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ECONOMY IN FEEDING THE FAMILY

II

The Cereal Breakfast Foods

By JOHN PHILLIPS STREET

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Cereal Breakfast Foods.

The cereal foods occupy a very important place in the diet of the American family, both in sickness and in health. Vegetable foods supply about 95 per cent. of the carbohydrates in the average dietary, and the cereal foods themselves supply fully 55 per cent. Grains in the raw state are unattractive to the taste and are somewhat difficult of digestion, and for this reason cereals are generally cooked before eating. The oldest method of cooking them was by parching, and in the early days the Scotchman's oatmeal and the Indian's maize were prepared in this way. The next development was porridge, in which the grain was boiled or steamed with water, milk or meat stock, and thus rendered more palatable. Porridge, however, requires long cooking, its keeping qualities are poor, and it is far from being a convenient food preparation. In spite of these disadvantages—and the necessary long cooking is by no means an unqualified disadvantage—porridge has enjoyed a wide use and popularity, and the modern cereal breakfast food is its lineal descendant.

A generation ago practically the only cereal foods on the market were wheat flour, corn meal, hominy and hulled corn; barley, rye and rice finding only a very limited use. At the present time we find an almost endless number and variety of specially prepared breakfast foods offered for our use. Many of the brands, however, are exploited by extensive and expensive advertising and live only so long as a fluctuating public taste demands them. Some endure but for a season, while others have taken a fixed place in the long list of American food materials.

TYPES OF CEREAL BREAKFAST FOODS.

However, while the brand names of the foods may change, the types of cereal breakfast foods which they represent persist from year to year. There are four main types of these foods: those in which the grain is simply husked and more or less crushed or ground; those which have been steamed or partially cooked at the factory and then ground or rolled and dried; those which have

been cooked by dry heat only, such as puffed rice or wheat; and those in which more or less of the insoluble starch has been converted into soluble form by the action of barley malt, as in the so-called malted foods.

The grains used in this country in these products are oats, wheat, corn, rice, and less commonly barley and rye. Although the various flours, starches, and edible cereal pastes (noodles, macaroni, vermicelli and spaghetti) are in a sense cereal breakfast foods, they will not be discussed at this time.

Oats is characterized by its high protein and fat content; wheat, rye and barley by high protein and moderate fat; corn by its relatively high fat; while rice is distinctly low in protein, and in the polished form almost free from fat, fiber and ash. These characteristics of the individual grains greatly affect the composition of the breakfast foods made from them, as will be shown later. In the preparation of certain breakfast foods the grain is used in its entirety; in others more or less of the germ is removed, thus materially reducing the percentage of fat; in others the ground product is thoroughly bolted to remove most of the fiber; while in still others the use of heat or a malting process materially alters the form of carbohydrates present. To certain of the "ready-to-eat" brands, salt, sugar, syrup, or honey has been added, thus increasing the ash or carbohydrates and decreasing the relative percentages of the other ingredients. In general, however, the composition of the finished breakfast food closely follows that of the parent grain.

Barley is not a popular breakfast cereal in this country, and when used it is usually in the form of "pearled" barley with a much lower content of fiber and considerably less of all the other ingredients, except carbohydrates, than the unhulled, untreated grain.

The germ of the corn kernel is rich in fat, which tends to become rancid on keeping, and more or less of it is generally removed in the preparation of corn breakfast foods. Hominy, samp and cerealine are names used quite loosely for corn products, which differ little from one another in composition, save that hominy generally carries a little more fat. They are all essentially carbohydrate foods. The toasted and flaked corn preparations are steamed and rolled grains, which have been

cooked longer, and to which salt and a sweetening material are commonly added.

In the oatmeal of our forefathers much of the hull or husk remained in the ground product, but with modern improved processes more of the fibrous hull is removed. The germ is not removed from the oat preparations. In the crushed or flaked oat foods the grain is more or less cooked with steam, and while still moist rolled into thin flakes and dried. Such products are, of course, only partially cooked, and further cooking is necessary before using.

The rice foods come to us either flaked, or as "puffed" rice. In the latter form the rice has been treated by a special process of cooking with dry heat, the resultant product resembling somewhat popcorn in flavor and texture.

