THE NATION'S LARDER IN WARTIME

*This is an abridged version of the last of a series of lectures recently delivered before the Royal Institution **

THE FEEDING OF CHILDREN

BY

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[Dr. Spence began his lecture with a recapitulation of the composition of foods, and spoke of the need for a knowledge of foodstuffs suitable for the health and growth of children.]

If an expert were asked to arrange an exact and ideal diet for a child he would in theory have to calculate the total amounts of the different foodstuffs which would be required according to the age, size, and activity of the child, and also the different kinds which would have to be given to provide the essential body-building and body-protecting materials. In practice, however, he would not bother to calculate the total amounts of the foods required and would not advise the quantitative measurement of all foods. He would insist on certain minimal amounts of the essential foods, but he would allow the total quantity of food to be governed by the appetite of the child and the wise arrangement and spacing of his meals.

A child of 10 must have about 60 grammes of protein a day in order to provide for the growth of the body and maintenance of its structure. From 35 to 40 grammes of this must be animal (first-class) protein. One pint of milk provides 20 grammes of such animal protein, and the remainder can be provided from 1 oz. of meat or fish and $\frac{1}{2}$ oz. of cheese or an egg. One ounce of bread contains 15 grammes of starch and 2 grammes of vegetable protein. Milk is not a beverage but a food, 1 pint of which contains 20 grammes of animal protein, 25 grammes of sugar, and 22 grammes of fat, with valuable amounts of calcium, vitamins, and other protective materials. Two ounces of beefsteak contains 15 grammes of protein and 12 grammes of fat; a similar amount of liver contains 15 grammes of protein, 10 grammes of fat, and a variety of essential protective substances besides. A few ounces of carrots, potatoes, or salads contains all the necessary daily amounts of an important vitamin.

With this sort of knowledge the expert ensures the necessities of a diet, leaving the rest to be provided by cereals and other foods as appetite and taste demand.

Breast-feeding

The milk of all mammals has been designed as the food most fitted to the suckling young of the particular species, but an increasing number of women fail to lactate and have therefore to resort to bottle-feeding for their infants.

A theoretical question arises: If so suitable a nutritive as breast milk has been provided for the infant, would it be possible to go on feeding on that alone for a few years past the usual milking period? The answer is that breast milk would not be a complete food for older children, because certain essential substances have been left out of the milk of all mammals, and to compensate for this an extra supply of these substances has been given to the young before birth. Iron is an example; a child is born with a sufficient store of iron to last it for seven or eight months. During that period, while getting insufficient iron for its daily use from its mother's milk, it has to rely on its own reserves.

Accepting the fact that breast milk is the ideal food for infants until about the sixth or seventh month of life, it remains to be asked what it is that interferes with this

function in so many women who desire to breast-feed but fail to do so. Either the difficulty arises in the first few days after the birth of the child, as a result of which lactation is never established, or, lactation having been established, difficulties arise two or three weeks after the birth which cause a disappearance of the breast milk.

Two factors are necessary for a satisfactory establishment of breast-feeding. The first is the right emotional attitude of the mother to her task, and the second, the mechanical stimulus which the suckling infant gives to the breast.

All women who have successfully carried a child and given birth to it are capable of lactating. A very small proportion will fail to master the technique of breast-feeding because of some physical weakness in themselves or in the baby, but at least 95% of women will be able to feed their children if they desire to do so and are not mis-handled by their attendants. The stresses and strains of war experiences are not those which interfere with breast-feeding. Indeed, by a wise biological adjustment, the absence of a husband at the war seems to have the effect of bringing out more strongly a woman's essential maternal qualities.

Artificial Feeding of Infants

The artificial bottle-feeding of infants must be used if breast-milk feeding fails or when weaning is decided upon. In former times if a mother's milk failed a wet-nurse was used, for not to be breast-fed was to die; but now substitute feeding with cow's milk or with a mixture of dried cow's milk powder and water has become a safe if not complete satisfactory substitute.

Cow's milk provides most of the necessary materials for growth and health, but in winter it may be deficient in some of the protective vitamins. For this reason it is customary to give some orange juice and cod-liver oil daily to all artificially fed infants from their second month onwards. If fresh cow's milk is used it is advisable to dilute it with a little water and add some extra sugar. Elaborate milk mixture formulas changing month by month are unnecessary. The simple plan should be followed of using a mixture of three parts of cow's milk to one of water, adding to every four fluid ounces of this mixture one teaspoonful of sugar. The amount of milk required and the bulk of the feeds will vary with the age, size, and appetite of the child. Mothers should accustom themselves to recognize the instinctive needs and appetite of their babies. The smallest baby will require at least 10 oz. of milk a day, a six-months-old baby at least 20 oz., and a nine-months-old baby at least 25 oz. In guiding mothers aright the use of these simple figures will ensure that they are providing adequate food amounts and avoiding the danger of over-diluting with water in preparing feeds.

