

THE QUESTION OF ECONOMY IN FOOD.¹

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IT is the duty of the medical profession to point out clearly the relation between an adequate supply of food and health and efficiency. It is a problem which has been before them for many years and has been investigated from many points of view by scientific men in this and other countries. The results give the clearest guidance in this time of crisis, but the Government have not formed a proper estimate of their value. An attempt will here be made to state clearly the results, which are not disputed, and to indicate the measures which should be employed to meet the restricted supply of food.

Food Requirements of the Body.

The combustion of foodstuffs is a characteristic of life, and in man only ceases with life itself. It is true that men may fast for 30 to 40 days without any fatal or very serious results, as the observations upon the professional fasting men have proved. Water they must have, and food they obtain by living upon their own living substance. This material consumed by a fasting man corresponds to foodstuffs which would yield 1500 to 2000 calories per day. The man is losing weight rapidly, soon becomes incapable of work, and unless the fast is broken will die. If, on the other hand, just sufficient food to maintain life be given, a man at rest in bed requires food with a fuel value of about 1800 calories per day to make good the daily loss, which is due to the "physiological work" of living. Even during the deepest sleep the body is always at work, the heart must continue to pump the blood, the muscles of the chest contract in breathing, and the glands elaborate their products. The two conditions just described give an estimate of the minimum needs of an adult.

The voluntary ration, 4 lb. bread, $\frac{3}{4}$ lb. sugar, and 2 $\frac{1}{2}$ lb. meat per head per week, yields about 1200 calories per day, and when allowance is made for women and children is calculated to supply 2000 calories per man. It may therefore be considered a maintenance diet, and with the addition of other food will form an adequate diet for a man doing light work.

There are points of resemblance and also of difference between a man and a machine. No one expects to obtain work from a steam or petrol engine without a proportionate supply of fuel; the more work, the more fuel. There is always waste, and in respect of efficiency the engine is far behind the living body. The points of difference are enormous. The body is not only a transformer of energy, but effects its own repairs, becomes stronger with use, and even reproduces itself. The law of conservation of energy applies to man. For national efficiency the man who does essential muscular work must have a greater amount of food than the sedentary worker, and it matters not what may be their respective wages. The dietary which would be generous for a man or a horse doing no work would be slow starvation if he were forced to work hard each day. A system of rations, therefore, which pays no attention to occupation is absurd. In the following table of standards due to Atwater it will be seen that a man doing very hard work requires twice as much food as the man who does none.

Condition as regards muscular work.	Calories required per day.
None	2700
Light	3000
Moderate	3500
Hard	4500
Very hard	5500

These values are found to be necessary, as the following examples of daily rations will show.

As regards these data it is true that allowance has not been made in all cases for waste; but against this must be set the increase due to the food which is bought to supplement the ration.

¹ Part of a lecture on "The Restricted Supply of Food: its Relation to Health and Efficiency," delivered to the Royal Sanitary Institute, April 25th, 1917.

Examples of Daily Rations.

—	Protein in grms.	Fat in grms.	Carbo-hydrate in grms.	Calories, total.
Food supplied free. seamen, R.N. ...	91	48	406	2585*
" " " boys, " ...	107	69	406	2745*
" consumed by seamen, " ...	176	—	—	4080
Food supplied free to four British Regiments	133	115	424	3369
U.S.A. Army (peace ration)	157	140	603	4179
Ordinary prisoners, Scotland, light work, mostly sedentary... ..	133	35	536	3115
U.S.A. labourers at hard muscular work	177	—	—	6485
U.S.A., very poor working people... ..	69	—	—	2275
Japan, labourers	118	—	—	4415
Duke of York's Royal Military School (young men)	157	206	472	4514
Boys 9-14 years of age at English Public School	123	97	430	3400
Children over 8 years of age in L.C.C. School	88	65	377	2515

* Allowed also 4d. a day to buy extra food.

A system of rations may be necessary under certain conditions, but it is an uneconomical one, and on physiological grounds is unsound. It allows little or no free choice of food and is not readily adjusted to the various factors which determine the need of different qualities or quantities of food. Likes and dislikes are expressions of physiological needs. Healthy men are animals, and when they work steadily and well do not overfeed, even if they have free choice of abundant food. This is well shown by the fact that the average weight of the body remains very constant over long periods, it may be years, in the healthy and active adult, and likewise, as would be expected, the average consumption of food and the output of work.

