# FOOD SUPPLY AND NUTRITION IN THE NETHERLANDS DURING AND IMMEDIATELY AFTER WORLD WAR II[1]

M. J. L. Dols, M.D. and D. J. A. M. van Arcken

## Introduction

ONE of the most important social problems both from a health and from an economic point of view is the public health. This is readily seen from the fact that impaired health goes hand in hand with an increase in the rate of illness by which the economic production of a nation is reduced, whereas, in the opposite case, good health can enlarge the labor achievements and consequently the economic output.

It may be accepted now as a generally known fact that good and sufficient nutrition is one of the most important factors for the maintenance and promotion of public health. Those who may doubt on this point may be referred to the consequences of malnutrition in a large part of the world and of undernutrition in the various countries during the German occupation.

Good and sufficient nutrition, however, can be maintained only if the country itself can produce the necessary food or if it is able to supplement its domestic production to the required level and to the desirable composition (Jansen) (1).

These facts apply not only under normal conditions but also during a war or occupation of a country. Therefore, a brief history of the nutrition of the Dutch people during the second World War is of interest not only to those who were living in the Netherlands during the German occupation, but also to many others abroad, who have followed our fight against starvation from a great distance.

Many people in our densely populated country lost their lives

[1] From the Ministry of Agriculture, Fisheries and Food, The Hague Food Division.

in this struggle against famine; many others undoubtedly have had their health impaired. Nevertheless, during these very difficult years the Dutch food authorities did all they could to prevent total starvation with its serious consequences.

In this report we have no intention to defend the work of the department of Food Supply during the occupation nor to argue the correctness of any policy followed. The purpose of this report is only to tell the general reader and the nutritionists, medical and public health people, physiologists, economists, and agriculturists especially about the food supply, production and imports before the war and also about the serious difficulties with the food supply of the Dutch people during the German occupation. Furthermore, some of the most important facts which have determined the policy of the Dutch food authorities in that time will be discussed.

Also, there will be presented data on the Dutch production, export, rationing and distribution of food during the occupation which are of great importance for the nutritionists in our country as well as abroad.

## Prewar Consumption

It may be considered a matter of common knowledge that nutrition in the Netherlands in prewar days was on a high level, not only as regards the per capita consumption of calories but also with respect to meal patterns and quality (2). The fact, however, that the Netherlands was largely dependent for its food supply upon imports of foodstuffs or raw materials is less generally known, and even now it is not always fully realized.

This dependence applies not only to grains for bread and to fats but also to feed for livestock. The latter products are converted by fowls and livestock into highly valuable foodstuffs (butter, cheese, meat, milk, eggs), an appreciable portion of which would be exported.

Tables 1 and 2 give the import and export figures for the most

Table 1. Prewar production and imports of foodstuffs in the Netherlands. In gross tons, yearly figures, or annual averages.

| Product | Imports 1935-36 1937-38 | Production 1934-38 | Imports[1] 1938-39 | Production[1] 1938-39 | Imports[1] 1939-40 | Production[1] 1939-40 |
|---|---|---|---|---|---|---|
| *Cereals* | | | | | | |
| Wheat | 538,000 | 389,000 | 701,000 | 417,000 | 705,000 | 400,000 |
| Rye | 9,000 | 517,000 | 29,000 | 603,000 | 32,000 | 420,000 |
| Barley | 233,000 | 138,000 | 178,000 | 146,000 | 201,000 | 146,000 |
| Oats | 9,000 | 412,000 | 40,000 | 449,000 | 55,000 | 326,000 |
| Corn | 939,000 | 1,000 | 777,000 | 1,000 | 624,000 | 2,000 |
| Flour (Grain) | 52,000 | —— | 90,000 | —— | 98,000 | —— |
| Total | 1,780,000 | 1,457,000 | 1,815,000 | 1,616,000 | 1,715,000 | 1,294,000 |
| *Oil Seeds* | | | | | | |
| Linseed | | | 292,000 | 16,000 | 303,000 | 22,000 |
| Ground Nuts | | | 178,000 | —— | 192,000 | —— |
| Palmkernels | | | 49,000 | —— | 46,000 | —— |
| Soya Beans | | | 110,000 | —— | 119,000 | —— |
| Copra | | | 53,000 | —— | 76,000 | —— |
| Rape Seed | | | 2,000 | 6,000 | 3,000 | —— |
| Sesam Seed | | | 6,000 | —— | 6,000 | —— |
| Other Oil Seeds | | | 66,000 | 9,000 | 63,000 | 9,000 |
| Total | | | 756,000 | 31,000 | 808,000 | 31,000 |
| *Oil Cakes* | | | | | | |
| From Oilseeds as Above | | | 417,000 | | 448,000 | |
| Cattle Cake Imported as Cakes | | | 177,000 | | 191,000 | |
| Total | | | 594,000 | | 639,000 | |
| *Oils and Fats* | | | | | | |
| Quantity from Imported Seed (Including Linseed Oil), Whale-Oil and Vegetable Oil for Human Consumption | | | 162,000 | | 208,000 | |

[1]For oil seeds and oil cakes, data are for the calendar years 1938 and 1939.

| Product | Production 1938 | Exports 1938 | Production 1939 | Exports 1939 |
|---|---|---|---|---|
| Butter | 101,000 | 52,000 | 109,000 | 56,000 |
| Cheese | 126,000 | 58,000 | 121,000 | 52,000 |
| Milk | 5,146,000 | —— | 5,412,000 | —— |
| Milk Products | 171,000 | 187,000 | 164,000 | 184,000 |
| Meat (on the Hook) | 361,000 | 32,000 | 411,000 | 42,000 |
| Eggs (in Millions) | 2,250 | 1,150 | 2,450 | 1,375 |

Table 2. The Netherlands as an export country before the war. (Amounts in gross tons).

important foodstuffs during years previous to 1940. The average production figures of Dutch crops in a few prewar years have been inserted for comparison in Table 1 in order to stress the volume of imports. The aggregate Dutch production of various foodstuffs and the export figures for the same years are compared in Table 2.

Immediately after the outbreak of the war in August, 1939, the importation of foodstuffs became extremely difficult and stopped altogether during the German domination. From May 15, 1940, the Netherlands was entirely dependent for its food supply upon the stocks of foodstuffs and raw materials on hand at the time and upon the home production. The stocks of the most important products on hand on May 15, 1940, are shown in Table 3.

Moreover, under compulsion from the German occupation

Table 3. Stocks of the most important foodstuffs on May 15, 1940.

| Product | Number of Tons | Product | Number of Tons |
|---|---|---|---|
| Wheat | 450,000 | Sugar | 95,400 |
| Rye | 166,500 | Butter | 3,600 |
| Barley | 252,000 | Cheese | 16,500 |
| Oats | 122,800 | Edible Oils and Fats | 130,700 |
| Pulses | 79,000 | Oil Seeds | 111,300 |
| Potato Starch | 24,400 | Cattle Cakes | 85,300 |

authorities, appreciable quantities of food products were supplied to the occupation forces and additional large quantities were exported, with or without imports to be supplied in exchange. A summary of these quantities expressed in terms of hectares of cultivated land is given in Table 4. The total area of cultivated land in the Netherlands amounts to some 2,300,000 hectares. In the four and one-third years from May, 1940 to September, 1944, the output of about 60 per cent of our cultivated land was exported.

For the period September, 1944 until the end of the war no reliable data are available.

Because of the loss of imports, agriculture had to be adapted to new circumstances. This adjustment consisted in an appreciable reduction in our pig and poultry population. Both pigs and poultry are the rivals of man as regards the consumption of cereals, and if this reduction had not been carried out, both the total production of home-grown grain and the stocks on hand would have been consumed by these animals.

In addition, the production of foodstuffs had to be increased

Table 4. Compulsory Dutch exports during the war and supplies to German military forces expressed in terms of hectares of cultivated land, from May, 1940 until September, 1944.

| Product | Net Exports (Hectares) | Supplies to German Forces in the Netherlands (Ha.) |
|---|---|---|
| Arable Crops | 135,000 | 108,000 |
| Dairy Products | 190,000 | 67,000 |
| Margarine, Fat and Oil (Fatty Acids Included) | 107,000 | 15,000 |
| Meat and Meat Products | 267,000 | 208,000 |
| Horticultural Products | 115,000 | 14,000 |
| Eggs and Poultry | 97,000 | 19,000 |
| Fish | 19,000 | 7,000 |
| Total (General 1,368,000)[1] | 930,000 | 438,000 |

[1]One hectare is 2.47 acres.

as much as possible. This could be achieved by promoting the cultivation of a few crops essential for our nutrition. One instance of this was the stimulation of potato growing, the prewar acreage of 130,000 hectares being raised to 210,000 hectares in 1943. The acreage under rape seed was increased from 3,000 hectares in prewar years to some 50,000 hectares in 1943, and the acreage under rye was increased from 110,000 hectares to 300,000 hectares (more recent figures are less fit for comparison, since many areas had been inundated). In order to make these adjustments, part of the grass lands had to be broken up and the growing of a few crops of minor importance had to be restricted. Only in this way was it possible to raise the production of home-grown crops to a level at which starvation need not necessarily be feared, in spite of the fact that the importation of foodstuffs had become impossible and local stocks were nearly exhausted.

Table 5. Annual use of fertilizers in kilograms per hectare of cultivated land.

| Year | N | $P_2O_5$ | $K_2O$ |
|---|---|---|---|
| 1935-1938 (Average) | 32.5 | 56.0 | 50.5 |
| 1939-1940 | 39.9 | 39.1 | 46.9 |
| 1940-1941 | 36.0 | 21.3 | 60.3 |
| 1941-1942 | 26.7 | 4.0 | 53.1 |
| 1942-1943 | 23.5 | 2.3 | 55.3 |
| 1943-1944 | 19.0 | 2.0 | 48.2 |
| 1944-1945 | 9.1 | 0.6 | 30.3 |
| 1945-1946[1] | 27.7 | 21.5 | 23.1 |

[1]Estimation.

Calculations had shown that under the most favorable circumstances, *i. e.,* with sufficient fertilizers at our disposal, and an ideal crop plan, the Dutch soil might supply an average of 2,000 calories per capita per day. This figure should be borne in mind in connection with the rationing policies which will be dealt with presently.

As regards the fertilizer supply, this remained well below the prewar level, as appears from data in Table 5. Importation of synthetic fertilizer was stopped, and the country became dependent on manure for fertilizer. The quality of manure is necessarily closely connected with the feeding of the cattle and thus is on

the one hand dependent upon the application of fertilizers to meadows and pastures, and on the other hand upon the quantity of concentrated fodder.

From calculations by Van der Meulen (3) it appears that the quantity of fertilizers imported in 1938 yielded an amount of nitrogen almost equal to that obtained from the manure used in prewar times when cattle received a good feeding of concentrates. Other elements needed as fertilizer, normally were supplied largely by artificial fertilizer, manure being a relatively unimportant source which, nevertheless, during the war was not a negligible factor in its effect on the fertility of our cultivated land.

The consequences of the shortage of fertilizers manifested themselves in a decline of the production figures, as appears from Table 6.

It is needless to say that the total stoppage of the importation of concentrated fodder and the insufficient dunging of pastures and meadows greatly affected the production of meat and dairy products. Some figures on the milk supply to dairies, which are shown in Figure 1, convey an idea of the extent of this effect.

It stands to reason that the quality of the war rations, which were entirely home-produced, was inferior to that of prewar rations. They contained more carbohydrates but fewer proteins and fats. This, too, clearly appears from the graphs attached.

Table 6. Exhaustion of the Dutch soil as a consequence of war.

| Product | Estimated Production Per Hectare Expressed in Terms of Kilograms[1] | | | | |
|---|---|---|---|---|---|
| | 1940 | 1941 | 1942 | 1943 | 1945 |
| Cereals | 2,514 | 2,237 | 2,117 | 2,098 | 1,449 |
| Pulses | 2,425 | 2,097 | 1,630 | 1,817 | 1,864 |
| Potatoes and Sugarbeet | 21,859 | 21,546 | 21,506 | 19,822 | 15,044 |

[1]On account of the war no data are available for 1944.

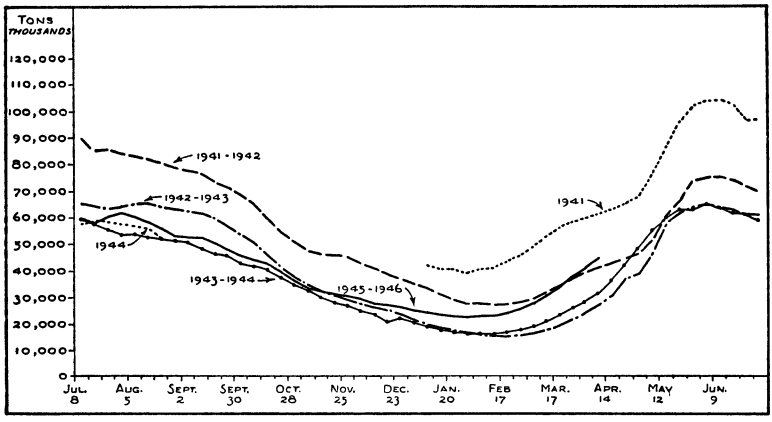


Fig. 1. Weekly deliveries of milk at dairies by live-stock farmers in the Netherlands, January 5, 1941 — April 13, 1946. (August 27, 1944 to July 7, 1945 not available.)