In the preparation of wheat breakfast foods the germ, as a rule, is not removed, and save in farina and the gluten preparations more or less of the bran and middlings are retained. In certain products the whole grain, bran and all, is used. The unground wheat grain is seldom used as breakfast food, except in the "puffed" products (prepared similarly to puffed rice), and in frumenty, in which the husked grain is boiled with milk and spices. The latter preparation has but a restricted use in this country. Where the grain is only moderately crushed and the bran not removed, the product is known as cracked wheat or wheat grits. The flaked wheat foods are prepared in the same way as rolled or flaked oats. Shredded wheat is prepared by a special process and represents the whole grain. The gluten breakfast foods are characterized by a very high protein content and contain only about half the starch usually found in wheat foods. They are intended primarily for those to whom much starch in the diet is objectionable, but as a rule the extent to which the starch has been removed falls far short of the manufacturer's claims.

In the so-called malted foods advantage is taken of the diastatic power of barley malt, the diastase of malt imitating the action of the ferments of the saliva and pancreatic juice. Generally the amount of malt added is not sufficient to convert more than a part of the starch into soluble forms. Analysis shows that in many of these foods the soluble carbohydrates

exist largely in the form of dextrin and suggests the possibility of glucose or some other soluble dextrin-containing carbohydrate being added. Furthermore, it must not be forgotten that the treatment of starch with dry heat also produces dextrin, as illustrated in the case of ordinary toast. It is evident, therefore, that many of these "malted" foods are not deserving of the name.

Still another group of breakfast foods now quite widely used includes the various laxative preparations. These usually consist chiefly either of wheat bran or some inert material, such as agar-agar or Iceland moss. In some instances fruits and nuts are used and occasionally an oil, such as olive oil, or linseed oil.

COMPOSITION OF CEREAL FOODS.

Aside from the constituent grains and the method of manufacture, the cereal breakfast foods are of two general classes, those which are either raw and which need prolonged cooking or which have been cooked to some extent and need further treatment before use, and those which are "ready-to-eat." Pearled barley, hominy, samp, corn meal, oat flakes, cracked wheat and farina are types of the first class, while among the "ready-to-eat" preparations we find such products as cerealine, corn flakes, rice flakes, wheat flakes, puffed rice, shredded wheat, Grape-nuts and some of the various "malted" foods. Table I, pages 32 to 39, gives the analyses of 130 of these products examined in this laboratory between 1909 and the present time, 32 being analyses just made. In addition to the chemical composition the claimed weight of the package (which was generally found to be correct) is given together with the calories yielded by one-fourth pound of the food, and the cost per package, per pound and per 100 calories. The costs are based on New Haven prices maintaining on September 26th of this year. These costs will be discussed in more detail later.

COMPARATIVE FOOD VALUE OF THE CEREAL BREAKFAST FOODS.

In order that the relative composition of these foods may be shown more clearly, an abridged table, Table II has been prepared, in which the average data for the different types are given, grouped under the two headings, "to be cooked" and "ready-to-serve." See pages 24 and 25.

Among the foods requiring further cooking the superiority, from a nutritive standpoint, of the oat meals is apparent at a glance. They contain from 50 to 100 per cent. more protein and from three to nine times as much fat as the other "to-be-cooked" products. In fact, they are the only breakfast foods, aside from certain laxative preparations, that contain any considerable percentage of fat, and indeed for this reason they have been criticized as "heating" foods and undesirable for use in hot weather and by people suffering from certain types of disease. An average serving of rolled oats, however, contains only about 1 1-3 ozs. of the dry cereal, and a daily consumption of this amount for four months would supply only about as much fat as 2-3 lb. of butter. The "heating" effect of oat preparations, therefore, obviously may be neglected except under most unusual conditions. If oatmeal supplies so little fat in the ordinary dietary, it is apparent that the amounts supplied by the other "to-be-cooked" cereals is almost negligible. This further emphasizes the fact that, while these foods contain important percentages of protein, they are, with the exception of the oatmeals, essentially carbohydrate foods.

While among the "ready-to-eat" preparations considerable variations are shown in all the ingredients except the carbohydrates, the most striking differences, as we have shown elsewhere, are in the amounts of carbohydrate rendered soluble in water by the various manufacturing processes. Only about 10 per cent. of the carbohydrates of flaked rice, *Shredded Wheat* and *Triscuit* are water-soluble, raising a serious question as to the desirability of the extensive use of such foods in the dietaries of young children. Flaked wheat shows only about 15 per cent., while on the other hand, flaked corn shows 26, puffed rice 32, puffed wheat 27 and *Grape-Nuts* 36 per cent. of water-soluble carbohydrates.