At about the age of six months, while milk feeding is being continued, extra protective materials and energy-producing materials must be introduced. These are provided in vegetable purées and in cereals. Although marrow bone and vegetable broth is much used for children of this age, it has practically no food value. It serves a temporary purpose of cultivating a taste for savoury substances, but it should be quickly replaced by a purée of vegetables made from potatoes and other roots. Cereals should be used sparingly; the taste for these is apt to develop too rapidly to the exclusion of more essential foods. For the same reason it is wise to avoid altogether the use of sweet biscuits. Wheat bread is the cereal most commonly used in our diet, but for young children it is best to vary the choice of cereals as much as possible, using oatmeal, barley, rice, and other cereals known so well as constituents of milk puddings.

From the eighth month onwards eggs, fish, and meat should be introduced; the use of fruits, fruit juice, and vegetables

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should be extended, and jam, treacle, dripping, and butter should be added to the child's diet.

The amounts of essential foods which should be taken daily by a child of twelve months can be summarized as follows:

Milk	1 pint
Minced meat, fish, or poultry	1 oz.
Butter or margarine	$\frac{1}{2}$ oz.
Fruit or fruit juice	1 oz.
Potatoes or other root vegetables	3 oz.

If the flesh meats are not available the milk should be increased to a pint and a half. The bone-making minerals, particularly calcium, are fully provided in a pint of milk.

In addition to these essential body-building and protective foods, the appetite will have to be satisfied with the following energy-producing foods: lentils, potatoes, bread and other cereals, jams, fruits, treacle, dripping, and milk puddings. During the winter extra protective foods should be given, such as one egg or one ounce of herring or fish roe or one teaspoonful of cod-liver oil each day.

The Second Year

The second year is a transitional period in which the child passes from the milk feeding of infancy to the milk and mixed feeding of later childhood. This is a period of particular importance, for at this age rickets and other nutritional diseases are most likely to appear.

Twenty years ago nearly half the children of the toddling stage in industrial towns suffered from rickets. The discovery of the cause and cure of this malady is one of the great beneficent services of medical science. In the end it was shown that it was caused by eating too little of foods containing a bone-forming vitamin. The absence of sunlight in winter intensified this lack of the vitamin. The vitamin was particularly necessary at periods of rapid growth. Thus it could be seen why these children in the second year of life suffered so much from rickets. They were not receiving enough of the raw material to make bone or of vitamin D to stimulate the formation of hard bone. The fault lay in the belief that milk was necessary only for younger babies, and that a two-year-old child was not yet old enough to eat fish, meat, or eggs. Taking little or no milk, meat, fish, or egg in their diet, they lived mainly on bread, jam, tea, potatoes, and suet puddings, with only a scrape of fish or meat from their parents' plates. When meat, milk, fish, or egg was placed in the diet, or when cod-liver oil was given, rickets disappeared from our big industrial towns.

The importance of providing the right foods in this stage between weaning and the age of three is now realized. The diet should contain each day a pint of milk with the same body-building and protective foods which have been described for a twelve-months-old child, only in larger quantities. This age period is important for another reason: it is the stage when likes and dislikes and habits of diet which may persist throughout life are being laid down. It is of little use providing the essential foods if the child refuses to eat them and cries until it gets chocolate biscuits and jam.

Diet in Later Childhood

From early childhood to adolescence there is a steady rise in food requirements, but the principles of dieting remain the same throughout. After infancy a child requires the same kinds of food as an adult, or perhaps it would be better said that adults should eat those kinds of food which are known to be suitable to growing boys and girls. While the child needs less total food than the adult, its diet must contain relatively more protein, mineral materials, and protective materials to allow for growth of bone and other tissues of the body. For example, a child requires each day about 1 gramme of calcium, whereas an adult requires only two-thirds of a gramme.

In estimating food requirements it is customary to use the physicist's terminology, in which a calorie is a unit of heat energy. In the practice of dietetics it is not necessary to calculate or use calorie requirements, but an idea of comparative food needs at different ages can be gathered from the following figures. A child of two requires food to produce about 1,000 calories a day. A child of six requires food to produce 1,500 calories a day. A child of ten requires food to produce 2,000 calories a day. At adolescence a growing boy or girl will require as much as an adult following a sedentary occupation—that is, 2,500 to 3,000 a day. Some boys at puberty require even more than that, and it is a wise precaution to see that the extra requirements at that age are not made up only out of sweets and cakes from a tuck-shop. Let some of the extra requirement be met by an additional supply of milk if possible. If milk is not available, an extra ounce of cheese, fish, fruit, or other body-building and protective foods should be sought.

