HOW TO SELECT FOODS

III. FOODS RICH IN PROTEIN

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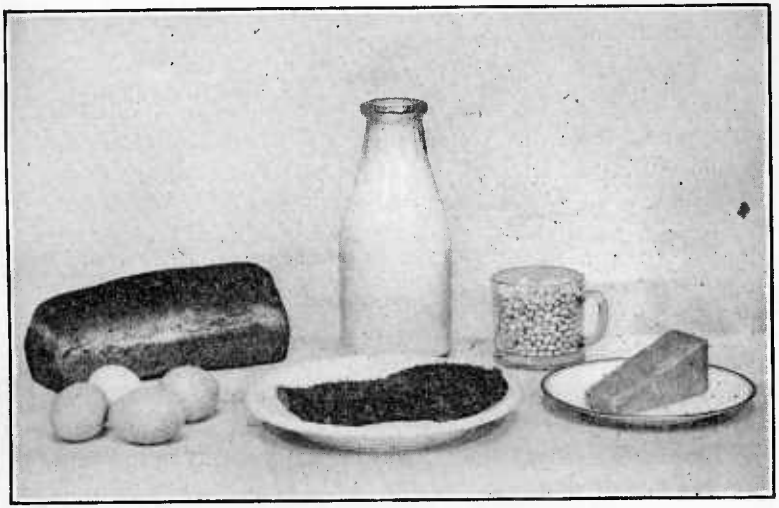

FARMERS' BULLETIN 824

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the States Relation Service
A. C. TRUE, Director

Washington, D. C. July, 1917

Additional copies of this bulletin may be obtained free from the Division of Publications, U. S. Department of Agriculture

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1917

THIS series of bulletins on the selection of food discusses briefly those principles of nutrition which the houskeeper should understand in order to plan meals wisely and economically. They do not attempt to give definite suggestions for obtaining foods at low cost nor recommend any special foods or combinations of foods.

This bulletin deals with food materials which are rich in protein and tells why the body needs this nutrient and how much is supplied by different foods.

Since the protein foods include many of the more expensive foods in common use, and since an adequate supply of protein is essential to the growth and upkeep of the body, it is especially important for the housekeeper to know how much her family needs and to be able to choose the materials which, in her particular circumstances, will best provide the proper kind and amount.

HOW TO SELECT FOODS [1]

III. FOODS RICH IN PROTEIN.

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IMPORTANCE OF PROTEIN AND FOODS WHICH SUPPLY IT.

Every farmer knows that nitrogen is one of the chemical elements which neither his crops nor his stock can do without. He knows also that it costs more than any other necessary element. The same is true of nitrogen in human food. It is absolutely necessary for the building and repairing of body tissues and can be obtained by the body only from the food substance or nutrient known as protein.

A larger proportion of protein is found in eggs, meats, fish, milk, cheese, and the dried seeds of the legumes (peas, beans, cowpeas, soy beans, peanuts, etc.) than in most other materials, and these usually are spoken of as foods rich in protein, or the protein group of foods. Except for the dried legumes, these protein-rich foods are all of animal origin and are mostly among the more expensive food materials. Some of the cereals, especially wheat and oats, and some of the nuts are also fairly rich in protein, while smaller amounts are found in the other cereals and minute quantities in vegetables and fruits.

Milk is included among the protein-rich foods, although seven-eighths of it is water, and both fat and milk sugar are more abundant in it than protein. The particular form of protein it supplies is especially valuable.

Milk is the best source of protein for little children and should be the chief item in their diet (see p. 9). Besides furnishing protein, it provides them with some of the mineral matter necessary to build tissue and with certain other substances which, in tiny quantities at least, are indispensable for healthy growth and development. Like any kind of protein, it can also be used by the body as fuel to provide energy for the work of the muscles.

[1] Prepared under the direction of C. F. Langworthy, Chief, Office of Home Economics.

It does not make so much difference from which materials older persons get their supply of protein, though a variety of kinds is usually considered desirable. Not all of it ordinarily comes from the protein-rich foods, for wheat and other cereals contribute much protein to the diet. In fact, it is possible to plan perfectly wholesome and appetizing diets in which about half of the necessary protein is furnished by bread and other cereal foods. Rations so planned have been discussed in other bulletins of this series.[1]

The following lists may help to show about how much protein there is in some of the common food materials and how they compare with one another in this respect. The second list is illustrated on the title page of this bulletin.

There is about ¼ ounce of protein in—
1 glass milk.
1 egg.
1½ to 2 ounces medium fat meat.
Whole-milk cheese (1 ounce or 1⅕ cubic inches).
1½ ounces dried navy beans.
3 medium-sized slices bread, either white or whole-wheat (3 ounces).

There is about 1 ounce of protein in—
1 quart milk.
4 eggs.
6 to 8 ounces medium fat meat.
4 ounces whole-milk cheese.
6 ounces dried navy beans.
1 small loaf bread, either white or whole-wheat (12 ounces).

HOW MUCH PROTEIN IS NEEDED.