From a nutritive standpoint, the table shows that these types of breakfast foods, excepting possibly the oatmeals and *Holland Rusk*, are practically interchangeable. While one-quarter of a pound of oatmeal or *Holland Rusk* yields 430 calories, the same quantity of each of the other foods listed yields approximately the same number of calories, 400. For all practical purposes, therefore, it may be assumed that one ounce of any of the commonly used breakfast foods yields about 100 calories. An attempt has been made in the table to indicate in terms of familiar

TABLE II.—AVERAGE COMPOSITION AND COSTS OF

| Type. | Pounds per hundred. | | |
|----------------------------|---------------------|------|---------------------|
| | Protein. | Fat. | Carbo- hydrates. |
| <i>To Be Cooked.</i> | | | |
| Corn meal..... | 7.5 | 0.8 | 78.7 |
| Hominy and samp..... | 7.9 | 0.7 | 76.9 |
| Oat meal (Bestovotes)..... | 16.2 | 6.6 | 63.1 |
| Oats, rolled..... | 15.6 | 6.6 | 64.4 |
| Groats, Robinson's..... | 12.8 | 8.6 | 67.7 |
| Farina..... | 10.9 | 1.3 | 74.4 |
| Wheat, flaked..... | 11.1 | 2.1 | 73.4 |
| Wheat, cracked..... | 9.3 | 2.3 | 73.3 |
| Post Tavern Porridge..... | 10.3 | 0.8 | 74.5 |
| <i>Ready To Serve.</i> | | | |
| Corn flakes..... | 6.9 | 0.3 | 78.6 |
| Corn, puffed..... | 8.7 | 0.3 | 78.5 |
| Rice flakes..... | 10.0 | 0.4 | 81.3 |
| Rice, puffed..... | 7.6 | 0.2 | 79.5 |
| Wheat flakes..... | 9.3 | 1.1 | 80.5 |
| Wheat, puffed..... | 13.1 | 1.8 | 70.2 |
| Wheat, shredded..... | 11.0 | 1.4 | 75.0 |
| Triscuit..... | 11.0 | 1.4 | 73.9 |
| Force..... | 10.6 | 1.1 | 73.7 |
| Grape-Nuts..... | 11.5 | 0.6 | 74.2 |
| Holland Rusk..... | 12.1 | 5.1 | 70.4 |
| Kellogg's Krumbles..... | 12.0 | 1.2 | 72.3 |

measure the volume of the different foods weighing one ounce and yielding 100 calories. For instance, 1 *Shredded Wheat* biscuit, $2\frac{1}{2}$ *Triscuits*, $\frac{2}{5}$ cup rolled oats, $1\frac{1}{4}$ cups corn flakes, or 4 heaping tablespoonfuls of *Grape-Nuts* each yields 100 calories and weighs about one ounce.

DIGESTIBILITY OF THE CEREAL BREAKFAST FOODS.

The value of a food depends not only upon the amounts of nutrients present but also upon their digestibility. Experiments with healthy men have shown that partially cooked wheat preparations have the highest digestibility and those made from unbolted wheat the lowest. Experiments at the Maine Experiment Station with rolled oats, rolled wheat, corn meal, hominy and certain

TYPICAL BREAKFAST FOODS IN PACKAGE FORM.

| Per pound. | Cost. | | Calories per ¼ lb. | | Necessary to yield 100 Calories. | |
|------------|-------------------|--------------|--------------------|---------------|----------------------------------|---------|
| | Per 100 calories. | Per serving. | Total. | From protein. | Volume. | Weight. |
| cts. | cts. | cts. | | | | oz. |
| 8 | 0.50 | 0.81 | 402 | 34 | 1/5 cup* | 1 |
| 10.5 | 0.66 | 1.01 | 401 | 39 | 1/6 " | 1 |
| 10 | 0.58 | 0.74 | 430 | 73 | 1/5 " | 0.9 |
| 9 | 0.56 | 0.75 | 432 | 71 | 2/5 " | 1.1 |
| 50 | 2.74 | 3.50 | 456 | 59 | 1/5 " | 0.9 |
| 13.5 | 0.86 | 1.31 | 403 | 49 | 1/4 " | 1 |
| 10 | 0.61 | 0.64 | 408 | 50 | 1/2 " | 1 |
| 15.5 | 0.97 | 1.80 | 401 | 42 | 3/10 " | 1 |
| 10 | 0.63 | 0.89 | 396 | 47 | 1/5 " | 1 |
| 18 | 1.18 | 0.97 | 394 | 31 | 1 1/4 " | 1 |
| 37.5 | 2.33 | 1.83 | 402 | 39 | 1 1/3 " | 1 |
| 30 | 1.78 | 1.37 | 422 | 45 | 1 1/3 " | 1 |
| 56 | 3.50 | 2.45 | 400 | 34 | 1 1/4 " | 1 |
| 30 | 1.78 | 1.46 | 422 | 42 | 1 " | 1 |
| 60 | 3.76 | 1.99 | 399 | 60 | 2 " | 1 |
| 16 | 0.98 | 1.00 | 408 | 50 | 1 bisc. | 1 |
| 20 | 1.24 | 1.50 | 403 | 50 | 2 1/2 bisc. | 1 |
| 17.5 | 1.10 | 1.40 | 397 | 48 | 1 cup | 1 |
| 16 | 1.01 | 1.16 | 398 | 52 | 4 tablesp. | 1 |
| 29 | 1.69 | ..... | 430 | 55 | ..... | ..... |
| 16 | 1.01 | 2.05 | 398 | 54 | 1 cup | 1 |