I will now summarize my remarks on the food requirements in childhood, making use of categories which have already been explained. It will be seen that throughout childhood a pint of milk should be regarded as the basis of the diet. This supplies about half the essential body-building proteins and nearly all the calcium which is required.

	Optimal Food for a Child	
	Aged 2 years	Aged 10 years
<i>Basis of the Diet</i>	Milk, 1 to 1½ pints a day	Milk, 1 pint a day
<i>Body-building Foods</i>	Minced meat, fish, poultry, 1 to 2 oz. a day; cheese (grated), $\frac{1}{2}$ oz. twice or thrice weekly	Minced meat, fish, liver, poultry, 2 oz. a day; cheese (grated or spread on food if necessary), $\frac{1}{2}$ to 1 oz. a day
<i>Protective Foods</i>	(a) Butter or vitaminized margarine, $\frac{1}{2}$ oz. a day (1 oz. a day if skimmed milk is used). Egg, one a day; or (b) Fish roe, herring, salmon, liver, 1 oz. a day; fruit or fruit juice, 1 oz. a day; green vegetables, salad, tomato, or carrots, 2 oz. a day	(a) Butter or vitaminized margarine, 1 oz. a day; egg, one a day; or (b) Fish roe, herring, salmon, liver, 1 oz. a day; potatoes, 4 oz. a day; fruit or fruit juice, 2 oz. a day; or Green vegetables, salad, tomatoes, carrots, 4 oz. a day
<i>Energy-producing Foods</i>	Bread, potatoes, lentils, cereals, jam, treacle, honey, dripping, dried fruits, butter, margarine, ham, bacon, etc., to satisfy appetite	

Rationed Feeding

These diets I have described are optimal ones. Providing more than enough of body-building and protective foods, they carry in them a considerable factor of safety. But with rationing in force it becomes important that we should ask to what extent we can reduce these diets, or how far the essential foods for children may be restricted without harm coming to them. It should first be realized that for many years past, through poverty or ignorance, large numbers of children in this country have lived on diets deficient in proteins and other body-building foods. Whatever may happen in the future, it is unlikely that food supplies will be so restricted as to cause a general lowering of children's diets to these levels. But the greater the restriction the more need there will be to measure carefully the basic requirements of each child and to distribute the available food wisely and economically.

Children of all ages could live for many months on a basic daily diet containing no more than a pint of milk with one ounce of cheese, six ounces of potatoes, some salad or green vegetables, and one small helping of meat, fish, or egg twice a week, leaving the appetite to be satisfied by bread, part wholemeal and part white, margarine, dripping, and jam, oatmeal, and pulses in the form of fresh or dried peas and beans. At this basic level of diet a child should receive in addition during the winter months a teaspoonful of cod-liver oil or, failing that, an ounce of butter or a helping of liver or fresh fish.

Much has been learned about effective rationing by making dietary surveys in families with low incomes where excellent health is maintained by a wise spending of money and careful cooking and distribution of the food. These surveys have shown that most of these families use the same methods of preventing any waste of meat foods and fat.

The commonest method is to use a stockpot for which every scrap of protein food, cooked or uncooked, is saved, which is reinforced each day by adding potatoes, split peas, lentils, and other pulses. The soup from this stock has no special nutritive value beyond that of the substances put into it, but it makes the fullest use of all available protein food and serves yet another purpose in ensuring an easy method of distribution of this food between different members of the family. The habit of placing about an ounce of grated cheese in the bowl of soup before it is eaten is an additional and satisfactory device for getting the most out of restricted protein foods. If each child were given a bowl of this soup every day, in addition to the basic diet which has been described, all the food materials essential for healthy growth would be provided.

In seeking advice about feeding children some parents in the past have been in the habit of demanding from their advisers a detailed diet list or menu for each meal. This should never be necessary. The facts about food are very simple and should be understood in terms of the total daily requirement of essential body-building and protective foods. Common sense must dictate how this is to be spread over the different meals.

[Dr. Spence here described the Oslo "breakfast," adding the suggestion that in an English household the best time of the day to provide the "breakfast" was tea-time, when children were most hungry and when ordinarily the diet consisted of wheaten flour in various forms. He concluded his lecture with an explanation of the value of milk as a food and the importance of pasteurization.]

WORK OF EMERGENCY HOSPITALS

CASUALTIES FROM DUNKIRK

The following is an account of the work of the Emergency Medical Service, Ministry of Health, in connexion with the evacuation of Dunkirk, as seen from one of the Sector Headquarters.