It is not necessary for a healthy person to measure his food as carefully as a doctor measures the medicines or even the food which he prescribes for an invalid. If the body is in good condition it adapts itself to the ordinary variations in its food supply; when there is a little too much it can store or dispose of what it does not need at once, and when there is not enough it can draw for a time on its own substance to make good the lack. The danger comes when, day in and day out, the body gets too much or too little food, or when the kinds provided are not the most suitable. There is no need of measuring exactly how much protein is obtained with every meal, but if the diet as a whole is to be healthful and economical, the person who plans it ought to know in a general way how much protein and other nutrients are needed and how much is contained in the different food materials, and then choose accordingly.

In an earlier bulletin of this series[2] the diet as a whole was considered and a simple way of planning wholesome, economical, and attractive meals was suggested. The housekeeper was advised to think of the common food materials as grouped under five heads and to make sure that the diet every day included something from each of the five groups.

[1] U. S. Dept. Agr., Farmers' Bul. 808 (1917). How to Select Foods.—I, What the Body Needs. U. S. Dept. Agr., Farmers' Bul. 817 (1917). How to Select Foods.—II, Cereal Foods.

[2] U. S. Dept. Agr. Farmers' Bul. 808 (1917). How to Select Foods.—I. What the Body Needs.

The five groups are as follows:

(1) Fruits and vegetables. Without these there is danger that the diet may be lacking in mineral matter and other substances needed in the making of tissues and for keeping the body in health.

(2) Milk, cheese, eggs, meat, fish, and dried legumes (peas, beans, etc.). Without these there is danger that the diet may be lacking in protein, an indispensable tissue builder.

(3) Cereals (wheat, oats, rye, corn, barley, and rice) and their products. Without these the diet would contain practically no starch, the cheapest kind of body fuel.

(4) Sugar, molasses, sirups, honey, and other sweets. Without these the diet would be lacking in sugar, valued as body fuel and for its flavor.

(5) Fats (butter, lard, meat fat, and olive, peanut, cottonseed, and other fats and oils). Without these the diet might be lacking in fat, which has a high value as body fuel and gives to food an agreeable quality commonly called "richness."

This bulletin deals chiefly with the second or protein group.

According to the standard commonly used in this country as a practical guide in planning meals [1] about 3½ ounces of protein a day is a reasonable quantity for a young or middle-aged man of average size, weighing about 150 pounds and doing a moderate amount of muscular work—like that of a carpenter. It is believed that it is wise to obtain this protein from a variety of food materials (see p. 9).

Half of this protein (about 1¾ ounces) he might get from a pound loaf of bread and 4 ounces of oatmeal porridge or other cooked cereal used as a breakfast food. The other 1¾ ounces probably would be supplied chiefly by one or more of the following: Meats, fish, eggs, milk, cheese, and dried legumes. It might be obtained from an egg at breakfast, one-half pound of pork chops or mutton chops (weighed with bones and trimmings) at dinner, and three-quarters cup (6 ounces) of baked beans or cowpeas at lunch or supper.

As before stated, this is about the amount of protein needed by a man of average size and weight. A larger person would have more body tissue to keep in repair, so would require more protein, while a smaller person would require less. Women, in general, are smaller and weigh less than men, and a woman of average size, weighing from 120 to 130 pounds, is commonly said to need about four-fifths as much protein as a 150-pound man. Growing children need more protein in proportion to their size than adults, because they must increase the amount of their body tissue as well as keep it in repair.

The more active a person is, the more force or energy he will expend and the more food must be provided for this purpose. This use of food as body energy or fuel has been discussed in other bulletins of

[1] U. S. Dept. Agr., Farmers' Bul. 142 (1917), p. 33.

this series, and rations have been suggested which provide the total food needed for a man doing moderate muscular work and for a family.[1] When a person does more muscular work and therefore needs more food, it is usually wise to increase the use of materials rich in fat, starch, or sugar rather than of those rich in protein, not only because the former are often cheaper, but because such a diet usually pleases the taste quite as well. It has been found that when a diet consisting of the common food materials combined in the usual way provides enough energy, it is almost certain to provide enough protein, too.

If the food provides more protein than the body needs for tissue building, the excess may be used by the body as fuel. Unless this excess is unusually great it will not prove harmful ordinarily.

Applying these points to the quantity of protein needed daily, it is found that, compared with the 3½ ounces of protein needed by a 150-pound man, a woman weighing 120 to 130 pounds and doing moderate muscular work would need about 2⅘ ounces. If she were to use food materials similar to those in the diet described for the man, she might cut down the bread from 1 pound to three-fourths pound (or by about four slices), and could get along with three-eighths pound (6 ounces) of meat instead of half a pound. A child up to three or four years of age needs daily as much protein as would be supplied by a quart of milk or by 1½ pints of milk and one egg.

A family consisting of father, mother, and three children between 3 and 12 years of age would require about 3½ times as much as the man, or not quite three-fourths pound (12 ounces) of protein. This would be supplied by the following day's ration: Three pounds of bread and 1 pound of cooked cereal mush, three-fourths cup of fat (butter, etc.), 1¼ cups of sugar, 4 or 5 pounds of fresh fruit and fresh or root vegetables, 1 pound of meat, and 3 quarts of milk.