* A cup equals ½ pint.

specially prepared brands, showed that in general about 90 per cent. of the organic matter was digested. The general conclusion from these experiments was that rolled wheat showed the highest and the corn products the lowest digestibility, oats occupying an intermediate position. When the actual nutrients are compared with the total nutrients it is seen that the relation previously noted still maintains; that is, the oat preparations provide the largest amounts of digestible protein and fat, followed by wheat, rye and barley, while the corn and rice products supply but relatively small amounts of these elements and relatively large amounts of carbohydrates. Other Maine experiments bring out the interesting fact that the processes to which certain products

have been subjected during their manufacture, while converting a part of the starch into soluble carbohydrates, have at the same time diminished the digestibility of the protein. For instance, rolled wheat showed 85 per cent. protein digestibility, while *Force* and *Grape-Nuts* showed but 76 and *Shredded Wheat* only 58. These and other experiments show that the raw cereals, if sufficiently cooked, are as quickly and as easily digested as the best malted cereals, and more quickly than the ordinary prepared cereals and a large majority of the so-called malted cereals.

THE COOKING OF BREAKFAST FOODS.

The proper cooking of any food is a very important factor in its digestibility. Aside from the usefulness of heat in sterilizing food, the main purposes of cooking are to improve the food's appearance and flavor, to break down certain refractory elements and to convert the nutrients into more assimilable forms.

The manufacturing processes used in these foods—crushing, rolling, steaming, parching, puffing or shredding—all to a greater or lesser degree rupture the cells of the grain, and thus render the cell contents more susceptible to the action of the digestive juices of the body. As a rule, however, even some of the "ready-to-eat" foods come to us in a form which requires more cooking before their nutrients can become entirely available to the body. In the average home the over-cooking of cereals is most unusual; on the other hand, undercooking is all too common. This tendency is fostered by the claims of the breakfast food label, and we have offered to us "15-minute" oat flakes and similar alluring and alleged time-conserving preparations. The consumer has no way of knowing how much of the needed cooking has been performed by the manufacturer, and he may safely assume that the directions accompanying the food underestimate rather than exaggerate the time necessary for proper preparation. Frequently the prepared foods are condemned as indigestible simply because the cooking period has been too limited; but theoretically there is no reason why, if properly cooked, they should not be quite as digestible as cereals cooked entirely in the home. No hard and fast rule can be laid down as to the proper cooking period for the various cereals, but generally speaking the

greater the amount of husk or hull present the longer the food should be cooked.

COST OF CEREAL BREAKFAST FOODS.

In Table I the cost of the foods is shown on the basis of the package, the pound and the 100 calories. The cost is omitted in a number of instances, either because the food could no longer be found in this State or because, with the present greatly increased prices of all commodities, it was unsafe to assume any price for these without a direct inspection of the package as to its net contents. Omitting such unusual preparations as *Colax* and *Sea Moss Farina*, both in a sense medicine rather than food, the cost per pound ranges from 6.5 cents in a wheat bran to 76 cents in *Dieto Rusks*. Of the preparations requiring cooking, the corn products are the cheapest, followed by oats, with the wheat foods the most expensive. (*Robinson's Groats* is an imported food primarily intended for invalid use, and its high cost removes it from the category of family breakfast foods.) The specially prepared foods cost from two to seven times as much per pound as the simple cereal preparations, such as oatmeal, farina and hominy.

In a consideration of cost, however, composition must not be overlooked, and judged on this basis oatmeal is by far the cheapest of all the cereal breakfast foods. Nor must we forget that while we pay very much more for the prepared than for the uncooked foods, this price is in part justified by their convenience, and the saving in both time and fuel by the shortening of the home-cooking period. In hotels, hospitals and large establishments where a fire is kept throughout the day for other purposes, the prolonged cooking required by the raw cereals may be effected with practically no expense. In households where a gas stove is used exclusively for cooking, and then only at specified and limited times, it is indeed a question whether the "ready-to-eat" brands may not in many cases be the more economical purchase.

