Canada are consuming at least as much food per head as before the war. United States per head consumption is 15 per cent. higher than pre-war. The prevailing high prices for agricultural products are providing incentives to higher levels of agricultural production in these countries.

Long-term Prospects.

Long-term aspects of agricultural production trends include programmes which seek to achieve the maximum of self-sufficiency. In parts of Eastern Europe the land reform programmes now in effect will in the long run contribute to increased livestock numbers. Several major land reclamation schemes and irrigation works are planned in a number of countries. Expanded production in the Middle East is expected. In Central Africa governments are developing plans to increase output in many parts of this area. In the Far East several countries have long-term re-settlement projects requiring from five to fifteen years

for completion. Land reform programmes are under way in several Far Eastern countries. Agricultural production in the United States, Canada, Australia and New Zealand is likely to be encouraged to stay at its present high level.

The cereals harvest in the Northern Hemisphere is expected to be lower than in 1946 because of the winter conditions in Europe, rust in India, drought in China and excessive rains in the United States. Europe's bread grain output may prove to be from four to six million tons lower and India's wheat crop is reported to be down about one million tons. A marked improvement is expected in the U.S.S.R. and certain other areas of Eastern Europe over the 1946 figure.

The Southern Hemisphere grain harvests are expected to show marked improvement, particularly in the case of Australia.

World sugar supplies of 1947-48 will probably be only a little better than 1946-47, because the substantial increase of output in Europe may be almost matched by the anticipated decline in Cuban production. Production of fats and oils continues to show steady improvement, and supplies in 1947-48 should be better than 1946-47. The output of meat and milk in 1947-48 is likely to show only a little improvement over 1946-47, because while in Europe and the Southern Hemisphere some increase in domestic fodder crop output may occur, the world-wide shortage of feedstuffs continues. In Europe livestock numbers are expected to show a slight increase, but meat output is expected to remain low. (Reference: World Meat Production and Consumption—"Review of Marketing and Agricultural Economics," September, 1947.) World fish production has steadily increased since the end of the war, but has not yet regained pre-war levels.

What is the general food balance? The damage caused by the war to agriculture in Asia and Europe is slowly being repaired, but adverse weather has checked recovery in food production this year, especially in parts of Europe. In Asia the overall indigenous food output is likely to remain substantially unchanged compared with 1946-47. Unless food imports can be raised, there seems little or no prospect of improvement beyond the existing unsatisfactory level of 1,700 to 2,000 calories. In Western and Central Europe indigenous food supplies are likely to be considerably smaller in 1947-48, and the already low calorie level may fall a further five to ten per cent. unless food imports can be increased. Fortunately, larger food exports from producing countries are expected this year. There should be more fats for exports and more grain, especially from the Southern Hemisphere. There is a possibility of grain exports being made available from U.S.S.R. and South-eastern Europe. The minimum grain import requirements may approximate thirty-four to thirty-eight million tons. Supplies available for export may tentatively be estimated at thirty to thirty-four tons. Thus it may only be barely possible to achieve the target of maintaining bread rations. However, it is by no means certain that such high export programmes will be fulfilled.

CONCLUSION.

It is strikingly clear that in many areas, notably South-east Asia, food intake was not sufficient to provide for minimum human requirements even in pre-war years. High death rates point to the extent of chronic malnutrition and the subsequent inroads of disease. The recent war worsened the position. The agricultural systems of Europe and Asia were gravely disorganised, and the struggle for rehabilitation has only just begun. Nutritional levels in many countries are worse than pre-war. Present production, accompanied by careful distribution, can only be expected to maintain these suffering populations at a subsistence level. The task of F.A.O. is to so plan production and distribution that nutritional standards may be raised to some approximation of the scientific estimates of requirements.

In two subsequent articles, the history of F.A.O. will be set down, and the nature of the enormous task confronting the organisation will be more closely examined.

THE CURRENT WHEAT SITUATION.

With an all-time Australian record wheat crop in prospect, currently estimated at 260 million bushels, and a New South Wales crop estimated at, at least, 120 million bushels—more than half as great again as the largest crop ever harvested in this State —it is perhaps opportune to review, in summary form, the current Australian situation in the light of the latest information available regarding the world wheat position.

The world supply-demand situation was reviewed in some detail in the May issue of this journal.* Since then, however, North American and European crops have been harvested and it is now necessary to modify some of the statements and forecasts made at that time. Wheat prices, which appeared earlier to have reached their peak in the first quarter of this year, have recently climbed to all-time record levels, the Australian Wheat Board's current export price being 19s. 5¼d. per bushel, bulk basis, f.o.r. principal ports. Nor, at present, is there any sign of a business recession which the United States Bureau of Agricultural Economics confidently expected would make itself felt in the latter half of this year. Wheat prices have increased despite an all-time record harvest in the United States, a moderate Canadian crop, and a prospective record crop in this country. This increase in price is due primarily to the exceptionally small European harvest this year, and to a below-average corn crop in the United States, necessitating the more extensive use of wheat for feeding livestock in that country, with the result that little, if any, more wheat is available for export from the United States than would have been available if both corn and wheat yields had been more nearly normal. The exceptionally high prices at present being paid for wheat reflect the acute shortage of all basic foodstuffs which still exists in so many parts of the world.

*See "A Review of the World Wheat Situation in 1947"—"Review of Marketing and Agricultural Economics," May, 1947.