## Rationing

When a second European war threatened to break out, the then Minister of Economic Affairs decided in 1937 to establish the Government Office for the Preparation of the Food Supply in Time of War. This office was charged with making the necessary preparations for the economic warfare in the field of the food supply for the Dutch people, for such time as the Netherlands would be neutral or the Dutch territory in Europe would be partly or wholly occupied, as might be the case.

The existing organization, based on the Agricultural Crisis Act of 1933, participated in this preparatory work. By September, 1938, nine economic emergency acts had already come into force, among which were the soil-production act and the rationing act.

Thus, when war broke out in August, 1939, the machinery was ready to be put into operation. One of the first measures taken in the Netherlands was the introduction of a rationing scheme for animal feed, aimed at the most economical consumption of feed stocks on hand at the time.

Immediately after the occupation of the Netherlands by the Nazis on May 15, 1940, measures were taken for the distribution of all human foods, the object of which was to maintain the food supply on as high a level as possible under the circumstances and thus prevent the health of the Dutch people from being affected beyond repair. These preparations had started as far back as 1939. The population was divided into age groups; each group was entitled to a ration which covered its requirements as much as possible, both as regards quality and quantity. In addition to this classification according to age, a second was made according to classes of labor. Workers on heavy and very heavy work as well as those on long-time or night jobs were entitled to extra rations. Supplementary rations were also given to persons employed on work considered injurious to health and special regulations were made for sick persons and expectant and nursing mothers.

Besides this rationing, which was based on ration books and coupons, there was the Communal Kitchen system. Originally only those people got meals from the Communal Kitchen who, either for economic, social, or financial reasons, were not able to cook their own meals. To partake of these meals it was necessary to hand in part of the current coupons; however, the food value of these meals was much greater than was represented by the coupons thus handed in.

Moreover, from 1941 large groups of workmen were entitled to a coupon-free meal from these Kitchens. The food value of these meals amounted to some 600 calories per three-quarter litres per day. In this way approximately 450,000 workers got an extra meal daily, these meals being supplied by 140 Communal Kitchens throughout the country.

In addition to these groups of persons who were entitled to an extra meal over and above their normal rations, large groups of school children received extra food. Also, the distribution of milk in the schools was continued during the first few years of

the war. Later on these extra supplies had to be stopped on account of lack of milk. Even in prewar days, school children in several large towns were provided with food in various forms. The object was to provide children of the poorest classes with meals. When rationing regulations took effect, care was taken that children's rations never fell below the physiological standard, and coupons had to be taken from such children as partook of these meals. On account of this regulation their number declined. The parents simply could not be talked into delivering coupons for this purpose. In many places these meals, which were organized by municipalities and school boards, had to be stopped. In order to improve this situation, it was decided on February 1, 1942 to provide the children with a full meal from the Communal Kitchen and these meals were supplied coupon-free. Originally only children of the poorest classes were entitled to such meals, but in 1943 the basis of participation was altered. From that date onward, in addition to the children referred to above, all children were entitled to a meal who, according to the school doctor, were 20 per cent below normal weight. The inclusion of a National Socialist organization by the German authorities, which was vainly protested by the Government Office for Food Supply, caused attendance to be very small.

Besides children of the elementary schools, pupils of secondary and technical schools and those in the universities also were entitled to a daily coupon-free meal.

The numbers of persons who were supplied with meals by the Communal Kitchens during the period from March, 1942 to August, 1944 are shown in Figure 2.

Besides the rationing of food, the provision of vitamins to some important groups was undertaken. In the first place, expectant and nursing mothers and the school children were provided with vitamin C tablets. Later on, by order of the occupation forces, these tablets were distributed also among the work-

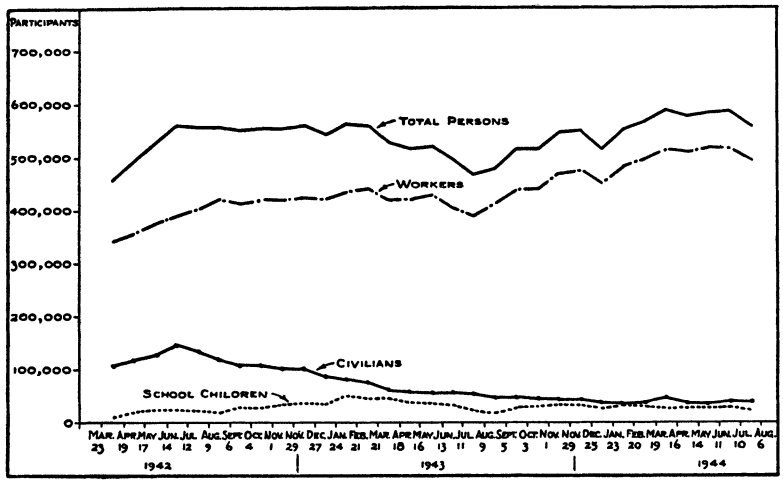


Fig. 2. Average daily number of persons served at Communal Kitchens in the Netherlands by four-week periods from March 23, 1942 to August 6, 1944.

men. They were supplied during a period beginning early in March until May 15th or thereabouts. During the winter months vitamin D tablets also were distributed among babies and very young children. The importance of supplying these vitamins will be discussed later.

In addition to giving these vitamin preparations, oranges and mandarins also were distributed sometimes among the children, and carotene preparations and fresh carrots were issued to the children over and above their normal rations.

## Committees

Even previous to May 10, 1940, by mutual agreement, the Public Health Division of the Department of Social Affairs, the Department of Economic Affairs, and the Government Office for the Preparation of the Food Supply in Time of War had reached an understanding concerning the formation of a Food Council. The outbreak of the war caused this Council to be formed not as an independent body but as a Committee of the Health Council. Throughout the war this Food Council assisted

the Director General for the Food Supply in his task and undoubtedly did much useful work on its own initiative as well as on request. It also brought into existence the Advisory Bureau, which materially contributed to the solution of the many problems regarding the numerous rationing regulations with which the housewife was faced.

A special subcommittee of the Food Council was charged with the compilation of the "Regulations Regarding the Rationing of Food for Sick Persons," and another subcommittee studied the correlation between the rations and public health. The activities of the latter subcommittee, the so-called Pouls Committee, were broken off by the railroad strike, but after the liberation immediately were taken up again with the cooperation of American and English research workers. A report of the results of this research work will be released in due course.

In addition to these activities of the subcommittees, the Food Council encouraged scientific research into many subjects. This research was carried out mainly by "Het Nederlandsche Instituut voor Volksvoeding" (the Netherlands Institute for National Nutrition) and "Het Centraal Instituut voor Voedingsonderzoek C.I.V.O. (the Central Institute for Food Research). As examples, the research work concerning the milling extraction of grains for bread and the preparation of synthetic vitamin C may be mentioned.

## Food Rations

The food rations distributed throughout the Netherlands by weeks from April 27, 1941 until October 1, 1944 are shown in Figures 3 to 10 inclusive in terms of the average daily calories furnished and the average daily grams of protein, carbohydrate, and fat. For each of these four food values, the content of the rations is given according to age groups, *viz.*, 0-3 years, 4-13 years, 14-20 years, and 21 years and over, or adults classified as

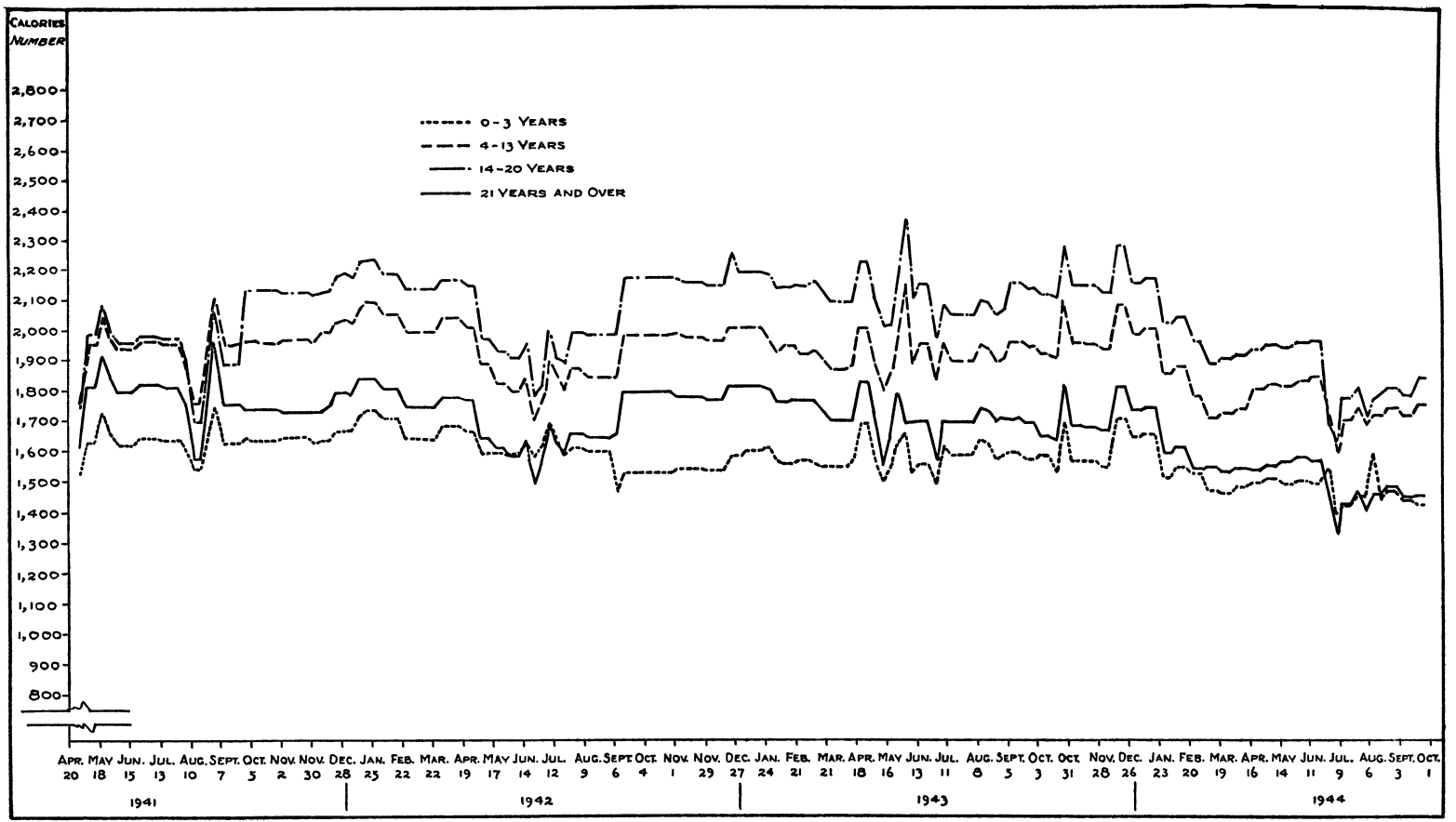


Fig. 3. Calories per day in weekly food rations distributed throughout the Netherlands to different age groups from April 27, 1941 to October 1, 1944.