THE INCREASED COST OF CEREAL FOODS.

In the case of 22 brands we have full data as to the size of the package and its cost for both the years 1909 and 1917. By referring to Table III it will be seen that in nearly every case the net

TABLE III.

COMPARATIVE PACKAGE WEIGHTS AND PRICES.

| Brand. | 1909. | | | 1917. | | |
|------------------------------------|------------|-----------|-------------------|------------|-----------|-------------------|
| | Weight oz. | Cost cts. | Cost per lb. cts. | Weight oz. | Cost cts. | Cost per lb. cts. |
| Hominy..... | 30 | 10 | 5.5 | 24 | 18 | 12 |
| Hominy..... | 31 | 6 | 3 | 74 | 43 | 9.5 |
| Kellogg's Toasted Corn Flakes..... | 10 | 10 | 16.0 | 8 | 11 | 22.0 |
| Post Toasties..... | 10 | 10 | 15.0 | 8 | 11 | 22.0 |
| Quaker Toasted Corn Flakes | 10 | 8 | 12.0 | 8 | 7 | 14.0 |
| Quaker Yellow Corn Meal.. | 46 | 12 | 4.0 | 24 | 12 | 8.0 |
| Hornby's Oats..... | 28 | 15 | 8.5 | 20 | 15 | 11.0 |
| Quaker Oats..... | 24 | 10 | 6.5 | 20 | 10 | 8.0 |
| Quaker Puffed Rice..... | 7.5 | 10 | 21.5 | 4 | 14 | 56.0 |
| Cream of Wheat..... | 28 | 15 | 8.5 | 28 | 22 | 12.5 |
| Force..... | 12 | 15 | 18.5 | 10 | 11 | 17.5 |
| Grape-Nuts..... | 16 | 12 | 12.0 | 13 | 13 | 16.0 |
| Hecker's Farina..... | 16 | 10 | 10.0 | 16 | 14 | 14.0 |
| Holland Rusk..... | 7 | 10 | 24.0 | 6 | 11 | 29.5 |
| Malt Breakfast Food..... | 30 | 15 | 8.0 | 28 | 22 | 12.5 |
| Pettijohn's Breakfast Food. | 23 | 11 | 7.5 | 24 | 18 | 12.0 |
| Premier Farina..... | 16 | 10 | 10.0 | 16 | 14 | 14.0 |
| Quaker Cracked Wheat.... | 30 | 15 | 8.0 | 26 | 25 | 15.5 |
| Saxon Wheat Food..... | 25 | 15 | 9.5 | 26 | 22 | 13.5 |
| Shredded Wheat..... | 13 | 12 | 14.5 | 12 | 12 | 16.0 |
| Triscuit..... | 13 | 10 | 12.5 | 9.5 | 12 | 20.0 |
| Wheatena..... | 25 | 15 | 9.5 | 19 | 18 | 15.0 |
| Ave. 6 corn products.. | .. | .. | 9.3 | .. | .. | 14.6 |
| Ave. 2 oat products.. | .. | .. | 7.5 | .. | .. | 9.5 |
| Ave. 13 wheat products. | .. | .. | 11.7 | .. | .. | 16.0 |
| 1 rice product.... | .. | .. | 21.5 | .. | .. | 56.0 |

weight of the package has been reduced and in many instances the cost of the package increased. Hominy that in 1909 averaged 4 cents per lb. now costs 11 cents, corn flakes have increased from 14 to 19 cents, rolled oats from 7.5 to 9.5 cents, puffed rice from 21.5 to 56 cents, *Grape-Nuts* from 12 to 16 cents, farinas from 9.5 to 14 cents, cracked wheat from 8 to 15.5 cents and *Triscuit* from 12.5 to 20 cents per lb. Of the brands listed *Force* is the only one which costs no more per pound to-day than in 1909. On the average the corn products in the eight years advanced 57, oats 27, wheat 37 and rice 162 per cent. These startling increases emphasize the importance of intelligent buying of these widely used foods.

TABLE IV.