These amounts are intended to meet the needs of a family in which the father does about as much muscular work as that required by the carpenter's trade and the mother that required for cooking, cleaning, and general housework. If they both lead sedentary lives, the protein might safely be cut down by one-tenth or even one-eighth.[2]

HOW MUCH PROTEIN DIFFERENT FOODS SUPPLY.

Because protein is so important to the health of the body, it is not considered desirable in diets consisting of the ordinary combinations of food materials to cut down the quantity in the daily food below that just suggested. How then can the housekeeper reduce the cost of food and still provide enough of this necessary but expensive

[1] U. S. Dept. Agr., Farmers' Bul. 808 (1917). How to Select Foods.—I. What the Body Needs. U. S. Dept. Agr., Farmers' Bul. 817 (1917). How to Select Foods.—II. Cereal Foods.

[2] U. S. Dept. Agr., Farmers' Bul. 142 (1916). Principles of Nutrition and Nutritive Values of Food.

material? The best way is to learn how much protein is provided by different kinds of food and then choose the kinds which will furnish what the family needs for the lowest cost and with the least waste. This task will be easier if the housewife will group in her mind the foods which are rich in protein and then consider ways of substituting less expensive for more expensive ones.

The lists given below include some of the more common foods in which protein is abundant and show in a general way the amounts and proportion of protein in the different kinds as they are purchased; that is, including refuse, such as bones and gristle, egg shells, etc.

Approximate amounts of protein in common food materials.

Fresh meats:
- Beef contains from 2 to 3 ounces of protein per pound.
- Veal contains from 2 to 3 ounces of protein per pound.
- Mutton contains from 2 to 2¼ ounces of protein per pound.
- Lamb contains about 2¼ ounces of protein per pound.
- Pork contains about 2 ounces of protein per pound.
- Poultry—chicken, duck, goose, turkey, etc.—contains from 2 to 2¼ ounces of protein per pound.
- Game—squirrel, rabbit, wild birds, etc.—contains from 2 to 2¼ ounces of protein per pound.

Prepared meats:
- Corned beef contains 2¼ ounces of protein per pound.
- Dried beef contains 4 ounces of protein per pound.
- Pork sausage contains 2 ounces of protein per pound.
- Canned chicken contains 4 ounces of protein per pound.

Fresh fish—cod, haddock, halibut, mackerel, perch, salmon, shad, etc.—contains from 1½ to 2½ ounces of protein per pound.

Dried fish contains from 2½ to 3 ounces of protein per pound.

Eggs contain 2 ounces of protein per pound.

Dairy products:
- Whole milk contains about 1 ounce of protein per quart.
- Skim milk contains about 1 ounce of protein per quart.
- Buttermilk contains about 1 ounce of protein per quart.
- Condensed milk contains about 1 ounce of protein per 12-ounce can.
- Whole-milk cheese contains about 4 ounces of protein per pound.
- Cottage cheese contains about 3 ounces of protein per pound.

Dried legumes:
- Beans contain 3 ounces of protein per pound.
- Cowpeas contain 3 ounces of protein per pound.
- Peas contain 4 ounces of protein per pound.
- Peanuts contain 3 ounces of protein per pound.

Nuts:
- Almonds contain nearly 2 ounces of protein per pound.
- Walnuts contain a little over 1 ounce of protein per pound.

Cereal foods:
- Wheat flour contains 2 ounces of protein per pound.
- Corn meal contains 1¼ ounces of protein per pound.
- Oat meal contains 2⅔ ounces of protein per pound.
- Bread contains 1½ ounces of protein per pound.

For some purposes it may be more convenient to have the protein present in different food materials expressed in fractions or percentages of the whole. This is done in the following summary:

Approximate proportions of protein in common food materials.

Fresh meats:
- Beef, one-eighth to one-fifth, or 12 to 20 per cent protein.
- Veal, one-eighth to one-fifth, or 12 to 20 per cent protein.
- Mutton, one-eighth to one-seventh, or 12 to 14 per cent protein.
- Lamb, one-seventh, or 14 per cent protein.
- Pork, one-eighth, or 12 per cent protein.
- Poultry—chicken, duck, goose, turkey, etc.—one-eighth to one-seventh, or 12 to 14 per cent protein.
- Game—squirrel, rabbit, wild birds, etc.—one-eighth to one-seventh, or 12 to 14 per cent protein.

Prepared meats:
- Corned beef, one-seventh, or 14 per cent protein.
- Dried beef, one-fourth, or 25 per cent protein.
- Pork sausage, one-eighth, or 12 per cent protein.
- Canned chicken, one-fourth, or 25 per cent protein.

Fresh fish—cod, haddock, halibut, mackerel, perch, salmon, shad, etc.—one-tenth to one-seventh, or 10 to 14 per cent protein.

Dried fish, one-sixth to one-fifth, or 16 to 20 per cent protein.

Eggs, one-eighth, or 12 per cent protein.

Dairy products:
- Whole milk, one-thirtieth, or 3 per cent protein.
- Skim milk, one-thirtieth, or 3 per cent protein.
- Buttermilk, one-thirtieth, or 3 per cent protein.
- Condensed milk, one-eighth, or 12 per cent protein.
- Whole-milk cheese, one-fourth, or 25 per cent protein.
- Cottage cheese, one-fifth, or 20 per cent protein.