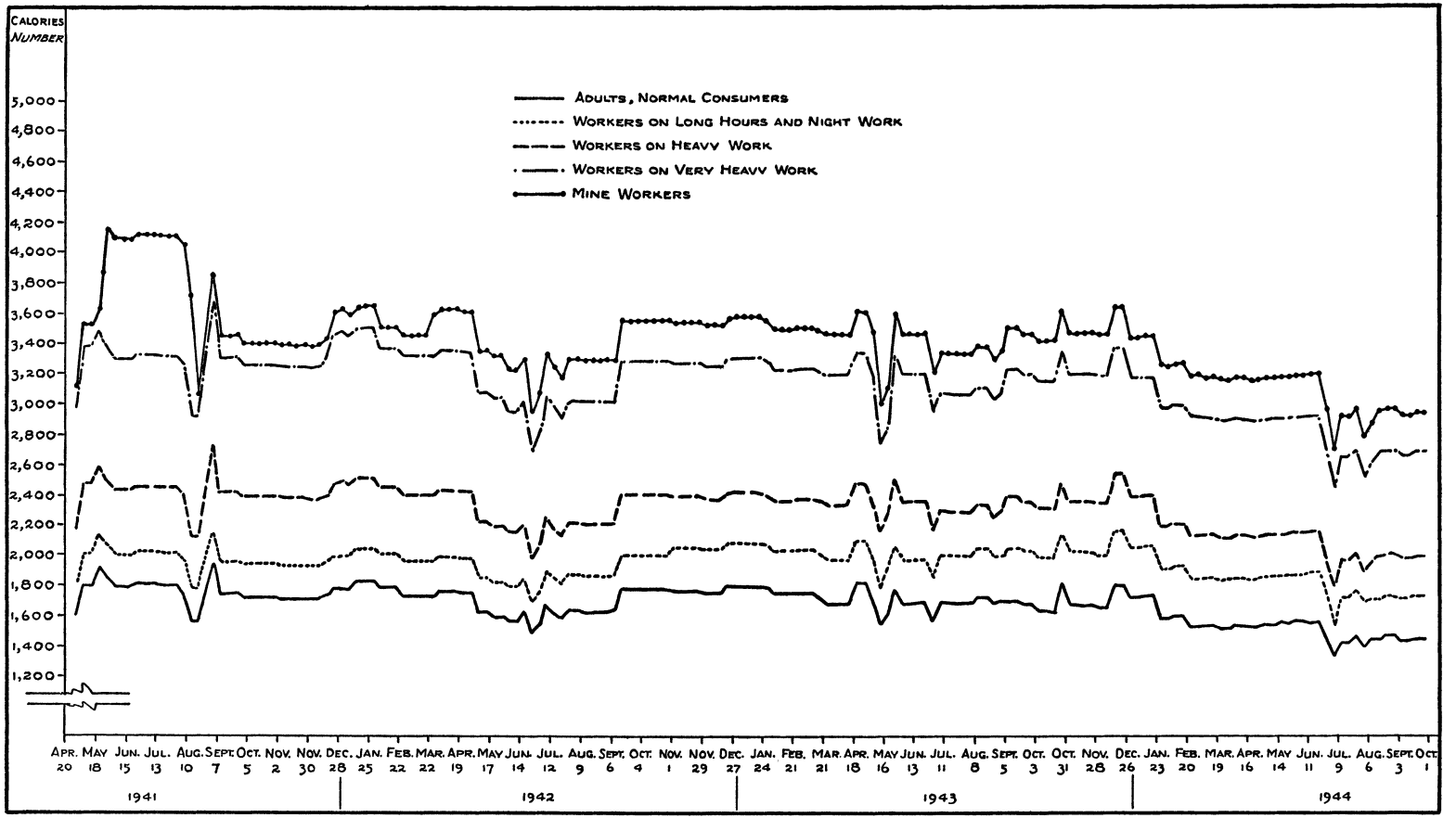


Fig. 4. Calories per day in weekly food rations distributed throughout the Netherlands to adult normal consumers and to groups which received supplementary rations from April 27, 1941 to October 1, 1944.

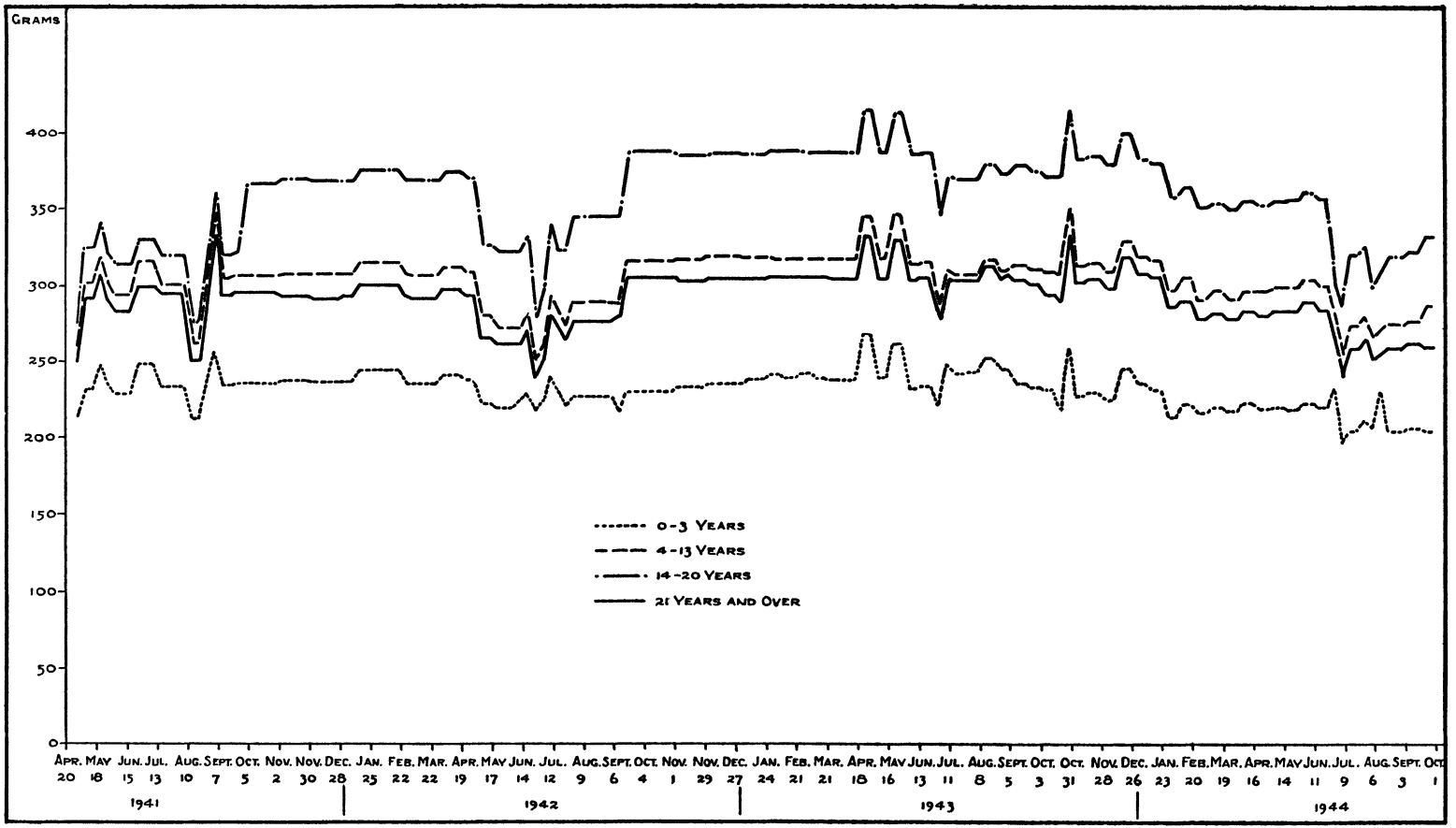


Fig. 5. Grams of carbohydrate per day in weekly food rations distributed throughout the Netherlands to different age groups from April 27, 1941 to October 1, 1944.

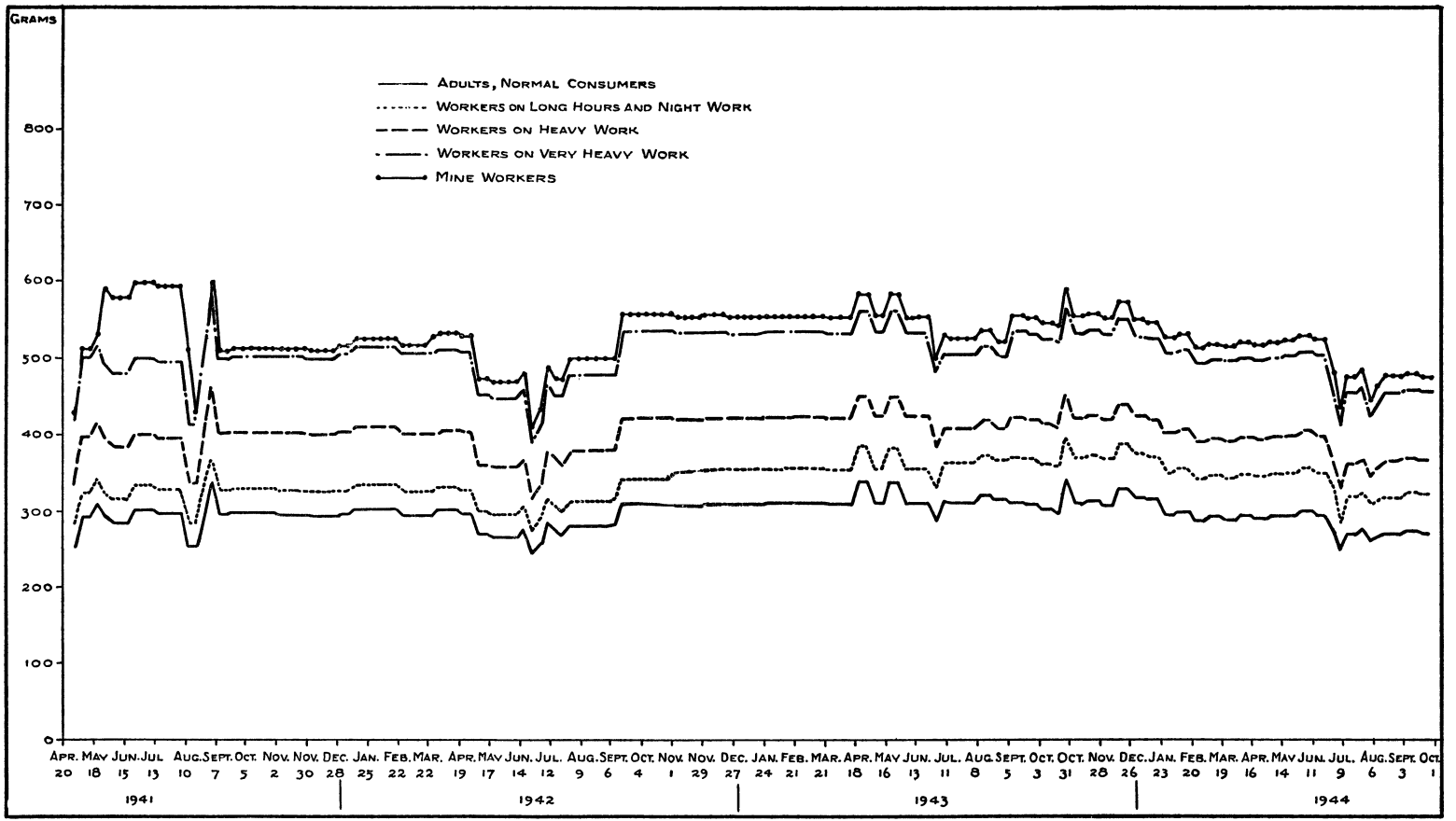


Fig. 6. Grams of carbohydrate per day in weekly food rations distributed throughout the Netherlands to adult normal consumers and to groups which received supplementary rations from April 27, 1941 to October 1, 1944.

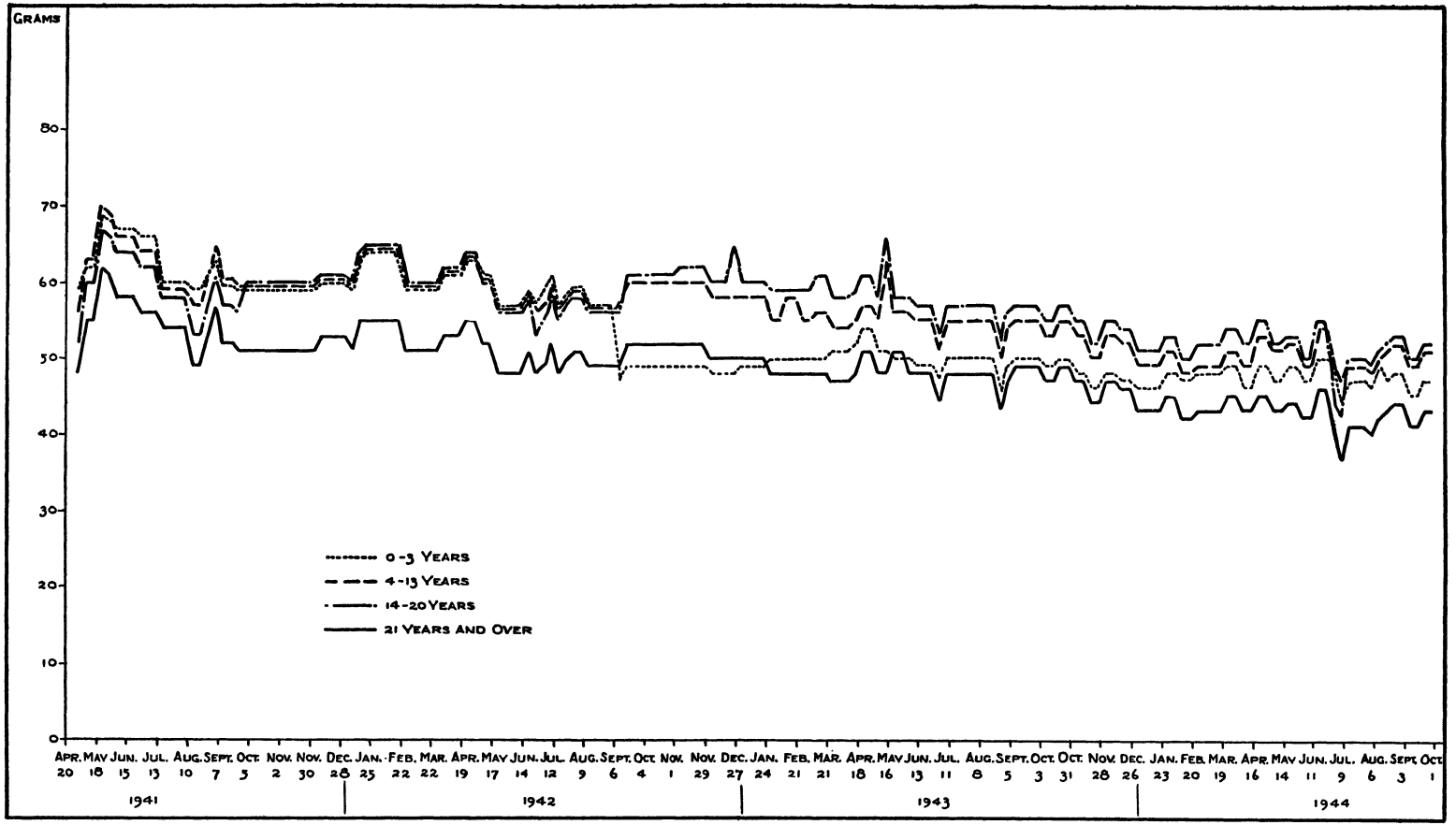


Fig. 7. Grams of protein per day in weekly food rations distributed throughout the Netherlands to different age groups from April 27, 1941 to October 1, 1944.