WEIGHTS OF ONE SERVING OF FOOD, CALORIES YIELDED, AND COST.

| Food. | Weight of 1 cup ($\frac{1}{2}$ pint) of dry food. | Weight of one serving. | Total calories. | Per serving. | Per 100 calories. |
|-------------------------------------|----------------------------------------------------------|------------------------------|--------------------|-----------------|----------------------|
| | oz. | oz. | | cts. | cts. |
| <i>Corn.</i> | | | | | |
| Corn flakes, Jersey | 0.95 | 0.95 | 99 | 1.07 | 1.08 |
| " " Kellogg's | 0.78 | 0.78 | 76 | 1.07 | 1.40 |
| " " Post Toasties | 0.90 | 0.90 | 89 | 1.24 | 1.39 |
| " " Quakers | *0.90 | 0.90 | 90 | 0.79 | 0.88 |
| " " Washington Crisps | 0.67 | 0.67 | 65 | 0.67 | 1.03 |
| Corn meal, in bulk | 5.40 | 1.62 | 163 | 0.71 | 0.44 |
| " " Quaker | 5.40 | 1.62 | 163 | 0.81 | 0.50 |
| Corn puffs, Quaker | 0.78 | 0.78 | 78 | 1.83 | 2.33 |
| Hominy, Hecker's Cream | 6.03 | 1.51 | 152 | 1.13 | 0.75 |
| " " Sunbeam | 5.93 | 1.48 | 145 | 0.88 | 0.54 |
| Roman Meal | 5.40 | 1.62 | 161 | 1.00 | 0.63 |
| <i>Oats.</i> | | | | | |
| Groats, Robinson's Patent | 4.48 | 1.12 | 128 | 3.50 | 2.76 |
| Oat Meal, in bulk | 5.50 | 1.38 | 156 | 0.61 | 0.39 |
| " " Bestovotes | 4.76 | 1.19 | 128 | 0.74 | 0.58 |
| " " Keen & Robinson's | 5.54 | 1.39 | 156 | 1.91 | 1.22 |
| " " McCann's | 6.00 | 1.50 | 171 | 1.79 | 1.04 |
| Oats, rolled, in bulk | 2.50 | 1.25 | 140 | 0.55 | 0.39 |
| " " Bufeco | 2.68 | 1.34 | 145 | 0.67 | 0.46 |
| " " Hecker's | 2.68 | 1.34 | 142 | 0.67 | 0.46 |
| " " Hornby's | *2.68 | 1.34 | 146 | 0.92 | 0.63 |
| " " Leggett's | *2.68 | 1.34 | 142 | 1.01 | 0.71 |
| " " Purity | 2.68 | 1.34 | 140 | 0.67 | 0.46 |
| " " Quaker | *2.68 | 1.34 | 144 | 0.67 | 0.47 |
| " " Scott's | 3.28 | 1.64 | 187 | 1.38 | 0.74 |
| <i>Rice.</i> | | | | | |
| Rice, head, in bulk | 7.00 | 1.75 | 175 | 1.31 | 0.75 |
| " small, in bulk | 7.00 | 1.75 | 175 | 1.09 | 0.63 |
| " broken, in bulk | 7.00 | 1.75 | 175 | 0.88 | 0.50 |
| " flakes, Kellogg's | 0.73 | 0.73 | 77 | 1.37 | 1.78 |
| " puffed, Quaker | 0.70 | 0.70 | 70 | 2.45 | 3.50 |
| <i>Wheat.</i> | | | | | |
| Farina, Cream of Wheat | 6.21 | 1.55 | 155 | 1.21 | 0.78 |
| " " Crystal Wheat | *6.05 | 1.51 | 154 | 1.37 | 0.89 |
| " " Hecker's Cream | *6.05 | 1.51 | 151 | 1.32 | 0.88 |
| " " Mother's Wheat Hearts | 5.78 | 1.45 | 145 | 0.73 | 0.50 |
| " " Quaker (F. S.) | 5.68 | 1.42 | 141 | 0.99 | 0.69 |
| " " Vitos | 6.17 | 1.54 | 160 | 0.82 | 0.53 |
| " " Wheatena | *6.05 | 1.51 | 159 | 1.42 | 0.89 |
| Wheat, cracked, Quaker | 6.20 | 1.86 | 186 | 1.80 | 0.97 |
| " flakes, Alber's | 2.05 | 1.03 | 105 | 0.64 | 0.61 |
| " flakes, Kellogg's | *0.78 | 0.78 | 82 | 1.46 | 1.78 |
| " puffed, Quaker | 0.53 | 0.53 | 54 | 1.99 | 3.62 |
| Force | 1.28 | 1.28 | 127 | 1.40 | 1.10 |

* Estimated from weight of similar preparations.

TABLE IV—Continued.