Dried legumes:
- Beans, one-fifth, or 20 per cent protein.
- Cowpeas, one-fifth, or 20 per cent protein.
- Peas, one-fourth, or 25 per cent protein.
- Peanuts, one-fifth, or 20 per cent protein.

Nuts:
- Almonds, one-ninth, or 11 per cent protein.
- Walnuts, one-fourteenth, or 7 per cent protein.

Cereal foods:
- Wheat flour, one-eighth, or 12 per cent protein.
- Corn meal, one-fourteenth, or 7 per cent protein.
- Oat meal, one-sixth, or 16 per cent protein.
- Bread, one-eleventh, or 9 per cent protein.

In considering the amount of protein supplied by certain foods, one must make a distinction between the cooked and the uncooked state. Dried legumes and cereals, for example, usually take up considerable water during cooking, and thus become more bulky and dilute. A pound of baked beans supplies the body with about one-third as much protein as a pound of raw beans. Oatmeal takes up so much water in cooking that a pound of boiled oatmeal has only about one-eighth

the food value of a pound of raw. A pound of raw beans or oatmeal would have practically the same total food value after cooking as before, but their weight would be greater. In the same way, a cupful of raw beans or oatmeal would make several cupfuls when cooked.

When eggs are beaten, as in making omelets and meringues, air is forced into them and they become more bulky. In this way a given number of eggs can often be made to serve more persons than if they are prepared without beating; but each person gets less egg. If meat is made into stew, it goes farther, because the water adds to the bulk of the dish; but the finished dish has much lower protein and fuel value than the original meat. When meat is cooked without water, as in roasting, broiling, or frying, there is not much change in its composition.

A housekeeper in choosing foods at market rightly compares them in their raw state; but when she is considering them as they are actually served at meals, she must remember these differences in cooking. They should also be considered in choosing dishes at restaurants. Changes in cooking cereals are discussed in another bulletin of this series.[1]

DIFFERENT KINDS OF PROTEIN.

Protein is abundant in so many animal foods, because the other animals, as well as human beings, need it for building and maintaining their bodies. Plants also need nitrogen for building their structure, especially the seed from which new plants are to develop. The plants vary in this respect, protein being especially abundant in the ripe seeds of the pulse or bean family (also called the legumes), the cereals, and some of the nuts.

Because the protein serves a different purpose in the different plants and animals or in different parts of the same one, protein from one source is not always quite the same in character as that from another. Moreover, because animals resemble human beings more than plants do, protein of animal origin is in some ways (though not in every way) specially well adapted to human needs. This is particularly true in the case of milk and eggs, which are provided by nature for the nourishment of young animals, and which often are exceptionally adapted to the needs of children and invalids.

Protein as it occurs in vegetable foods is not usually as thoroughly digested and utilized in the human body as that from animal foods. From this it must not be supposed that vegetable protein is lacking in value, or harmful, or likely to cause distress to the eater. On the contrary, the fact that in vegetable foods the protein is combined with indigestible cellulose gives them bulk and prevents the food

[1] U. S. Dept. Agr., Farmers' Bul. 817 (1917). How to Select Foods—II. Cereal Foods.

from becoming too concentrated during digestion, thus perhaps compensating for the lower digestibility of the protein. However, in considering their value as sources of body protein, one must remember that more than one-eighth of the protein found in the cereals and one-sixth of that in the legumes is not ordinarily utilized by the body and plan the meals accordingly.

It is only within a few years that scientists have begun to realize how different kinds of protein vary in food value, and their knowledge of the matter is still very incomplete. In time they may be able to say exactly how much of each kind should go into the perfect diet and by so doing reduce somewhat the total amount of protein now thought necessary. At present such careful reckoning is not feasible; at least, for the ordinary person, and the safest course seems to be to choose a diet which a variety of animal and vegetable food materials shall provide the amount of protein mentioned on page 5.

COST OF PROTEIN IN DIFFERENT KINDS OF FOOD.

Prices vary so much with place and season that definite statements about the cost of different materials are out of the question. What one can do, however, is to reckon how much one may pay at current prices for one material, say milk, eggs, or cheese, in order to obtain protein as cheaply as from another material, say meat at 25 cents a pound.

A pound of meat, medium fat and with an average amount of refuse (bones, trimmings, etc.) supplies about 2 ounces of protein. Eight eggs yield practically the same amount. If eggs cost 36 cents a dozen, 24 cents' worth will furnish about as much protein as a pound of meat at 25 cents. In other words, eggs at 36 cents a dozen are a little cheaper as sources of protein than meat at 25 cents a pound. If the meat costs 30 cents a pound, one may buy eggs at 45 cents a dozen and still get as much protein for one's money. If meat costs 35 cents and eggs 60 cents, however, the protein from the eggs is a little more expensive than that from the meat.

In the same way it may be reckoned that milk, which contains about 1 ounce of protein to the quart, might cost 12½ cents a quart and still provide protein as cheaply as meat at 25 cents a pound.