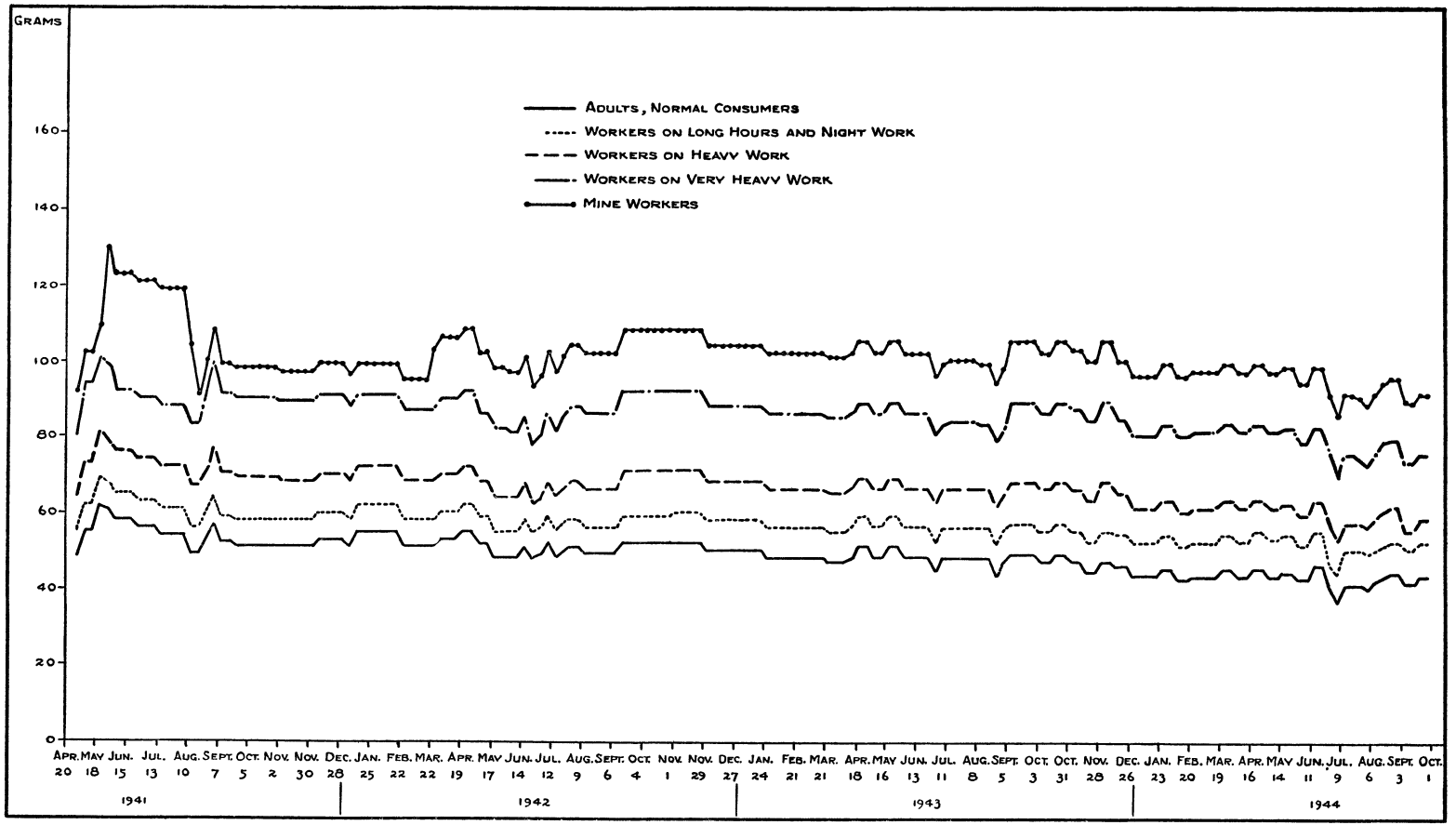


Fig. 8. Grams of protein per day in weekly food rations distributed throughout the Netherlands to adult normal consumers and to groups which received supplementary rations from April 27, 1941 to October 1, 1944.

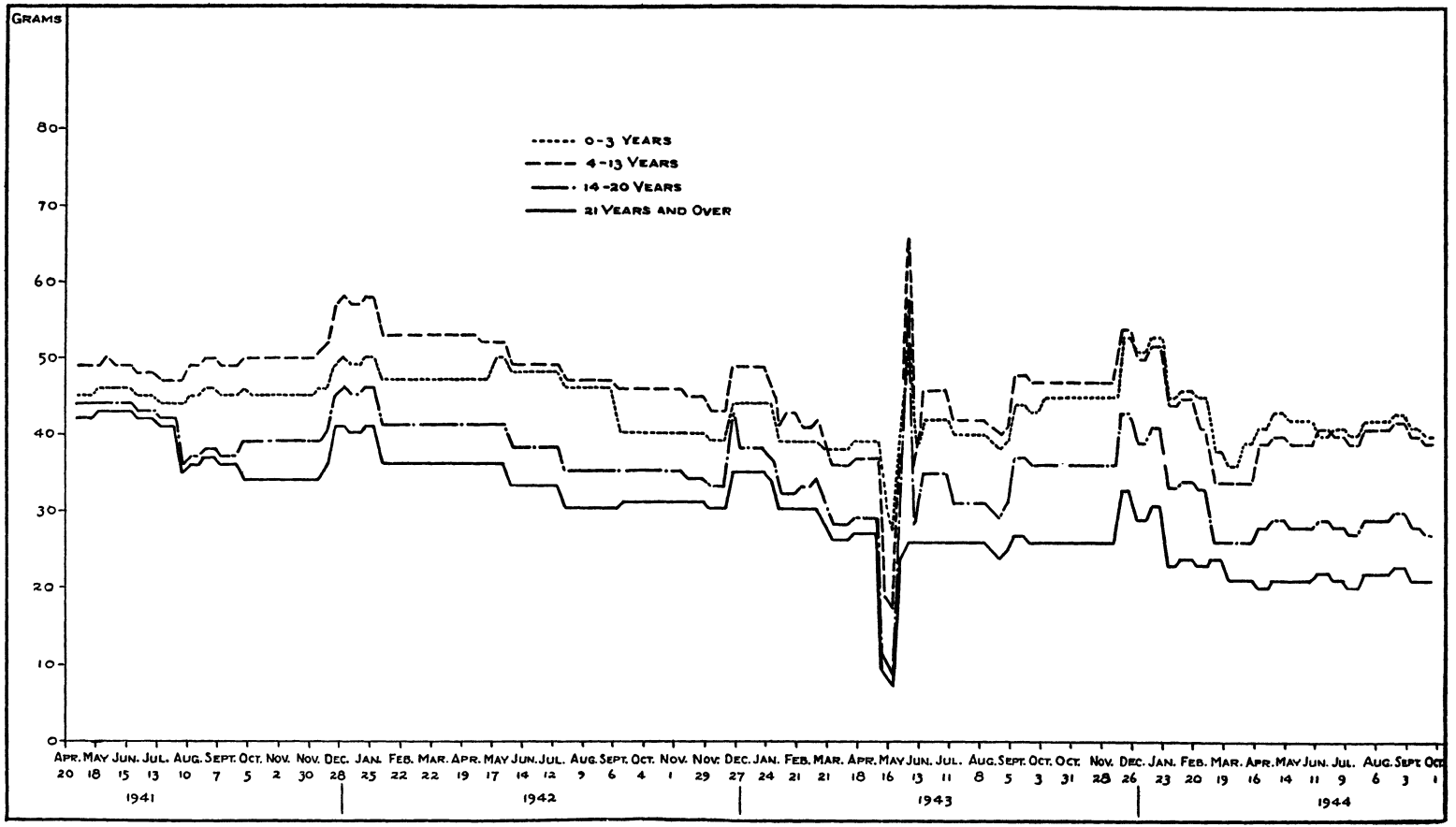


Fig. 9. Grams of fat per day in weekly food rations distributed throughout the Netherlands to different age groups from April 27, 1941 to October 1, 1944.

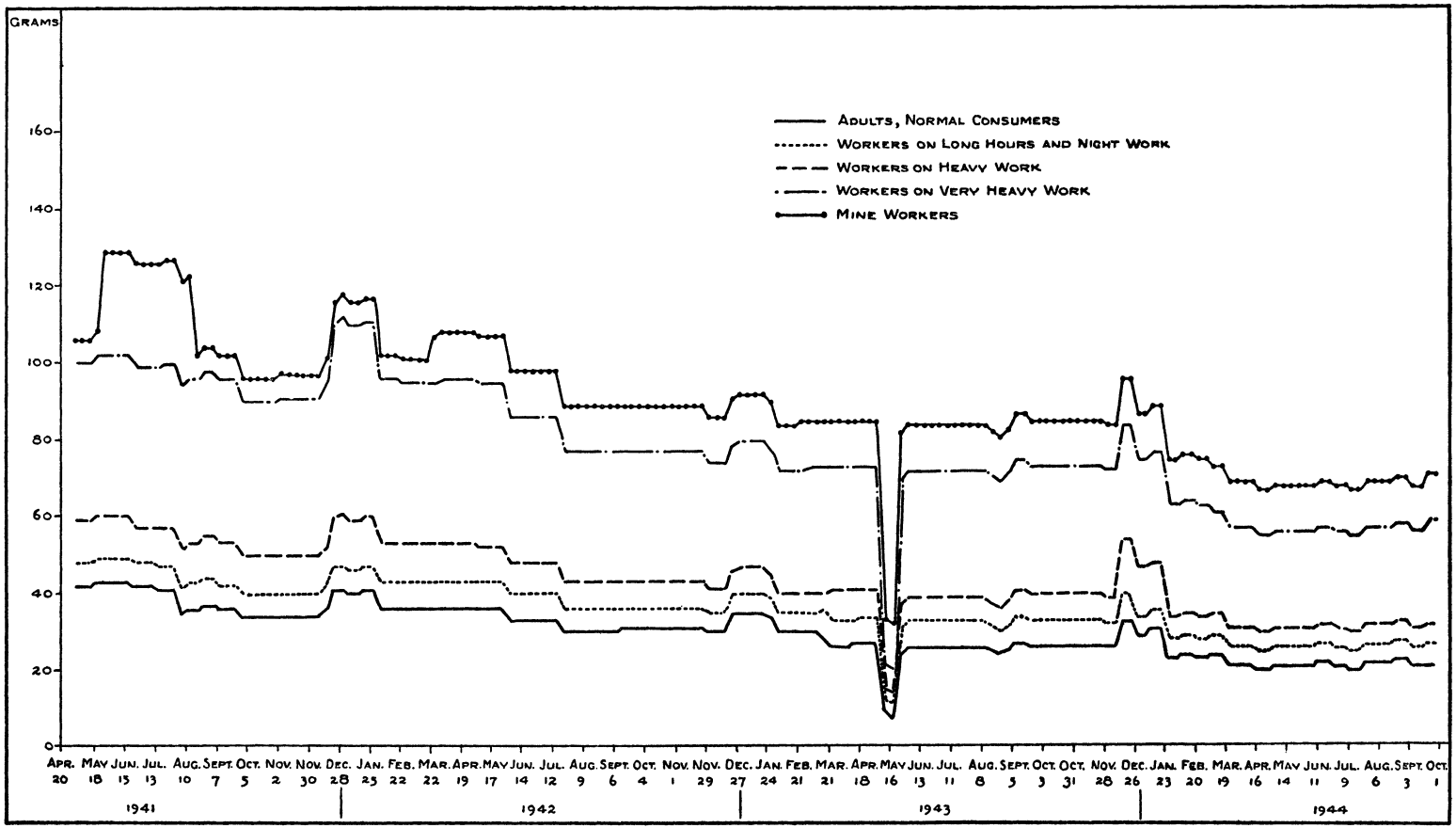


Fig. 10. Grams of fat per day in weekly food rations distributed throughout the Netherlands to adult normal consumers and to groups which received supplementary rations from April 27, 1941 to October 1, 1944.

average or normal consumers. Similarly, ration values are shown for groups of workers who received supplementary rations, *viz.*, workmen on long hours or night jobs, those on heavy work, those on very heavy work, and coal miners. These data are summarized by quarters in Appendix Tables 1 and 2 (pp. 356, 357) in which estimated average daily amounts of calcium, phosphorus, iron, vitamin A, thiamin, and vitamin C also are shown.