WEIGHTS OF ONE SERVING OF FOOD, CALORIES YIELDED, AND COST.

| Food. | Weight of 1 cup ($\frac{1}{2}$ pint) of dry food. | Weight of one serving. | Total calories. | Per serving. | Per 100 calories. |
|-------------------------------------|----------------------------------------------------------|---------------------------|--------------------|-----------------|----------------------|
| <i>Wheat—Continued.</i> | | | | | |
| Grape-Nuts (4 heap. tablespoonfuls) | 1.16 | 1.16 | 115 | 1.16 | 1.01 |
| Kellogg's Krumbles..... | 2.05 | 2.05 | 204 | 2.05 | 1.01 |
| Pettijohn's Breakfast Food..... | *2.05 | 2.05 | 208 | 1.54 | 0.74 |
| Ralston Wheat Food..... | 4.80 | 1.20 | 121 | 1.13 | 0.94 |
| Shredded Wheat (1 biscuit)..... | 1.00 | 1.00 | 102 | 1.00 | 0.98 |
| Triscuit (3 biscuits)..... | 1.20 | 1.20 | 121 | 1.50 | 1.24 |
| <i>Miscellaneous.</i> | | | | | |
| Fruit Nut Cereal..... | 4.13 | 1.16 | 117 | 1.52 | 1.30 |
| Post Tavern Porridge..... | 5.68 | 1.42 | 141 | 0.89 | 0.63 |

* Estimated from weight of similar preparations.

SUGGESTIONS AS TO PURCHASE.

In order to make a fair comparison of cost we must not lose sight of the fact that many of these foods are served in the dry condition as purchased, while others, such as oatmeal, farina and hominy, during the cooking process absorb large amounts of water. It is obviously unfair, therefore, to compare the nutrient value of one pound of raw oatmeal with one pound of corn flakes. To obviate this difficulty Table IV has been prepared showing the weights in ounces of the average individual serving for most of these foods. In preparing this table the cup ($\frac{1}{2}$ pint) has been taken as the unit of measure, and it has been assumed that an average serving of corn flakes, corn puffs, rice flakes, puffed rice, wheat flakes, puffed wheat, *Krumbles*, and *Force*, is one cup, that of corn meal and cracked wheat $\frac{3}{10}$ cup, of oatmeal, hominy, rice, farina and *Ralston Wheat Food* $\frac{1}{4}$ cup, of rolled oats and flaked wheat $\frac{1}{2}$ cup, of *Shredded Wheat* 1 biscuit, of *Triscuit* 3 biscuits and of *Grape-Nuts* 4 heaping tablespoonfuls. In some cases these servings may be somewhat excessive but they are at least comparative. Where the food was available we have weighed one cupful in each case and the weights are shown in the table. In certain cases an assumed weight has been used based on the known weight of a similar preparation.

Table IV also shows the number of total calories yielded by these servings, as well as the cost per serving and cost per 100 calories.

The main facts in this table are shown graphically and perhaps more clearly in the charts on pages 40 to 43. The one chart shows the relative cost of the foods per serving, the other the relative cost per 100 calories. In the main these two charts show similar results, the differences arising not so much from variations in composition as from the variations in weight of servings of the respective foods. The serving basis is perhaps the more popular way to consider the cost of these foods, but the 100 calories basis is clearly the more exact and the more scientific. Our consideration, therefore, will be on the latter basis.

The relative cheapness of the uncooked cereals is apparent, oats and corn showing the lowest costs and rice and wheat the highest. The highest priced foods under each cereal (excepting *Robinson's Groats* already referred to), are the "ready-to-eat" preparations, and among these there is a wide range of cost. Of the flaked foods, corn flakes are the cheapest, followed by wheat and rice; the puffed cereals show about the same relative cost. The most obvious facts shown by the charts are the cheapness of the rolled oat preparations, and that corn puffs, puffed rice and puffed wheat are clearly among the luxuries of the breakfast table.