A pound of whole-milk cheese contains about 4 ounces of protein or a little more than twice as much as most meat, so that it might cost twice as much as meat and still be as economical a source of protein. If, as is often the case, it costs less than meat, its protein is, of course, more than twice as cheap.

In the table following comparisons like those just given are shown in a slightly different way.

Protein and energy purchasable for 25 cents, from foods at certain assumed prices per pound.

Material and price.	Protein and energy obtained for 25 cents.	
	Ounces of protein.	Calories of energy.
Milk at—		
8 cents a quart	3¼	1,970
10 cents a quart	2½	1,575
12 cents a quart	2¼	1,315
Skim milk at 5 cents a quart	5¼	1,650
Full-cream cheese at—		
15 cents a pound	7½	3,325
25 cents a pound	4½	1,995
35 cents a pound	3¼	1,425
Cottage cheese, at 15 cents a pound	5½	835
Eggs at—		
25 cents a dozen	2¾	895
35 cents a dozen	2	640
60 cents a dozen	1¼	370
Beef (sides, medium fat), at—		
25 cents a pound	2¼	1,005
30 cents a pound	2	840
35 cents a pound	1¾	720
Cod, fresh, at—		
15 cents a pound	3	350
20 cents a pound	2	265
Salmon, fresh, at—		
20 cents a pound	2¾	725
35 cents a pound	1½	415
Salmon, canned, at—		
20 cents a pound	3¾	850
35 cents a pound	2¼	485
Cod, salt, at—		
10 cents a pound	7½	900
15 cents a pound	5	600
Herring, smoked, at—		
12 cents a pound	6½	1,520
16 cents a pound	5	1,140
Wheat flour, at—		
5 cents a pound	7¾	8,050
7 cents a pound	5½	5,750
Corn meal, at—		
3 cents a pound	10½	13,460
5 cents a pound	6¼	8,075
Oatmeal, at—		
5 cents a pound	11	9,050
8 cents a pound	7	5,655
White bread, at—		
5 cents a pound	6¼	5,925
5 cents for 12-ounce loaf (about 7 cents a pound)	4½	4,445
Rice, at—		
8 cents a pound	3½	4,970
12 cents a pound	2¼	3,315
Dried beans, at—		
8 cents a pound	8¾	4,890
15 cents a pound	4½	2,610
Dried peas, at—		
10 cents a pound	7¾	4,025
20 cents a pound	4	2,015
Peanuts, at—		
6 cents a quart	7	4,635
10 cents a quart	4	2,785
Almonds, at—		
18 cents a pound	2¼	2,245
25 cents a pound	1¾	1,615

The figures in the first column of this table tell about how much protein one would obtain in 25 cents' worth of some of the common protein foods. Two or more prices are given for each material. To show how the list may be used, let it be supposed that a housekeeper wishes to know which is cheaper as a source of protein, eggs at 35 cents a dozen or cheese at 25 cents a pound. She looks at the figures

opposite these two items and finds that cheese is decidedly cheaper, yielding 4 ounces where eggs yield only 2¼ ounces.

The figures in this table take account of the fact that some kinds of protein are more completely utilized by the body than others. They represent the amount of available protein rather than the total amount found in the food as purchased. The difference between total and available protein is greatest in the legumes and least in the animal foods (see pp. 9 and 10).

The second column of figures refers not to the protein but to the amount of body fuel or energy that the different materials would furnish. This bulletin is not so much concerned with the question of energy as with that of protein (see p. 4). Still, it should not be forgotten that foods must be considered from the standpoint of the energy as well as the building and regulating materials they furnish, and even in choosing among the protein-rich foods it is important to know how they compare in both respects. Two quarts of milk, eight eggs, and a pound of medium-fat meat yield 2 ounces of protein each, but the meat contains so much more fat that it yields more than three times as much body fuel or energy as the milk and nearly twice as much as the eggs. By comparing the figures given for one material with those for another one can quickly see which furnishes fuel more economically, even if one does not understand exactly how the measurements are made.[1] Thus, if the figure opposite milk at 8 cents a quart is 1,970 and that opposite bread at 7 cents a pound is 4,445, it is easy to see that, as a source of body fuel. the milk is more than twice as dear as the bread.

USE OF PROTEIN-RICH FOODS IN COOKERY.

Protein usually is introduced into meals in two ways: First, by means of dishes made up principally of a protein-rich food such as meat, milk, or eggs, and, second, by dishes or combinations in which a small proportion of protein-rich food is used with materials from other food groups, as when milk and eggs are used in the preparation of soups, vegetables,cakes, etc.; when cheese is served with pie or other dessert; or when nuts are served as dessert, are used in making bread, cakes, or puddings, or are added to salads. Recipes for both types of dishes are given below. The first four furnish enough protein to be relied on as the main supply at an ordinary meal. The others will be found to contain more protein than many persons would suppose. The amount of protein contained in each dish is stated, so that the housekeeper may form an idea of how much of the day's supply (see p. 5) may be obtained from it.

[1] U. S. Dept. Agr., Farmers' Bul. 142 (1915). Principles of Nutrition and Nutritive Value of Food.

Beef and Bean Stew.