On October 14, 1939, rationing was started, sugar being the first rationed item. Other articles followed gradually. The number of rationed articles materially increased after June, 1940. Rationed were: tea and coffee, bread and flour, rice, butter and margarine, oatmeal, vermicelli, meat, cheese, groats, eggs, coffee-substitute, and milk, in the order mentioned; and on April 26, 1941 even potatoes were rationed, followed later on by jam, skim milk, cocoa powder, and some typical war products, such as children's beverage powder, and mixed flour. Milk rationing had a somewhat irregular course. From April 19, 1941, standardized milk was allotted to all groups; after August 2, 1941, however, only to children under 14 years old. Skim milk was not on the ration then, but could be had only in limited quantities. On September 6, 1942 this article too was rationed. During the period that no standardized milk was distributed and skim milk was still unrationed, the caloric value of milk in the diet was calculated on the basis of a weekly consumption of one and three-quarter litres of skim milk by persons aged 14 years and over.

Without exaggeration it may be said that from April 26, 1941, the day when potatoes were rationed, practically the whole diet was "on the ration." The charts showing food values of rationed foodstuffs start on that day and continue until the memorable date of September 17, 1944 and are for the whole of Holland. On that very day the Netherlands was, with respect to distribution areas, divided into three large parts: the Western provinces,

*i.e.,* the provinces of Noord-Holland, Zuid-Holland, and Utrecht; the Southern provinces, *i.e.,* the areas south of the big rivers; and the Eastern provinces, *i.e.,* Groningen, Friesland, Drenthe, Overyssel, and part of Gelderland.

From Figures 3 and 4, showing the caloric value, it appears that up to approximately the middle of 1943 the aggregate caloric level remained much the same except for some temporary deviations. Then a reduction came which, especially after the beginning of 1944, became larger and larger. The results of the 1943 crop did not come up to expectations, among other things due to lack of fertilizers, shortage of agricultural implements, labor, and last but not least the increasing black market. The inundations in 1944 did the rest.

The composition of the rations which supplied these calories, however, underwent a radical change in the course of years, as also appears from the graphs. The amount of carbohydrates increased, whereas that of proteins and especially fats decreased more and more. This is explained by the necessity for Dutch agriculture to adapt itself to new circumstances as a result of the lack of imports. The production of cereals and potatoes had increased; that of meat, milk, and eggs had decreased. Up to July, 1943, the drop in the production of proteins and fats could be offset by increasing the production of foodstuffs with a high carbohydrate content. For reasons mentioned above, this method could no longer be applied after this date.

Thus far, the general course of the rationing of foodstuffs has been considered. If week to week variations shown in the charts are studied, some more striking facts present themselves.

In the period from April to September of every year, the graphs for calories and carbohydrates regularly show a decline, although during this decline some rather large fluctuations will be noted. These fluctuations are due to the transition from the distribution of the old potato crop to the new one. This transi-

tion invariably caused a temporary cutting down of the potato ration. Sometimes, if the supplies fell considerably short of expectations, the reduction amounted to twice the usual one. In most cases this temporary reduction was to the best of our abilities offset by putting quantities of pulses into distribution which, however, took place at more or less irregular intervals.

This periodic cut in rations, however, was caused also by another fact. During the same periods, the graphs for fats show much the same fluctuations and the temporary decrease in fat rations also affected the total amount of calories. As a matter of fact, the margarine, which was being manufactured from the home-produced rape seed, was not yet sufficient to compensate for the decrease in butter.

Another variation which occurred every year, and which is clearly apparent from the graph for fats, is the temporary rise between Christmas and New Year's, caused by the supplementary rations of butter or oil, cheese, and syrup in these periods.

The violent fluctuations in August, 1941, were caused by a temporary halving of the potato ration, which was offset immediately after by a proportional rise.

On studying the graphs, one can see that the lines for the youngest children drop after September 6, 1942, whereas those for the other groups have a rising trend. What is the cause of this phenomenon?

As of September 6, 1942, the weekly milk ration for the very youngest had to be reduced from seven litres to five and one-quarter litres; on that date skim milk was put into distribution, and this had to be taken into account in distributing the milk supply. On that very day the potato ration was increased for all groups; for the very youngest, however, the caloric value of this rise did not counterbalance the reduction caused by cutting down the milk ration.

In April, 1943, a sharp rise in calories was followed by a sharp

fall. The old potato crop had to be cleared quickly and a higher ration was given temporarily. Immediately after this the fat ration showed a trend to sink to its lowest possible level, soon rallied, however, and sometime afterwards was reestablished for the normal consumers and the labor groups at its original level. Persons under 20 years of age were given the opportunity to make up for the deficiencies by a temporary increase in rations. This is clearly shown by graphs of the fat rations and can be accounted for as follows: The situation with respect to fats was precarious and for some time young persons had not received their supplementary rations. In May, 1943, the Germans called up the former Dutch forces to be carried off as prisoners of war. The Dutch population replied to this action with strikes. Without informing the Dutch food authorities, the Germans then published an article in the newspapers to the effect that, owing to the strike, appreciable quantities of milk had been lost and this had caused an inadequate production of butter; therefore, the current butter coupon had to be continued for four weeks, no new coupon being made available. However, the authorities managed to give young persons this butter by an extra coupon. For older persons and the labor groups, such a thing was out of the question. Not until September 5, 1943, was the fat ration for children normal again; before that date it more or less fluctuated. During the transition to the new sugar crops, as of October 3, 1943, this ration had to be temporarily decreased. On October 24th of the same year, the deficiency was made up for by a double sugar ration, which is shown in the graph by a peak in the curve.

After the last supplementary rations about Christmas 1943, the general decrease of rations began in the spring of 1944. Thus in March, the fat ration was cut down, the skim milk ration already having been reduced in February. In April, 1944, the fat ration for young persons was raised again; this was impossible

for older persons and the labor groups. At the end of June, the periodic difficulties with the potato supply, caused by the transition to the new crops, occurred. In spite of enormous transport difficulties the rations were kept up to three kilograms. There were but limited possibilities for compensations at the time of the lowest ration, *i.e.,* during the latter half of June. People were provided twice with an extra supply of bread, cheese, and pulses, and had to overcome many difficulties up to September 17, 1944. The course of the rationing after that date will be discussed later on.

In general, it may be said that except for temporary deviations caused by circumstances mentioned above, rationing in the Netherlands followed a rather regular course. The graphs clearly show the relative food values of the rations allotted to the different groups of consumers. One should bear in mind, however, especially in judging the graphs for labor groups, that the value of the coupon-free meals, which have been discussed, has not been included. The distribution of vegetables, fruit, and fish likewise has not been taken into account. Local differences in the supply of these foods were appreciable; furthermore, they furnished negligible amounts to the food values under discussion.

## Embargo

The greatest difficulties in the food supply originated from the beginning of the offensive by Montgomery near Arnhem and Nijmegen. The Dutch Government in London declared a general railroad strike on September 17, 1944. It is well known how this order was carried into effect. On September 22nd, Dr. H. M. Hirschfeld and Mr. S. L. Louwes, Secretary General of the Ministry of Agriculture and Fisheries and Director General for the Food Supply, respectively, were informed in the name of Reichskommissar Seyss-Inquart that they had to address a summons to the Dutch people to the effect that, if the railroad

strike were not lifted immediately, the long-dreaded famine was bound to come. It was most obvious that this summons was meant to cancel the railroad strike. Messrs. Hirschfeld and Louwes were positive in their refusal although they knew that, as a retaliatory measure, an embargo would no doubt be proclaimed by the "Reichskommissar." The proclamation of this embargo, which indeed took place, prohibited the transport of all food from the northern and eastern production areas to the densely populated consumption centers in the western part of the country. It is now clear to everybody what this meant to Holland. The consequences had been foreseen by the Dutch authorities. They addressed frequent, but ineffectual warnings about this matter to the "Reichskommissar," pointing out to him the lack of sufficient stocks in the western provinces and the dangers the approaching winter would be sure to result in, if he did not see to it that stocks were formed in time.

Not until November 8th was the prohibition to convey food to the western provinces partly lifted. It was, however, a considerable time before the formation of the Central Ship Owners Food Supply ("Centrale Reederij Voedselvoorziening") caused the situation to improve slightly. At the very time when this organization was capable of carrying out its activities, frost set in; this brought to a complete stop the supplying of food and the forming of stocks in the western provinces. It was too late! Figure 11 shows the weekly supply of food shipped from the eastern to the western provinces in the period October 30, 1944 to June 30, 1945.

In the meantime, the inhabitants of the western provinces had consumed all the stock on hand and real famine had set in. People were forced more and more to leave the towns in search of food in the production areas. Many of them, however, did not live through these food expeditions.

Immediately after the unsuccessful attack near Arnhem, the

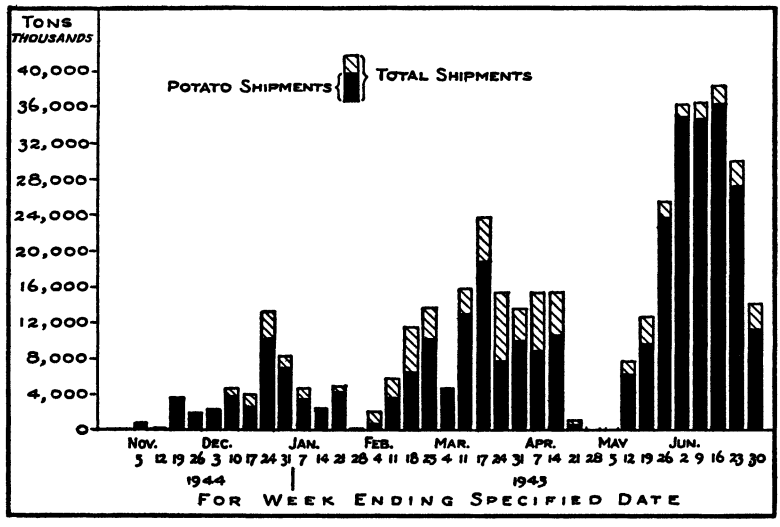


Fig. 11. Weekly shipments of all foodstuffs and of potatoes from Eastern Netherlands to Western Netherlands from October 30, 1944 to June 30, 1945.

Director General for the Food Supply urged our Government in London to relief action. After the proclamation of the embargo this action was asked for repeatedly, and it was even suggested that food be dropped from the air. In January, 1945, relief came: the starving population received consignments from the Swedish Red Cross, followed by those from the International and Swiss Red Cross which of course somewhat alleviated this most serious situation. When the last relief consignments were all but exhausted, the Allies, on April 29, 1945, began to drop food from airplanes. This method of rendering assistance was possible because the tide of war had turned. Supplies by land and sea soon followed. Nevertheless, during the period April 29th to May 8th, some 4,500 aircraft dropped 8,000,000 kilograms of high-quality food, representing an average per capita for the population of Western Holland of 2 kilograms.

This is not the place to give a full historical account of what preceded these "air droppings" and of the part played by the

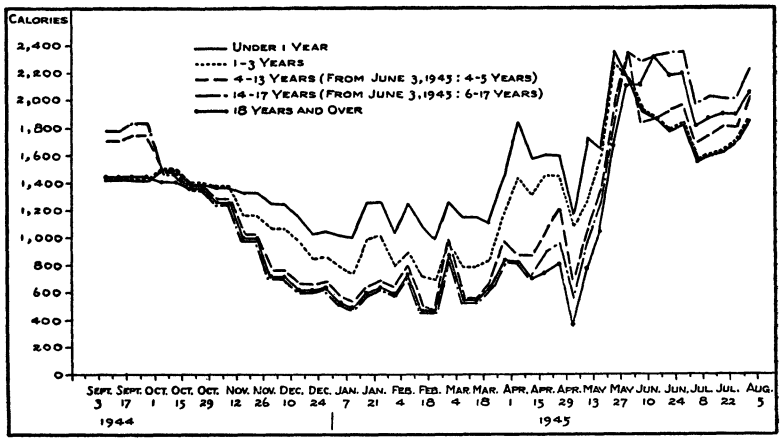


Fig. 12. Average calories per day by weekly periods for food rations, including Red Cross and S.H.A.E.F. supplies, distributed daily in Western Netherlands to different age groups from September 3, 1944 to August 5, 1945.

Ministry of Agriculture and Fisheries and, under its supervision, the Government Office for the Food Supply in Wartime. A single fact, however, ought to be mentioned in this connection.

The Allied attack across the Rhine caused the Eastern part of the country to be entirely cut off from the Western part. Then, on April 2, 1945, the Reichskommissar ordered Dr. Hirschfeld to come and see him, and informed him of the commands of the "Ober Kommando der Wehrmacht" for proceeding to an inundation of the whole Western part of the Netherlands and to devastations on an enormous scale in case of an Allied attack.

The Reichskommissar was willing to discuss with Dr. Hirschfeld how this calamity could be averted. During the negotiations he was prepared to allow food transports to the Western part of the Netherlands. After that Dr. Hirschfeld drafted a telegram with conclusions about these discussions, which was forwarded to the Chairman of the Confidents of the Netherlands Government and passed on to the Netherlands Government in London.