The limitation of the system of rations is shown by the presence of dry canteens in the Services, the numerous eating-houses in garrison towns and ports, the parcels from home and the "tuck" shops for school-children. Rigid rations, if they are adequate for a large number of men, must lead to waste, for in no other way can allowance be made for various physiological needs.

Regulation of the Supply of Food.

The supply of food may be inadequate in quality, quantity, or in both. The foodstuffs which at the present time must be considered are wheat, meat, milk, sugar, and potatoes. A deficiency in one form of food may be covered by another article which is available. Substitution can by physiological processes be carried further than is possible by the chemist. In the living body sugar and fat can be formed from starch in the food, and the reverse processes are also possible. As a general law it may be stated that as sources of energy the foodstuffs can replace each other according to their values as producers of heat, thus the following are isodynamic quantities:—100 grms. fat, 232 starch, 234 cane sugar, and 243 dried meat. In practice an important factor is the relative cost of the different foodstuffs, which will be considered later.

For a condition of health and efficiency the food should be more than enough to cover the outgoings in the form of heat and work; a balance upon the right side is useful in times of extra or special demand. This is especially the case in the young, for if this balance is not available healthy growth is impossible. Unsuitable food, inadequate in quality or quantity or both, is recognised as one of the chief causes of the terrible mortality of children. The resistance to disease is lowered by unfeeding and lack of exercise, and there are reasons to suspect that the economy of food in schools all over the country has had, and is having, a bad effect upon the health and vigour of the children.

Many men, women, and children are doing hard muscular work which they never did in times of peace; they must have more food if they are to be efficient, and cheap food if they are to save money as they are urged by the Government.

The ideal is a liberal supply of food with free choice. This may be impossible, and the question arises, How is the supply to be regulated in the interests of the nation? The Government have wisely avoided thus far a compulsory ration, and have made attempts at control by fixed prices

and other methods. The laws of nutrition will still be in force whatever this or any other Government may do, and wisdom would lie in the recognition of the supreme power of natural law. If one foodstuff is deficient a substitute can be found in others, owing to the powers of adaptation of the body and its capacity of converting some forms of food into others. Moreover, the body as an engine can use different kinds of fuel. If coal fails steam may be generated in the engines of a ship by oil, wood, or in emergencies even by burning parts of the ship itself. From this point of view the scarcity of wheat must be considered.

Cereals.—Other corn can take the place of wheat and should be used for this purpose. There is barley and malt used for the production of alcohol, an inefficient form of food at the best and a deadly poison in excess. According to the Food Controller there are 1,000,000 quarters of brewers' malt in this country at the present time; it is not to be used for food, but for the production of beer. The convictions for drunkenness in the Metropolitan Police district and the City for the first quarter of this year were 6176. The Food Controller says that the food value of beer is not disputed, and the Government does not consider it is necessary to save the millions of quarters of barley, malt, and other foodstuffs which are used in the manufacture of alcohol. There may be reasons of policy for allowing alcohol to men in the Services or employed in some essential occupations, but there is none for its widespread consumption. An underfed nation is more dangerous and inefficient than well-fed men, some of whom are aggrieved because they cannot obtain their beer.

Oats can be used as a substitute for wheat, but there is difficulty in obtaining a ready supply; the oats are being kept for the horses. A horse may consume 40 to 80 lb. of oats per week, and hunters and racehorses receive the best. Hunting and racing have been and are allowed; only now is the Government taking steps to consider whether savings in this respect should be effected in the interests of the food-supply of the people. There are thousands of hunters, racehorses, riding horses, and carriage horses used only for pleasure in this country; the consumption of oats, maize, beans, hay, straw, and carrots by these animals must be enormous. With the exception of the hay and straw, which would be useful for cows, all these tons of food could be used by man himself; the objection that the horses are needed as a reserve for breeding and for the Army has no force, for all of these animals could be kept at grass, and under these conditions would liberate many men for essential work.

The percentage composition of these cereals is as follows:

	Protein.	Fat.	Carbohydrate.	Fuel value per lb. Calories.
Wheat flour... ..	8.3	1.0	73.5	1615
Barley, pearled... ..	6.6	1.0	76.1	1630
Maize flour... ..	5.8	1.2	76.3	1625
Oatmeal... ..	13.4	6.6	65.2	1795

All of these substances have been used, even in times of peace, as substitutes for wheat. In some respects oats are a better food than wheat, and the fuel value of one pound is greater than the total for one day of the voluntary ration suggested by the Food Controller. A horse eating daily 10 lb. of oats consumes an amount of cereal food which would be sufficient for 10 to 20 men.