(This dish contains 3 or 4 ounces of protein.)

1 pound beef, lower round.
1 cup red kidney beans.
1 onion.
1 cup canned tomatoes, or 2 or 3 fresh tomatoes.
2 ounces salt pork.

Wash the beans and soak them overnight. Cut the pork into small pieces and try out the fat. Cut the beef into small pieces and brown it in the pork fat, then add the vegetables with water enough to cover. Cook just below the boiling point for about three hours.

This dish serves about 8 persons.

Baked Pork and Beans, or Cowpeas.

(This dish contains 6 or 7 ounces of available protein.)

1 quart navy beans.
¾ pound salt pork.
2 teaspoons salt.
¼ cup molasses or brown sugar.

Wash the beans (either navy, lima, or other beans, or cowpeas); soak them in cold water overnight or an equal length of time by day. Pour off the water and boil until they are soft. Again drain and place in a bean pot. Pour boiling water over the salt pork and scrape the rind until it is white. Cut slashes through the rind one-half inch apart. Bury the pork in the beans, leaving the rind exposed. Add the salt and the molasses or sugar, or a mixture of the two. Cover the beans with hot water and bake six or eight hours in a covered dish. Remove the cover and allow the beans to brown on top.

This dish serves 10 to 12 persons.

Baked Soy or Togo Beans.

(This dish provides about 6 ounces of available protein.)

Soy beans, known in the retail market as togo beans, resemble navy beans in some ways. They contain, however, a considerable amount of fat. For this reason neither pork nor other fat is used in cooking them unless it is wanted for flavor. They are considerably richer in protein also.

Wash and pick over 1 quart of soy beans. Cover with boiling water, boil for 10 minutes, and soak overnight in the same water. In the morning pour off and save the water. Pour cold water over the beans and rub them between the hands to remove the skins, which will float off in the water. Removing the skins in this way takes only two or three minutes and greatly improves the quality of the dish. If a few skins are left on, they will do no harm, unless the dish is being prepared for a person of poor digestion. Drain the beans, pour over them the water in which they were soaked, and cook until tender at a temperature just below the boiling point. Pour off the water, put the beans into a bean pot, cover with cold water, add 1½ tablespoonfuls of salt, and bake four or five hours in a covered dish. Remove the cover and bake one hour more.

This dish serves 10 to 12 persons.

Salt Codfish Chowder.

(This dish provides about 3 ounces of protein.)

½ pound salt codfish.
4 cups potatoes, cut into small pieces.
2 ounces salt pork.
1 small onion, chopped.
4 cups skim milk.
4 ounces crackers.

Pick over and shred the codfish, holding it under lukewarm water. Let it soak while the other ingredients of the dish are being prepared. Cut the pork into small pieces and fry it with the onion until both are a delicate brown, add the potatoes, cover with water, and cook until the potatoes are soft. Add the milk and codfish and reheat. Salt, if necessary. It is well to allow the crackers to soak in the milk while the potatoes are being cooked, then remove them, and finally add to the chowder just before serving.

This dish serves about 6 persons.

Scalloped Fish.

(The following dish, made from grayfish recommended by the Bureau of Fisheries as comparatively cheap, contains about 3 ounces of protein.)

1 can (14 to 16 ounces) grayfish, from which liquid has been drained.
2 level tablespoons cooking fat.
3 level tablespoons flour.
1 teaspoon lemon juice or vinegar, or ½ tablespoon finely chopped capers or sour pickle.
1 cup liquid (water, milk, tomato juice, or canned tomato soup).
Few drops onion juice.
Few grains cayenne pepper.

Melt the butter, add the flour, and cook for one minute; then add the liquid and boil until the mixture thickens. Add the seasoning. Do not make the mistake of oversalting this sauce. Into a baking dish put alternate layers of fish and sauce, cover with buttered crumbs, and bake.

If tomato juice or tomato soup is used in place of water, omit the lemon juice. If economy is an object, use vinegar in place of lemon juice. Either may be used with milk, provided it is not added until the sauce has become thick.

Any other canned fish or "left-overs" of cooked fresh fish may be used in place of the grayfish. If salmon or other fat fish is substituted, not so much cooking fat will be needed as with lean kinds, such as grayfish, cod, and so on.

This dish serves 4 to 6 persons.

Most people realize that they are introducing considerable protein into their meals by the use of meat and such dishes as those for which recipes are given above. Few realize, however, how large an amount is introduced in small quantities by means of soup or dessert.

This is shown by figures 1 and 2, representing meals which furnish equal amounts of protein. That in figure 1 consists of clear soup, bread and butter, two pork chops, potato and tomato, pineapple, and frosted cakes of the so-called butter-cake type. The meal in figure 2 includes the same quantities of bread and butter and of vegetables. Only one chop is used, but the protein (and also the energy) thus lost is made good by using a milk soup in place of the clear soup, and serving baked custard and sponge cake instead of fruit and frosted cake for dessert.

Other ways of introducing the same quantity of protein by material of different kinds can easily be found.