On April 4th, after having consulted Mr. Louwes, Dr. Hirsch-

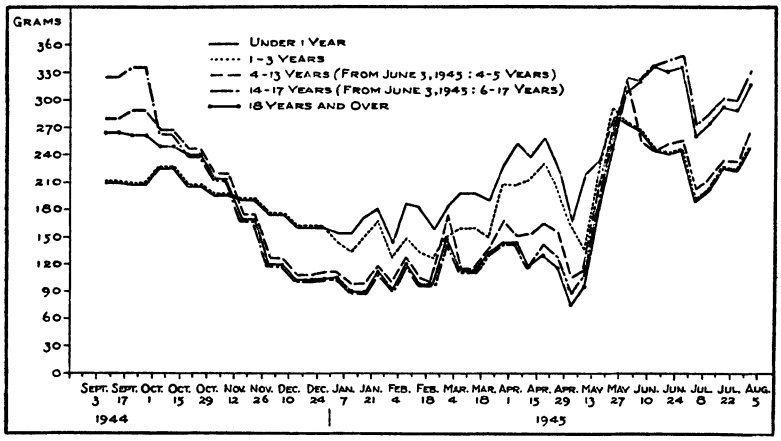


Fig. 13. Average grams of carbohydrate per day by weekly periods for food rations, including Red Cross and S.H.A.E.F. supplies, distributed daily in Western Netherlands to different age groups from September 3, 1944 to August 5, 1945.

feld got the news that the telegram had been actually sent off. As a result of the discussions between the Reichskommissar and Dr. Hirschfeld on April 2nd it became possible to arrange contact between the German authorities, the Confidents of the Netherlands Government and the Commander of the Underground Forces, so that, with the assistance of the German authorities, two representatives of the Confidents could start for that part of the country which had already been liberated in order to carry on negotiations. The discussions these Confidents carried on there prevented the attack on the Western part of the Netherlands, including the inevitable inundation by the Germans of a large part of this area. The consequences of this devastation would have been incalculable. Furthermore, these discussions led to a conference between the Allied army authorities and the Reichskommissar with his staff, which preliminaries took place on April 30, 1945 at Achterveld, and were attended by the Director General for the Food Supply and some members of his staff, as experts. At that place they came to an agreement in principle for the continuation of food supplies by air, and

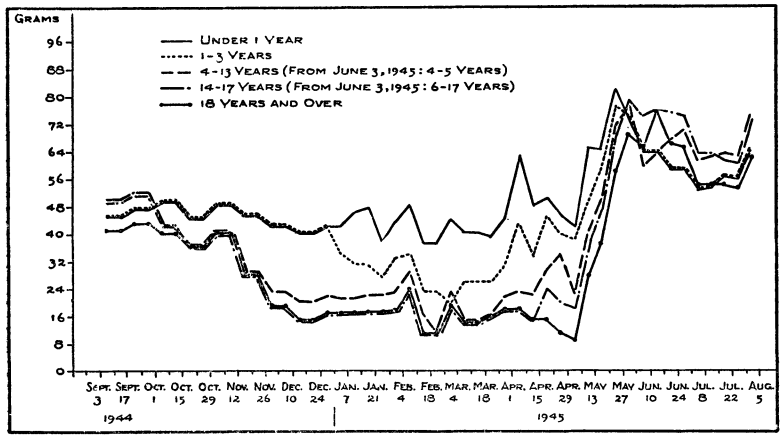


Fig. 14. Average grams of protein per day by weekly periods for food rations, including Red Cross and S.H.A.E.F. supplies, distributed daily in Western Netherlands to different age groups from September 3, 1944 to August 5, 1945.

also for sending supplies by sea and by land. This agreement was further elaborated in a conference at Wageningen on May 2, 1945. Capitulation came shortly afterwards and the liberation eagerly looked for had become a fact.

Figures 12 to 15 inclusive show the course of rationing in the Western provinces from September 3, 1944 to August 5, 1945. These charts and Appendix Table 3 (p. 358) give data for each age group on the total calories and the grams of carbohydrates, proteins, and fats per day in the ration distributed. By introducing the so-called emergency ration books and extra sheets belonging to them, distribution according to age groups was maintained. Laborers were no longer provided with supplementary rations. After a constant, gradual reduction, there was a slight rise early in January because of a rape-oil coupon being made available. Later peaks in the curves are due largely to the Red Cross consignments; the general drop is the result of the fact that local resources were running out. When on April 29, 1945, the last kilogram of potatoes and the last 400 grams of bread had been distributed, the Allies came to the rescue of the famine-stricken

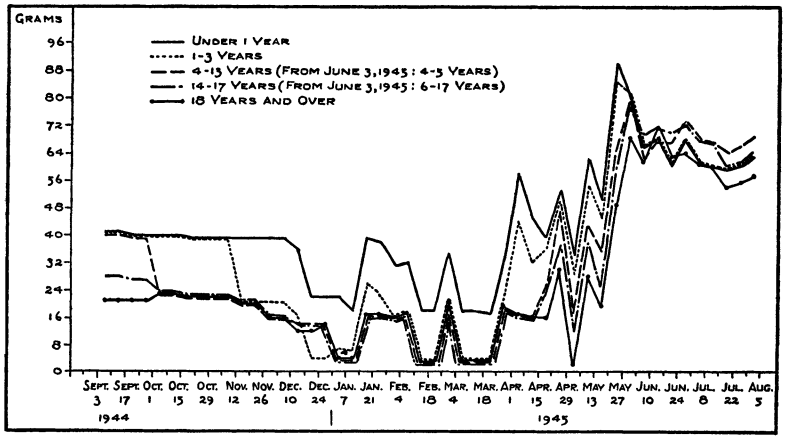


Fig. 15. Average grams of fat per day by weekly periods for food rations, including Red Cross and S.H.A.E.F. supplies, distributed daily in Western Netherlands to different age groups from September 3, 1944 to August 5, 1945.

people. Within three weeks the calories had been raised to 2,400 a day. In this connection, it is worth mentioning that the food authorities in the Western part of the country were aided by the Organization for Relief at Short Notice (Commissariaat Noodvoorziening) founded in the Southern part, which furnished a large supply of food in the shortest possible space of time and thus brought about the above-mentioned quick increase of rations (4).

## Improvements in Rationing

The Southern, Northern, and Eastern provinces never suffered as bad a shortage of foodstuffs as the Western. Before the liberation of the Western part of Holland, these provinces were on a much higher caloric level than the areas that were still occupied. For a short period after the liberation, it was just the other way around. In the Western provinces care was taken that the rations after the starvation period had the highest possible content in proteins and fats. Afterwards it was the duty of the authorities in charge to get uniform rationing all over the country.

| Age Groups and Special Groups | Calories | Proteins Gms. | Fats Gms. | Carbohydrates Gms. |
|---|---|---|---|---|
| Under 1 Year | 1,800 | 51 | 62 | 250 |
| 2- 4 Years | 1,900 | 54 | 62 | 265 |
| 5-14 | 2,475 | 70 | 65 | 390 |
| 15-20 | 2,650 | 75 | 65 | 425 |
| Adults—Normal Consumers | 2,300 | 61 | 58 | 370 |
| Workers on Long Hours and Night Jobs | 2,675 | 71 | 67 | 430 |
| Heavy Workers | 3,150 | 84 | 77 | 511 |
| Heaviest Workers | 4,000 | 106 | 105 | 633 |
| Expectant and Nursing Mothers | 3,200 | 94 | 96 | 465 |
| Coal Miners | 5,400 | 157 | 144 | 826 |

Table 7. Calories, protein, fat, and carbohydrate in the rations of different age groups and other special groups in the Netherlands after January 1, 1946.

Except for some slight deviations this end was attained in August, 1945.

The average rations for a normal consumer contained approximately 2,300 calories per day. Special attention was paid to the requirements of the most important groups, *i.e.,* children, expectant and nursing mothers, sick persons, and laborers in need of supplementary rations. The number of calories and grams of proteins, fats, and carbohydrates per day furnished by the rations for these groups on January 1, 1946 are shown in Table 7.

Meanwhile, some products such as groats, rolled oats, pulses, rusks, and biscuits had gone off the ration. This rendered the continuation of the graphs impossible, as it would be necessary to estimate some of the values.

Unfortunately, since January 1st, it has been necessary to cut the ration twice due to the world food shortage. As of July 1st, the ration to normal consumers supplied about 1,850 calories, including estimated amounts for foods not rationed.

## Death and Disease Symptoms

Even during the time our country was occupied by the Nazis,

the Pouls Committee, already referred to, regularly reported on the public health. These strictly confidential communications were used by the Director General for the Food Supply in determining the course to be followed. In the beginning the results were not unfavorable. However, the state of health of the school children, in fact, public health in general, appeared to become gradually worse and worse.

This is clearly illustrated by the appreciable increase in the number of accidents in factories and workshops, which rose from 22.9 per thousand during the first five months of 1939 to 138.5 per thousand during the corresponding period in 1943. Although it is by no means impossible that psychological and technical factors exercised their influence on these figures, Penris (5) is of the opinion that nutrition probably is responsible for this increase.

From the mortality rates for tuberculosis, it appears that the resistance of the population greatly decreased during the occupation. The rate more than doubled from 1939 to 1944, as appears from the following figures:

*Annual Death Rate from Tuberculosis Per 10,000 Population*

| *1939* | *1940* | *1941* | *1942* | *1943* | *1944* (first half-year) |
|---|---|---|---|---|---|
| 4.10 | 4.37 | 5.92 | 6.13 | 6.99 | 8.28 |

Later data are not available because of war conditions.

More detailed information is available for school children than for adults. These data were provided by the provisional reports of the Pouls Committee, which will be published in full in due course. From these, it appears that from 1941 the average weight of the children in all age groups showed a tendency to decrease. The numbers of children showing a positive Pirquet reaction increased appreciably, and decay of the teeth increased even more.

These conditions were found first in children in orphanages,

and later on also in children of the larger towns, but in a far less degree in children in small towns. No data are available for farmers' children.

Another condition, formerly seen only very seldom but recently of rather frequent occurrence, was volvulus of the sigmoid and prolapsus of anus and rectum. This has been commented upon by Schepel (6). This condition which is often seen in Russia and the Baltic countries is attributed to inadequate nutrition.

The above refers to the period preceding the famine. It was not long before people experienced the consequences of famine, as is apparent from the large increase in the rate of mortality. Early in January, 1945, the first obvious cases of death as the result of starvation were reported to the Government Office. The numbers of deaths in twelve municipalities in the first half of 1945 are shown in Tables 8, 9, and 10, and are compared with the deaths in the corresponding period of 1944. These data are from tabulations made by the Central Bureau of Statistics. The total deaths

Table 8. Numbers of deaths in twelve municipalities in the first half of 1944 and 1945.

| Municipality | Number of Deaths in First Six Months | | Ratio 1944 = 100 | Absolute Difference |
|---|---|---|---|---|
| | 1944 | 1945 | | |
| Amsterdam | 4,401 | 9,737 | 221 | 5,336 |
| Rotterdam | 3,255 | 7,854 | 241 | 4,599 |
| The Hague | 2,389 | 5,811 | 243 | 3,422 |
| Rijswijk | 91 | 211 | 232 | 120 |
| Voorburg | 188 | 449 | 239 | 261 |
| Delft | 424 | 863 | 204 | 439 |
| Leiden | 625 | 1,130 | 180 | 505 |
| Gouda | 287 | 519 | 181 | 232 |
| Schiedam | 396 | 737 | 186 | 341 |
| Vlaardingen | 180 | 369 | 205 | 189 |
| Dordrecht | 424 | 603 | 142 | 179 |
| Hilversum | 495 | 839 | 169 | 344 |
| Total | 13,155 | 29,122 | 221 | 15,967 |

| Age Group | Number of Deaths | | Excess Over Number in First 6 Months, 1944 | | Ratio 1944 = 100 | |
|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female |
| All Ages | 17,915 | 11,207 | 11,252 | 4,715 | 269 | 173 |
| Under 1 Year | 1,437 | 1,002 | 901 | 663 | 268 | 296 |
| 1-4 Years | 501 | 379 | 253 | 193 | 202 | 204 |
| 5-64 Years | 7,099 | 3,318 | 4,289 | 896 | 253 | 137 |
| 65 Yrs. and Over | 8,878 | 6,508 | 5,809 | 2,963 | 289 | 184 |

Table 9. Deaths according to sex and age groups in twelve municipalities in the first half of 1945 and excess over 1944.

more than doubled; for males the increase was 169 per cent and for females it was 73 per cent. Recently W. R. Aykroyd, Director of the Nutrition Research Laboratory at Conoor in India, stated that this phenomenon was observed also during the sweeping famine in that country. A satisfactory explanation has not as yet been found.