Sugar and Potatoes.—Sugar and potatoes are foods which were introduced into this country in times relatively recent, and it is obvious that they are not so essential as some people imagine. The children should have first claim on sugar, and they could also obtain milk-sugar in milk and malt-sugar in malt, besides those essential substances known as "vitamines." Substitutes for potatoes can be found in other vegetables and the carbohydrates of cereals.

Milk.—The supply of milk is another difficulty, and it has received the attention of the Government. A maximum price has been fixed for the retailer and the producer; the farmers have been selling their cows and giving up the production of milk, notwithstanding the fact that it was a very lucrative business, according to many writers to the daily press. For young children, invalids, and our sick and wounded soldiers milk is a food for which no efficient substitute can be found. During the spring and summer months there may be no serious shortage, for those are the best months, when the cows are at grass, the supply is large and feeding is cheap. There is a shortage at the present time and the

coming autumn and winter will show the effects of the reduction of the milking herds. Action, however, must be taken now. Heifers cannot be made into milch cows under ten months. The Government have revised their "milk orders"; the farmers ask for the recall of these orders. In any case a reserve of cows could be provided by the end of next winter if the Government purchased at once numerous heifers and turned them out to graze with young bulls on land owned or taken over by the Government. Even if money were an object the transaction would be probably a very profitable one. A supply of milk should be safeguarded and its cost should be low for the sake of the children, even if it be necessary for the State to give a subsidy.

Other Measures.

If the scarcity of food is general, the true remedy lies in an extension of the supply. Action has been taken at last, pasture has been ploughed up, but the highly fertile ground of the hop-gardens will apparently in many cases still grow hops for beer, instead of corn or potatoes for bread. The hop-growers should have compensation if necessary, but food they should grow, for it is food which is needed.

Another source of food which is undeveloped is the salt and fresh water fish, but this, owing to the supply of cattle, is not so urgent as the question of cereals.

If the cost of food continues to rise difficulties of a serious kind must occur, for a strong man is liable to become dangerous when he is hungry. A corresponding rise in wages does not meet every difficulty. The wage is not adjusted to the size of the breadwinner's family. A great relief and a true safeguard for the present and the future would be the free supply of dinner and tea to school-children; the necessary machinery is simple, if the expense is a general one borne by the State. The health of the future generation could be secured, a great burden would be taken from many hard-working and deserving parents. Foodstuffs which the labouring classes cannot obtain readily or cook could be used in these free meals, and bread would be saved. There would be no danger that the children would be overfed; healthy children are active and growing, and the law of averages as regards food would hold good.

Petty orders, such as the prohibition of Sunday-school treats and cakes, show no appreciation of the laws of nutrition and cause an amount of irritation out of all proportion to the result obtained. The owner of poultry is not allowed corn; the hen does not return in eggs the food value of the food consumed; no animal ever did or ever will, for it must have some for its life, but when allowance is made for the consumption of refuse the hen is economical. The owner of race-horses, hunters, and other horses used for pleasure is allowed in unlimited quantities the very best corn he can buy; he takes the food from the mouths of the poor by out-bidding them in the purchase of some of the best articles of food and at a time when there is a great scarcity.

IRELAND.

(FROM OUR OWN CORRESPONDENTS.)

Maintenance of Irish Asylums.

A SERIOUS financial position has arisen with regard to the Government grant for the maintenance of Irish asylums. The grant has come from an account known as the Local Taxation Account, and the amount payable has been practically stereotyped, regardless of the increasing expenditure of the asylums. At the time the grant was fixed it was sufficient to bear about half the cost of maintenance of asylum patients, but for several years prior to the war this cost was gradually increasing. With the present rate of prices the cost of maintenance has more than doubled since 1914, while the Local Taxation Account, owing to the falling-off in the revenue from licences and other local duties, is no longer able to bear even the stereotyped charge. Up to 1899 the State grant and local rates each contributed about 4s. per lunatic per week, whereas it is calculated that in the present year the State will only pay 3s. 6d. per head, and the balance, at least 13s., must be borne by local rates. The asylums are not alone in misfortune owing to the failure of the Local Taxation Account. Grants are also paid toward