For example, in a breakfast of 2 eggs and 3 ounces of toast (yielding as much protein as 2 ounces of uncooked cereal), with fruit, butter, and sugar, the eggs would provide the greater part of the pro-

tein. If for the two eggs there were substituted 2 cups, or 1 pint, of milk, the meal would provide just as much protein. The milk might be served as a beverage or on a cereal breakfast food; or be used in making such dishes as cereal mush, muffins, corn bread, or milk

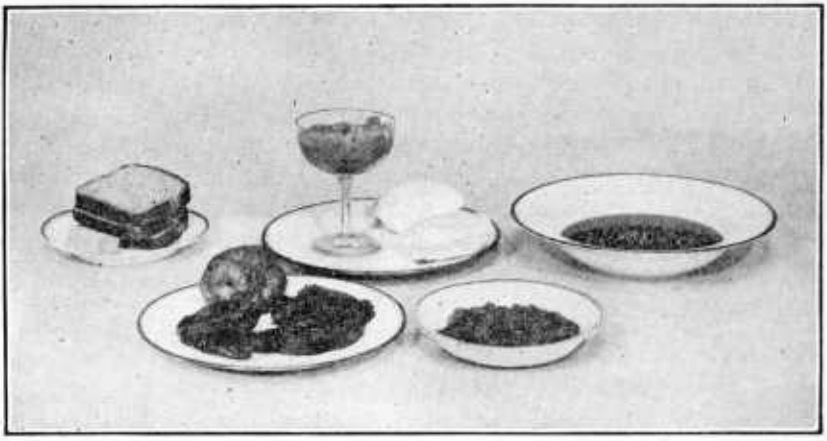

FIG. 1.—Meal in which protein equal in amount to that in figure 2 is supplied mainly by two chops.

gravy. In this case protein equal to that in two eggs might be distributed through several dishes.

In a lunch consisting of 4 ounces of fish, with bread and butter, a salad of fresh vegetables, and boiled rice and honey for dessert, the

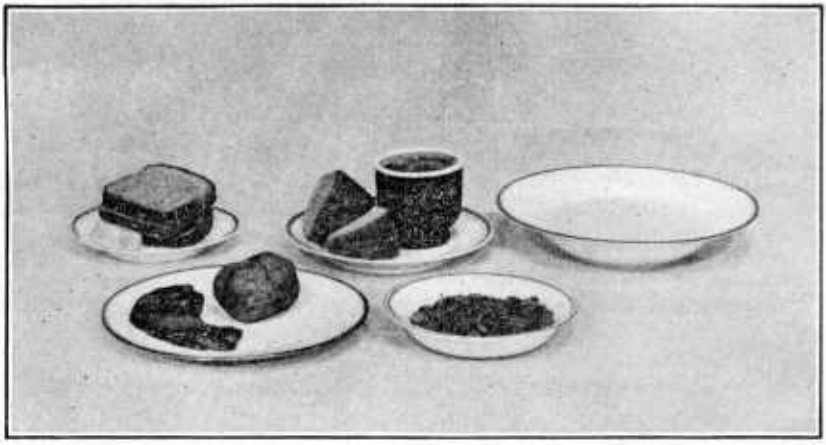

FIG. 2.—Meal containing the same amount of protein as that in figure 1, but partly from one chop and partly from eggs and milk used in soup, custard, and sponge cake.

greater part of the protein would be supplied by the fish. If 2 ounces of ordinary cheese or one-fourth cup of cottage cheese were substituted for the fish, and a cup of custard (4 ounces) were substituted for the fruit, the lunch would supply just as much protein.

In a dinner consisting of 4 ounces of roast beef, with bread and butter, vegetables cooked without the addition of milk or other protein-rich food, and a fruit pudding for dessert, the greater part of the protein would be supplied by the meat. If a soup made from 1 ounce of dried beans were served, one-half cup of milk used in the preparation of the vegetables, and 1 ounce of shelled nuts used for dessert in place of the pudding, it would be possible to reduce the meat to 2 ounces without lessening the amount of protein in the meal.

The following recipes are for dishes of the second type described on page 12, i. e., those in which a smaller amount of protein-rich food is combined with a larger amount of material from the other food groups. The amount of protein each contains is stated in each case.

Sponge Cake.

(Sponge cake made according to the following recipe contains about 1¾ ounces of protein. It is an expensive cake except where eggs are cheap, and should not be used in a diet otherwise well supplied with protein.)

Yolks 6 eggs.
1 cup sugar.
1 tablespoon lemon juice.
1 cup flour.
Flavoring.
Grated rind ½ lemon.
Whites 6 eggs.
¼ teaspoon salt.

Beat the yolks thoroughly, add the sugar, and beat until smooth. Add the salt to the whites of the eggs and beat them until stiff. Carefully mix yolks, whites, and sifted flour, handling so as not to drive out the air. Bake one hour in a slow oven.

This cake may be flavored with a tablespoonful of lemon juice and the rind of half a lemon, or with any common flavoring extract. If the eggs are perfectly fresh, however, it needs no flavoring, and this expense can be saved.

Eight medium-sized slices can be cut from such a cake.

Baked Custard.

(The following custard contains 2½ ounces of protein.)