Table 10. Weekly deaths in twelve municipalities in the first half of 1945.

| Week of Year | The Hague War Victims Excl. | Twelve Municipalities | | Week of Year | The Hague | Twelve Municipalities | |
|---|---|---|---|---|---|---|---|
| | | Total Deaths | Excess Over 1944 | | | Total Deaths | Excess Over 1944 |
| 1st | 128 | 763 | 202 | 14th | 287 | 1,300 | 710 |
| 2nd | 171 | 912 | 393 | 15th | 270 | 1,303 | 782 |
| 3rd | 236 | 1,064 | 548 | 16th | 244 | 1,101 | 643 |
| 4th | 241 | 1,246 | 711 | 17th | 231 | 1,168 | 707 |
| 5th | 274 | 1,579 | 1,103 | 18th | 220 | 1,262 | 790 |
| 6th | 310 | 1,417 | 906 | 19th | 252 | 1,325 | 889 |
| 7th | 298 | 1,362 | 848 | 20th | 196 | 948 | 508 |
| 8th | 326 | 1,320 | 778 | 21st | 133 | 828 | 369 |
| 9th | 306 | 1,330 | 683 | 22nd | 106 | 726 | 246 |
| 10th | 271 | 1,452 | 824 | 23rd | 130 | 693 | 285 |
| 11th | 303 | 1,508 | 866 | 24th | 105 | 599 | 208 |
| 12th | 318 | 1,522 | 959 | 25th | 90 | 581 | 191 |
| 13th | 278 | 1,292 | 697 | 26th | 87 | 521 | 121 |

The most striking symptom of starving persons is their total apathy, in spite of the fact that they often had lost their self control and were most irritable. This is one of the symptoms observed by Aykroyd. Also, insomnia during the night and sleep in the daytime occurred frequently. Peripheral nervous disorders and polyneuritis, severe cases of muscular weakness, dizziness, bad cases of anemia, edema, and polyuria, were common occurrences. Also avitaminoses and severe wound infections were reported by several doctors.

This war and the famine period have taught us, however, that the human organism is capable of far greater adaptation than was thought possible. This adaptation took place in the metabolism of the individual, which was economized. However, in contrast with the investigations on experimental starvation in man by Keys and collaborators (7), the adaptation of the human body took place very slowly.

For further details about the symptoms observed in starving persons, the report by J. B. Stolte (8) may be referred to.

## Conclusion

In this article attempt has been made to summarize the course of the Dutch food supply during World War II; some miscellaneous historical facts have been recorded, as well as occasionally the motives or circumstances that account for the policy pursued.

A comparison with rationing during World War I has been avoided on purpose, since from 1914 until 1918 the war situation was quite different. First of all, the Netherlands was unoccupied and the Dutch Government was free to determine its own policy. In addition, it should be borne in mind that since 1918 the population has increased by 40 per cent, whereas the acreage of arable land has increased by at most 6 per cent.

At present, attempts are being made to bring food up to the

prewar level as quickly as possible. To attain this end, however, many international obstacles have to be removed; among other things there are the monetary problem and the allocation of food and raw materials from the world stock. The world food shortage, however, is very serious; therefore, it cannot be expected that in 1946 the prewar consumption level will be reached.

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Appendix Table 1. Number of calories and amounts of carbohydrates, proteins, fats, minerals, and vitamins per day in foods distributed in The Netherlands to children and youths, by age group, April 27, 1941 to September 30, 1944.

| Year and Quarter | Calories No. | Carbohydrates Gms. | Protein Gms. | Fats Gms. | Calcium Gms. | Phosphorus Gms. | Iron Mgs. | Vitamin A Int. Units | Thiamin Mgs. | Ascorbic Acid Mgs. |
|---|---|---|---|---|---|---|---|---|---|---|
| | AGES 0-3 YEARS | | | | | | | | | |
| **1941** | | | | | | | | | | |
| II | 1,661 | 235 | 67 | 45 | 1.45 | 1.60 | 10 | 3,070 | 1.14 | 32 |
| III | 1,711 | 253 | 65 | 45 | 1.47 | 1.61 | 10 | 2,618 | 1.15 | 79 |
| IV | 1,732 | 251 | 66 | 47 | 1.50 | 1.51 | 10 | 4,346 | 1.11 | 67 |
| **1942** | | | | | | | | | | |
| I | 1,706 | 243 | 65 | 48 | 1.46 | 1.49 | 9 | 1,656 | 1.06 | 37 |
| II | 1,656 | 231 | 64 | 48 | 1.48 | 1.56 | 9 | 3,233 | 1.04 | 42 |
| III | 1,677 | 246 | 62 | 46 | 1.40 | 1.53 | 9 | 2,658 | 1.02 | 81 |
| IV | 1,650 | 253 | 55 | 41 | 1.21 | 1.37 | 9 | 5,324 | .96 | 77 |
| **1943** | | | | | | | | | | |
| I | 1,623 | 250 | 53 | 41 | 1.15 | 1.33 | 9 | 2,309 | .91 | 48 |
| II | 1,596 | 250 | 55 | 38 | 1.15 | 1.37 | 10 | 3,174 | .95 | 53 |
| III | 1,667 | 261 | 54 | 41 | 1.16 | 1.42 | 10 | 2,569 | 1.01 | 101 |
| IV | 1,664 | 249 | 53 | 47 | 1.15 | 1.35 | 9 | 4,202 | .94 | 69 |
| **1944** | | | | | | | | | | |
| I | 1,572 | 231 | 50 | 45 | 1.11 | 1.31 | 8 | 2,119 | .93 | 46 |
| II | 1,519 | 227 | 52 | 41 | 1.10 | 1.32 | 9 | 3,085 | .92 | 49 |
| III | 1,531 | 228 | 51 | 42 | 1.14 | 1.35 | 9 | 2,752 | .94 | 81 |
| | AGES 4-13 YEARS | | | | | | | | | |
| **1941** | | | | | | | | | | |
| II | 1,963 | 300 | 67 | 49 | 0.91 | 1.51 | 15 | 2,898 | 1.17 | 39 |
| III | 2,021 | 321 | 64 | 48 | 0.92 | 1.52 | 15 | 2,445 | 1.22 | 112 |
| IV | 2,072 | 322 | 66 | 52 | 0.96 | 1.53 | 15 | 4,193 | 1.24 | 95 |
| **1942** | | | | | | | | | | |
| I | 2,055 | 314 | 65 | 55 | 0.92 | 1.50 | 15 | 1,526 | 1.20 | 53 |
| II | 1,928 | 290 | 63 | 51 | 0.93 | 1.47 | 14 | 3,082 | 1.15 | 57 |
| III | 1,959 | 309 | 64 | 47 | 0.92 | 1.51 | 15 | 2,513 | 1.21 | 115 |
| IV | 2,101 | 338 | 65 | 46 | 0.97 | 1.57 | 16 | 5,306 | 1.31 | 113 |
| **1943** | | | | | | | | | | |
| I | 2,019 | 330 | 60 | 45 | 0.81 | 1.44 | 15 | 2,234 | 1.21 | 68 |
| II | 1,948 | 330 | 60 | 37 | 0.85 | 1.46 | 16 | 3,064 | 1.24 | 79 |
| III | 2,016 | 330 | 60 | 45 | 0.91 | 1.53 | 15 | 2,549 | 1.29 | 140 |
| IV | 2,056 | 333 | 58 | 49 | 0.91 | 1.49 | 14 | 4,158 | 1.26 | 103 |
| **1944** | | | | | | | | | | |
| I | 1,897 | 311 | 52 | 43 | 0.81 | 1.41 | 14 | 2,050 | 1.23 | 65 |
| II | 1,835 | 302 | 55 | 39 | 0.84 | 1.44 | 15 | 3,023 | 1.22 | 73 |
| III | 1,798 | 295 | 54 | 40 | 0.89 | 1.44 | 14 | 2,687 | 1.20 | 112 |
| | AGES 14-20 YEARS | | | | | | | | | |
| **1941** | | | | | | | | | | |
| II | 1,982 | 320 | 64 | 44 | 0.62 | 1.40 | 16 | 2,723 | 1.14 | 36 |
| III | 1,988 | 336 | 61 | 40 | 0.63 | 1.39 | 16 | 2,169 | 1.17 | 109 |
| IV | 2,217 | 383 | 67 | 40 | 0.70 | 1.55 | 18 | 3,855 | 1.39 | 125 |
| **1942** | | | | | | | | | | |
| I | 2,200 | 375 | 66 | 43 | 0.65 | 1.52 | 17 | 1,187 | 1.34 | 70 |
| II | 2,040 | 342 | 63 | 41 | 0.66 | 1.46 | 17 | 2,744 | 1.26 | 75 |
| III | 2,093 | 364 | 64 | 36 | 0.66 | 1.51 | 18 | 2,176 | 1.33 | 150 |
| IV | 2,293 | 408 | 68 | 36 | 0.71 | 1.62 | 19 | 4,969 | 1.49 | 147 |
| **1943** | | | | | | | | | | |
| I | 2,230 | 400 | 63 | 35 | 0.60 | 1.52 | 18 | 1,955 | 1.41 | 88 |
| II | 2,160 | 400 | 63 | 29 | 0.62 | 1.53 | 18 | 2,797 | 1.43 | 105 |
| III | 2,169 | 392 | 61 | 33 | 0.65 | 1.54 | 18 | 2,212 | 1.43 | 179 |
| IV | 2,253 | 401 | 60 | 39 | 0.66 | 1.53 | 18 | 3,820 | 1.44 | 138 |
| **1944** | | | | | | | | | | |
| I | 2,066 | 371 | 54 | 33 | 0.58 | 1.48 | 18 | 1,751 | 1.42 | 86 |
| II | 1,970 | 358 | 56 | 28 | 0.60 | 1.49 | 18 | 2,699 | 1.39 | 96 |
| III | 1,879 | 339 | 54 | 29 | 0.62 | 1.43 | 17 | 2,351 | 1.31 | 145 |

Appendix Table 2. Number of calories and amounts of carbohydrates, proteins, fats, minerals, and vitamins per day in foods distributed in The Netherlands to adults, according to type of work, April 27, 1941 to September 30, 1944.