The Sector Scheme tested in Reverse

When the general plan of the Emergency Hospital Scheme was formulated it was designed to meet demands arising from heavy air raid casualties. The London area was divided into ten sectors, each with its apex in or near Central London, and each associated with one of the large teaching hospitals. Peripherally, the sectors widened out to a base some thirty to forty miles away. This sector scheme was adopted in order to provide for an outflow of wounded from the casualty receiving hospitals in London to advanced bases in the periphery of the capital, and so to the base hospitals situated in the deeper parts of the sector. The casualty receiving hospitals were, for the time being, reduced in size and the surplus medical and nursing staffs were transferred to the outer hospitals, which had been increased in size and suitably equipped for the purpose they were intended to serve. It was a curious irony of fortune that on the first occasion on which this Sector Scheme was tested out the stream of casualties should have come not from the apex in London but from the base.

The circumstances surrounding the evacuation from Dunkirk involved the occurrence of many casualties on the beaches and in the boats, and these, together with many casualties from the Dunkirk area, crossed the Straits in a variety of small craft, which landed them at ports, piers, and beaches round the coasts of Kent and Sussex, from which they were evacuated inwards into Sectors IX and X, either directly or indirectly through the local hospitals on the coast.

The sector hospitals had exercised a wise discretion in "making" empty beds in the days preceding the evacuation so as to be prepared for any emergency, and in those in outer South-East London and inner Kent more than 5,000 beds were available. A similar precaution had been taken in the coast towns and in outer Kent and Sussex, where some 2,000 beds were ready for occupation.

Sorting Out the Wounded

From the hospital ships which brought the first batches of wounded to this country the most serious cases were taken to the Emergency Medical Service hospitals in the vicinity of the port to obviate the strain of a railway journey on a hospital train and to ensure active treatment at the earliest possible moment. The less severely wounded were taken on by train beyond the confines of Kent and Sussex and distributed to anxiously expectant E.M.S. hospitals in other sectors. After the hospital ships came the smaller boats, each having some wounded to disembark. Crossing the Straits by divers routes, they landed at a variety of places. There medical officers from the R.A.M.C. and the R.N. received and sorted them out into walking wounded and stretcher cases, and the latter were taken in ambulances of all sorts to the local E.M.S. hospitals.

As soon as these hospitals began to feel the strain the plan of evacuation to more distant hospitals was put into operation. Cases were transferred from the coastal hospitals to the E.M.S. hospitals within the sector, so as to retain empty beds in the former. But more and more small boats kept coming in, each with its quota of casualties. These had been wounded on the beach at Dunkirk and in the boats on the way over. Some had burns from incendiary bombs. One such group had the misfortune to have their boat sunk and to be thrown into the sea. Then they were rescued by another craft, which in its turn was also sunk. After these experiences and a period of two and a half hours' immersion in the sea, they were finally rescued and brought to land. It is good to know from the subsequent history of these cases that their unusual adventures did not retard their recovery.

The Flow of Casualties

Still, throughout May 31 and June 1 and 2 the flow continued. Military ambulances and ambulance coaches, conveying ten stretcher cases each, brought their burdens from the coast. Soon the hospitals in Tunbridge Wells and Maidstone were working to capacity, and though they still had many empty beds additional sector hospitals were utilized so as to ensure rapid surgical treatment of all the cases. At times the messages which reached sector headquarters from the various ports were contradictory, and this was not surprising in view of the attendant circumstances. At one hospital the doctors, nurses, and stretcher-bearers stood by all night to receive a convoy which miraculously disappeared into thin air, leaving no trace. Nevertheless all the hospitals concerned had plenty of work to do, and they operated without interruption day and night.

As there was no means of knowing when the flow would stop, arrangements were made to evacuate many of the less seriously injured to the West Country. Green Line ambulance coaches called at a number of hospitals at 9 o'clock one morning and transported their quota of patients to the station. These were put on board a casualty evacuation train, under a responsible medical officer and a staff of sisters and nurses, and conveyed to their destination, where they were safely in hospital and in bed by 8 p.m. the same evening, tired but little the worse for their long journey. Three further evacuations were carried out in the same way to different destinations, with the result that the sector could comfortably have dealt with at least three times the number it was called on to handle.

Response of the Sector Hospitals

Actually 1,873 cases were treated in sector hospitals during a period of twelve days. These included soldiers, sailors, and a few refugees, French, Belgian, and British, officers and other ranks. Despite the fact that nearly half of this total had received no treatment other than first aid before they reached the sector hospitals, and that they were carried in ambulances and ambulance coaches over distances varying