4 cups scalded skim milk.
6 eggs.
½ cup sugar.
¼ teaspoon salt.
A little grated nutmeg or powdered cinnamon.

Beat the eggs slightly; add the sugar, salt, flavoring, and hot milk. Pour into a buttered mold. Set in a pan of hot water and bake until firm.

This custard serves 6 to 8 persons.

Dried Bean Purée.

(This dish provides about 2 ounces of protein.)

2 cups dried beans.
2 quarts water.
1 onion.
½ tablespoon salt.
1 ounce, or 2 cubic inches, salt pork.

Soak the beans overnight, and in the morning drain and cover with cold water. Add the other ingredients and cook until the beans are tender. This soup may be eaten strained or unstrained. It may be boiled down until thick, or it may be thickened with a little flour.

A similar soup may be made from any kind of dried legumes, including soy beans, dried peas, lentils, or cowpeas.

Tomato juice may be added for flavoring, or the tops and roots of celery. Lemon juice improves the flavor.

This dish serves 6 to 8 persons.

Scalloped Corn.

(This dish furnishes a little over 1 ounce of protein.)

2 cups chopped corn.
2 eggs.
1 teaspoon salt.
1 pint scalded skim milk.

Beat the eggs slightly, add the other ingredients, place in a buttered baking dish, and bake in a slow oven until firm.

This dish serves 4 to 6 persons.

Recipes for potatoes, cabbage, and cauliflower prepared with cheese have been published in an earlier bulletin.[1]

As practical help in planning meals, it may be recalled that one hard-boiled egg used as a garnish on spinach or in a sauce on potato or other vegetable adds one-fourth ounce of protein to the meal, and that one-half ounce of almonds, which would be 10 or 12 nuts, an average allowance for one person as dessert, supplies about one-eighth ounce of protein. If raisins are served with the nuts, they add not only sugar and mineral matters, but also a very small amount of protein.

In families where eggs, milk, and other protein-rich foods are used freely in cookery, it is often easier to judge the amount of protein provided by the week than by the meal or the day.

In another bulletin[2] of this series the statement was made that a family consisting of father, mother, and three young children would get enough protein from a daily ration containing as much protein as is found in 2 quarts of milk and 1½ pounds of other protein-rich foods (meat, eggs, cheese, etc.) or 3 quarts of milk and 1 pound of the other protein-rich foods, providing cereal foods were freely used in addition. Such a ration would require a weekly allowance of 14 quarts of milk and 10½ pounds of meat, fish, poultry, eggs, cheese, etc., or of 21 quarts of milk and 7 pounds of meat, fish, poultry, eggs, cheese, etc. Those who use milk and eggs freely in cookery should remember that every extra quart of milk used during the week, either in cooking or otherwise, makes it possible to reduce the allowance of meat, etc., by one-half pound and every extra dozen of eggs used, either in cooking or otherwise, makes it possible to reduce this weekly allowance of meat by at least 1½ pounds.

[1] U. S. Dept. Agr., Farmers' Bul. 487 (1915), p. 33. Cheese and Its Economical Uses in the Diet.
[2] U. S. Dept. Agr., Farmers' Bul. 808 (1917). How to Select Foods.—I. What the Body Needs.

POINTS TO REMEMBER ABOUT PROTEIN FOODS.

Protein is necessary in the diet, because it supplies nitrogen needed for building and renewing body tissues.

The foods usually classed as rich in protein are: Milk and cheese; eggs; meat, poultry, and fish; dried legumes, such as peas, beans, cowpeas, soy beans, and peanuts; and almonds and some other nuts. Wheat, oats, and some other cereals also furnish considerable amounts of protein.

Milk is the best source of protein for children.

There is about one-fourth ounce of protein in each of the following: One glass of milk, one egg, 1½ to 2 ounces of meat, 1 ounce of cheese, and 13 ounces of bread.

The proportion of protein in cooked and uncooked foods often varies because they take up water during cooking and thus become more bulky and more dilute. A given weight of baked beans contains only about one-third as much protein as the same weight of raw ones, and boiled cereals from one-eighth to one-third, according to the amount of water they absorb.

A man at moderate muscular work is believed to need about 3½ ounces of protein a day, and a family consisting of father, mother, and three small children about 12 ounces a day.

A diet which is made up of the usual combination of food materials and which furnishes the body with enough energy usually furnishes enough protein. Nevertheless, because the protein-rich foods are among the most expensive, and because a proper variety of them is necessary for health, they must be considered very carefully in planning an economical diet.

It is possible to plan an attractive and wholesome diet in which one-half of the necessary protein is supplied by bread and other cereal foods which are relatively cheap.

The more milk, eggs, and other protein-rich foods are combined with other foods in cooking, the less protein-rich foods are needed for use as separate dishes.

Skim milk is not a substitute for whole milk as a food for little children, but it can be so used as a source of protein in the diet of adults. A quart in cooking or to drink will add as much wholesome protein to the general diet as a quart of whole milk. Providing they are clean and wholesome, sour skim milk and buttermilk may be used instead of sweet.

Real economy in the use of protein foods lies not in leaving them out of the diet, but in choosing and combining kinds which will supply the total amount needed as cheaply as circumstances permit.

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