| Year and Quarter | Calories No. | Carbohydrates Gms. | Protein Gms. | Fats Gms. | Calcium Gms. | Phosphorus Gms. | Iron Mgs. | Vitamin A -Carotene Int. Units | Thiamin Mgs. | Ascorbic Acid Mgs. |
|---|---|---|---|---|---|---|---|---|---|---|
| | ADULTS — GENERAL | | | | | | | | | |
| 1941 | | | | | | | | | | |
| II | 1,828 | 289 | 59 | 42 | 0.61 | 1.28 | 15 | 2,723 | 1.05 | 36 |
| III | 1,852 | 310 | 57 | 38 | 0.62 | 1.30 | 15 | 2,169 | 1.09 | 109 |
| IV | 1,828 | 308 | 58 | 36 | 0.66 | 1.30 | 14 | 3,802 | 1.11 | 92 |
| 1942 | | | | | | | | | | |
| I | 1,810 | 299 | 57 | 38 | 0.61 | 1.27 | 14 | 1,135 | 1.07 | 50 |
| II | 1,699 | 277 | 55 | 35 | 0.63 | 1.25 | 14 | 2,691 | 1.03 | 55 |
| III | 1,750 | 299 | 56 | 32 | 0.62 | 1.28 | 14 | 2,124 | 1.08 | 113 |
| IV | 1,876 | 326 | 57 | 32 | 0.67 | 1.35 | 15 | 4,917 | 1.18 | 110 |
| 1943 | | | | | | | | | | |
| I | 1,822 | 316 | 52 | 32 | 0.55 | 1.25 | 14 | 1,903 | 1.10 | 65 |
| II | 1,724 | 317 | 53 | 23 | 0.56 | 1.25 | 15 | 2,744 | 1.12 | 76 |
| III | 1,783 | 323 | 52 | 26 | 0.61 | 1.30 | 15 | 2,133 | 1.17 | 137 |
| IV | 1,784 | 321 | 51 | 28 | 0.61 | 1.26 | 15 | 3,690 | 1.14 | 101 |
| 1944 | | | | | | | | | | |
| I | 1,656 | 299 | 45 | 26 | 0.54 | 1.21 | 14 | 1,633 | 1.12 | 63 |
| II | 1,585 | 288 | 48 | 21 | 0.56 | 1.22 | 14 | 2,601 | 1.10 | 70 |
| III | 1,529 | 279 | 45 | 22 | 0.59 | 1.21 | 14 | 2,261 | 1.07 | 109 |
| | WORKERS ON LONG HOURS AND NIGHT WORK | | | | | | | | | |
| 1941 | | | | | | | | | | |
| II | 2,032 | 320 | 66 | 48 | 0.62 | 1.43 | 17 | 2,757 | 1.16 | 37 |
| III | 2,056 | 341 | 64 | 44 | 0.64 | 1.45 | 17 | 2,203 | 1.20 | 109 |
| IV | 2,032 | 339 | 65 | 42 | 0.68 | 1.45 | 17 | 3,836 | 1.22 | 93 |
| 1942 | | | | | | | | | | |
| I | 2,027 | 330 | 64 | 44 | 0.63 | 1.42 | 16 | 1,188 | 1.18 | 51 |
| II | 1,917 | 308 | 62 | 42 | 0.65 | 1.40 | 16 | 2,746 | 1.14 | 55 |
| III | 1,969 | 329 | 63 | 39 | 0.64 | 1.43 | 17 | 2,179 | 1.19 | 113 |
| IV | 2,146 | 367 | 66 | 39 | 0.69 | 1.52 | 18 | 4,973 | 1.33 | 116 |
| 1943 | | | | | | | | | | |
| I | 2,113 | 366 | 61 | 38 | 0.58 | 1.45 | 17 | 1,958 | 1.27 | 71 |
| II | 1,999 | 363 | 61 | 29 | 0.58 | 1.44 | 17 | 2,792 | 1.29 | 84 |
| III | 2,099 | 376 | 60 | 33 | 0.64 | 1.51 | 18 | 2,189 | 1.37 | 158 |
| IV | 2,132 | 379 | 60 | 35 | 0.65 | 1.50 | 18 | 3,745 | 1.36 | 120 |
| 1944 | | | | | | | | | | |
| I | 1,970 | 353 | 55 | 30 | 0.57 | 1.44 | 17 | 1,689 | 1.34 | 75 |
| II | 1,897 | 343 | 57 | 26 | 0.59 | 1.46 | 18 | 2,656 | 1.32 | 84 |
| III | 1,789 | 328 | 54 | 28 | 0.61 | 1.40 | 16 | 2,317 | 1.23 | 121 |
| | WORKERS ON HEAVY WORK | | | | | | | | | |
| 1941 | | | | | | | | | | |
| II | 2,455 | 388 | 76 | 59 | 0.66 | 1.68 | 20 | 2,902 | 1.38 | 48 |
| III | 2,499 | 411 | 75 | 56 | 0.68 | 1.70 | 20 | 2,348 | 1.46 | 147 |
| IV | 2,485 | 414 | 76 | 52 | 0.72 | 1.72 | 20 | 3,970 | 1.50 | 125 |
| 1942 | | | | | | | | | | |
| I | 2,485 | 407 | 74 | 55 | 0.67 | 1.68 | 20 | 1,328 | 1.46 | 71 |
| II | 2,304 | 373 | 71 | 52 | 0.69 | 1.62 | 19 | 2,862 | 1.38 | 75 |
| III | 2,339 | 397 | 73 | 45 | 0.68 | 1.67 | 20 | 2,259 | 1.44 | 151 |
| IV | 2,534 | 440 | 76 | 44 | 0.73 | 1.78 | 21 | 5,048 | 1.60 | 148 |
| 1943 | | | | | | | | | | |
| I | 2,468 | 431 | 69 | 44 | 0.62 | 1.68 | 20 | 2,033 | 1.52 | 89 |
| II | 2,379 | 426 | 71 | 36 | 0.62 | 1.68 | 21 | 2,855 | 1.54 | 105 |
| III | 2,398 | 424 | 71 | 40 | 0.67 | 1.70 | 20 | 2,264 | 1.55 | 179 |
| IV | 2,463 | 433 | 71 | 43 | 0.68 | 1.70 | 20 | 3,820 | 1.57 | 139 |
| 1944 | | | | | | | | | | |
| I | 2,274 | 403 | 63 | 37 | 0.61 | 1.65 | 20 | 1,756 | 1.54 | 86 |
| II | 2,172 | 391 | 65 | 31 | 0.62 | 1.66 | 21 | 2,712 | 1.52 | 98 |
| III | 2,064 | 371 | 61 | 32 | 0.64 | 1.60 | 19 | 2,372 | 1.42 | 145 |
| | WORKERS ON VERY HEAVY WORK | | | | | | | | | |
| 1941 | | | | | | | | | | |
| II | 3,332 | 487 | 93 | 101 | 0.73 | 2.11 | 27 | 3,437 | 1.74 | 59 |
| III | 3,375 | 509 | 93 | 98 | 0.75 | 2.15 | 27 | 2,875 | 1.86 | 185 |
| IV | 3,367 | 515 | 97 | 93 | 0.78 | 2.18 | 27 | 4,475 | 1.92 | 159 |
| 1942 | | | | | | | | | | |
| I | 3,425 | 513 | 93 | 101 | 0.74 | 2.13 | 26 | 1,906 | 1.87 | 92 |
| II | 3,156 | 469 | 90 | 92 | 0.75 | 2.04 | 25 | 3,377 | 1.74 | 96 |
| III | 3,156 | 494 | 92 | 81 | 0.74 | 2.10 | 26 | 2,668 | 1.83 | 189 |
| IV | 3,413 | 554 | 97 | 79 | 0.80 | 2.26 | 28 | 5,439 | 2.05 | 186 |
| 1943 | | | | | | | | | | |
| I | 3,332 | 543 | 90 | 78 | 0.69 | 2.13 | 27 | 2,424 | 1.95 | 112 |
| II | 3,187 | 542 | 91 | 64 | 0.69 | 2.13 | 27 | 3,185 | 1.97 | 134 |
| III | 3,183 | 524 | 89 | 73 | 0.73 | 2.12 | 26 | 2,655 | 1.93 | 222 |
| IV | 3,304 | 545 | 91 | 75 | 0.74 | 2.16 | 27 | 4,211 | 2.00 | 176 |
| 1944 | | | | | | | | | | |
| I | 3,048 | 508 | 83 | 65 | 0.70 | 2.12 | 27 | 2,150 | 1.97 | 110 |
| II | 2,931 | 497 | 84 | 57 | 0.71 | 2.12 | 27 | 3,058 | 1.94 | 126 |
| III | 2,741 | 460 | 79 | 58 | 0.70 | 2.00 | 25 | 2,708 | 1.78 | 181 |

Appendix Table 3. Number of calories and amounts of carbohydrates, proteins, and fats in foods distributed in three areas[1] of The Netherlands to various age groups and to different types of workers, October, 1944 to December, 1945.

| Year and Quarter | Calories No. | | | Carbohydrates Gms. | | | Protein Gms. | | | Fat Gms. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | West | North-east | South | West | North-east | South | West | North-east | South | West | North-east | South |
| | **INFANTS [2]** | | | | | | | | | | | |
| 1944 IV | 1,298 | 1,404 | 1,321 | 188 | 226 | 195 | 44 | 45 | 46 | 36 | 38 | 36 |
| 1945 I | 1,154 | 1,287 | 1,529 | 178 | 183 | 226 | 42 | 44 | 50 | 26 | 38 | 44 |
| II | 1,776 | 1,649 | 1,744 | 241 | 235 | 256 | 60 | 58 | 56 | 59 | 49 | 51 |
| III | 1,664 | 1,708 | 1,825 | 219 | 236 | 249 | 57 | 57 | 60 | 59 | 56 | 60 |
| IV | 1,672 | 1,672 | 1,663 | 234 | 234 | 233 | 54 | 53 | 53 | 54 | 54 | 53 |
| | **PRESCHOOL [3]** | | | | | | | | | | | |
| 1944 IV | 1,205 | 1,404 | 1,321 | 188 | 226 | 195 | 44 | 45 | 46 | 26 | 38 | 36 |
| 1945 I | 865 | 1,287 | 1,529 | 150 | 183 | 226 | 28 | 44 | 50 | 12 | 38 | 44 |
| II | 1,644 | 1,649 | 1,747 | 225 | 235 | 256 | 54 | 58 | 54 | 55 | 49 | 52 |
| III | 1,696 | 1,730 | 1,819 | 225 | 240 | 254 | 58 | 58 | 58 | 59 | 56 | 59 |
| IV | 1,744 | 1,744 | 1,735 | 248 | 248 | 245 | 56 | 56 | 56 | 54 | 54 | 53 |
| | **SCHOOL AGES [4]** | | | | | | | | | | | |
| 1944 IV | 1,073 | 1,401 | 1,256 | 184 | 249 | 221 | 31 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 664 | 1,284 | 1,778 | 119 | 224 | 308 | 19 | 37 | 58 | 10 | 22 | 31 |
| II | 1,460 | 1,729 | 2,016 | 204 | 276 | 331 | 48 | 60 | 59 | 47 | 39 | 46 |
| III | 2,068 | 2,109 | 2,221 | 299 | 318 | 348 | 69 | 69 | 67 | 62 | 57 | 57 |
| IV | 2,321 | 2,321 | 2,312 | 372 | 372 | 371 | 70 | 70 | 69 | 55 | 55 | 55 |
| | **ADOLESCENTS [5]** | | | | | | | | | | | |
| 1944 IV | 1,044 | 1,390 | 1,261 | 178 | 246 | 224 | 29 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 619 | 1,276 | 1,905 | 112 | 223 | 349 | 16 | 36 | 57 | 10 | 22 | 26 |
| II | 1,509 | 1,641 | 2,124 | 219 | 268 | 378 | 48 | 56 | 59 | 45 | 34 | 36 |
| III | 2,345 | 2,275 | 2,303 | 345 | 361 | 385 | 71 | 73 | 65 | 59 | 54 | 50 |
| IV | 2,523 | 2,523 | 2,418 | 415 | 415 | 406 | 76 | 76 | 70 | 55 | 55 | 51 |
| | **ADULTS — GENERAL** | | | | | | | | | | | |
| 1944 IV | 1,035 | 1,380 | 1,241 | 176 | 244 | 220 | 29 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 619 | 1,276 | 1,642 | 112 | 223 | 294 | 16 | 36 | 50 | 10 | 22 | 25 |
| II | 1,376 | 1,623 | 1,793 | 211 | 264 | 312 | 41 | 56 | 51 | 39 | 34 | 33 |
| III | 2,092 | 2,020 | 2,005 | 313 | 320 | 328 | 61 | 63 | 57 | 54 | 49 | 47 |
| IV | 2,179 | 2,178 | 2,156 | 359 | 359 | 356 | 62 | 62 | 61 | 50 | 49 | 48 |
| | **WORKERS ON LONG HOURS OR NIGHT WORK** | | | | | | | | | | | |
| 1944 IV | 1,035 | 1,380 | 1,241 | 176 | 244 | 220 | 29 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 619 | 1,276 | 1,755 | 112 | 223 | 313 | 16 | 36 | 53 | 10 | 22 | 28 |
| II | 1,449 | 1,707 | 2,160 | 226 | 280 | 371 | 43 | 58 | 61 | 39 | 36 | 42 |
| III | 2,373 | 2,411 | 2,374 | 376 | 389 | 387 | 70 | 75 | 67 | 60 | 56 | 56 |
| IV | 2,553 | 2,594 | 2,539 | 420 | 428 | 418 | 72 | 73 | 72 | 58 | 58 | 55 |
| | **WORKERS IN HEAVY OCCUPATIONS** | | | | | | | | | | | |
| 1944 IV | 1,035 | 1,380 | 1,241 | 176 | 244 | 220 | 29 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 619 | 1,276 | 1,840 | 112 | 223 | 327 | 16 | 36 | 55 | 10 | 22 | 30 |
| II | 1,512 | 1,771 | 2,435 | 239 | 290 | 418 | 44 | 60 | 68 | 39 | 37 | 48 |
| III | 2,727 | 2,702 | 2,668 | 436 | 436 | 435 | 80 | 83 | 74 | 67 | 63 | 63 |
| IV | 2,980 | 2,984 | 2,927 | 490 | 489 | 482 | 84 | 84 | 82 | 68 | 68 | 67 |
| | **WORKERS IN VERY HEAVY OCCUPATIONS** | | | | | | | | | | | |
| 1945 IV | 1,035 | 1,380 | 1,241 | 176 | 244 | 220 | 29 | 39 | 41 | 19 | 23 | 19 |
| 1945 I | 619 | 1,276 | 2,039 | 112 | 223 | 360 | 16 | 36 | 60 | 10 | 22 | 34 |
| II | 1,649 | 1,919 | 3,077 | 267 | 317 | 525 | 48 | 64 | 85 | 39 | 39 | 63 |
| III | 3,336 | 3,380 | 3,331 | 540 | 552 | 543 | 96 | 102 | 92 | 80 | 76 | 79 |
| IV | 3,704 | 3,790 | 3,705 | 599 | 615 | 601 | 103 | 105 | 102 | 90 | 91 | 89 |

[1] The three areas are: the western provinces of The Netherlands, including Noord-Holland, Zuid-Holland, and Utrecht; northern and eastern provinces, including Groninger, Friesland, Drenthe, Overyssel, and part of Gelderland; and the southern provinces, *i.e.*, the areas south of the big rivers.

[2] Under 1 year of age to August 4, 1945 in the western area, to September 1 in the northern and eastern areas, to June 9 in the southern area; thereafter under 2 years of age.

[3] Ages 1-3 years inclusive to August 4, 1945 in western area, to September 1 in northern and eastern areas, to June 9 in southern area; thereafter, ages 2-4 years.

[4] In the western area, ages 4-13 years to June 2, 1945, ages 4-5 years June 3 to August 4 and ages 5-14 years thereafter; in the northern and eastern areas, ages 4-13 years to September 1, 1945; thereafter ages 5-14 years; in the south, ages 4-13 years to June 9 and thereafter ages 5-14 years.

[5] In the western area, ages 14-17 years to June 2, 1945, ages 6-17 years from June 3 to August 4, and ages 15 to 20 years thereafter; in the northern and eastern areas, ages 14-17 years to September 1 and thereafter ages 15-20 years; in the southern area, ages 14-20 years to June 9, and thereafter ages 15-20 years.