TABLE I.—CEREAL

| Date of Analysis. | Brand. | | |
|-----------------------------------|------------------------------------------------|--------|------|
| | | Water. | Fat. |
| <i>Barley Preparations.</i> | | | |
| 1913 | Farwell & Rhines' Barley Crystals..... | 9.9 | 1.3 |
| 1909 | Quaker Scotch Brand Pearled Barley..... | 12.1 | 0.9 |
| <i>Corn (Maize) Preparations.</i> | | | |
| 1909 | Cerealine..... | 11.2 | 0.4 |
| 1909 | E-C Corn Flakes, Toasted..... | 12.1 | 0.3 |
| 1909 | F. S. Granulated Hominy..... | 13.3 | 1.0 |
| 1917 | Hecker's Cream Hominy..... | 11.7 | 0.4 |
| 1909 | H-O New Process Hominy..... | 11.3 | 0.3 |
| 1916 | Jackson's Roman Meal..... | 8.5 | 3.4 |
| 1917 | Jersey Corn Flakes..... | 7.7 | 0.3 |
| 1909 | Kellogg's Toasted Corn Flakes..... | 11.7 | 0.2 |
| 1909 | Korn Kinks..... | 12.0 | 0.4 |
| 1909 | Nichols' Snow White Samp..... | 13.4 | 0.3 |
| 1909 | Post Toasties..... | 11.7 | 0.3 |
| 1909 | Quaker Best Yellow Corn Meal..... | 12.3 | 0.8 |
| 1917 | Quaker Corn Puffs..... | 12.0 | 0.3 |
| 1909 | Quaker Toasted Corn Flakes..... | 11.6 | 0.4 |
| 1909 | Ralston Hominy Grits..... | 11.3 | 2.9 |
| 1909 | Street's Perfection Hominy..... | 12.4 | 1.3 |
| 1917 | Sunbeam Pearl Hominy..... | 14.3 | 0.6 |
| 1917 | Washington Corn Crisps..... | 12.1 | 0.2 |
| <i>Oat Preparations.</i> | | | |
| 1917 | Bestovotes..... | 11.0 | 6.6 |
| 1917 | Bufceco Rolled Oats..... | 11.1 | 6.8 |
| 1909 | Grandmother's Crushed Oats..... | 10.7 | 6.5 |
| 1909 | Health Brand White Oats..... | 10.9 | 7.8 |
| 1917 | Hecker's Cream Oat Meal..... | 11.5 | 5.6 |
| 1909 | Hornby's Steam Cooked Oat Meal..... | 10.6 | 6.7 |
| 1917 | Keen & Robinson's Granulated Scotch Oatmeal... | 10.4 | 9.1 |
| 1909 | Leggett's Premier 15 Minute Oat Flakes..... | 11.3 | 5.4 |
| 1917 | McCann's Irish Oat Meal..... | 9.2 | 8.7 |
| 1909 | Mother's Crushed Oats..... | 10.9 | 6.1 |
| 1909 | Paw-Nee Rolled Oats..... | 10.8 | 6.7 |
| 1917 | Purity Rolled Oats..... | 13.5 | 6.1 |
| 1909 | Quaker Oats..... | 10.8 | 6.0 |
| 1917 | Robinson's Patent Groats..... | 8.4 | 8.6 |
| 1917 | Scott's Porage Oats..... | 10.1 | 9.6 |
| 1909 | Sovereign 15 Minute Oat Flakes..... | 10.8 | 5.8 |
| 1909 | White Rose Rolled Oats..... | 10.3 | 8.0 |
| <i>Rice Preparations.</i> | | | |
| 1915 | Comet Cereal..... | 11.3 | 0.3 |
| 1909 | Cook's Flaked Rice..... | 12.6 | 0.1 |
| 1909 | Cook's Malto Rice..... | 11.3 | 0.2 |
| 1915 | Kellogg's Toasted Rice Biscuit..... | 5.0 | 0.3 |

BREAKFAST FOODS.

| Crude fiber. | Pounds per hundred. | | | | Calories per ¼ lb. | Cost in 1917. | | | Net weight of package. |
|--------------|---------------------|------|---------------------------------|---------|--------------------|---------------|------------|-------------------|------------------------|
| | Protein (N×6.25). | Ash. | Carbohydrates other than fiber. | Starch. | | Per package. | Per pound. | Per 100 calories. | |
| 0.9 | 11.5 | 1.2 | 75.2 | 62.7 | 410 | cts. | cts. | cts. | ozs.* |
| 0.3 | 9.5 | 1.0 | 76.2 | 69.2 | 401 | ..... | ..... | ..... | 18* |
| 0.1 | 6.9 | 1.5 | 79.9 | 60.2 | 401 | ..... | ..... | ..... | 10* |
| 0.2 | 6.6 | 2.2 | 78.6 | 61.3 | 393 | ..... | ..... | ..... | 10* |
| 0.2 | 8.0 | 0.4 | 77.1 | 75.7 | 399 | ..... | ..... | ..... | 74* |
| 0.5 | 9.8 | 0.3 | 77.3 | 71.2 | 402 | 18 | 12 | 0.75 | 24 |
| 0.2 | 8.0 | 0.4 | 79.8 | 74.4 | 404 | ..... | ..... | ..... | 30* |
| 5.0 | 13.3 | 3.7 | 66.1 | 37.4 | 398 | 25 | 10 | 0.63 | 40 |
| 0.3 | 8.5 | 0.9 | 82.3 | 64.7 | 418 | 10 | 18 | 1.08 | 9 |
| 0.2 | 6.4 | 2.7 | 78.8 | 55.5 | 392 | 11 | 22 | 1.40 | 8 |
| 0.1 | 7.4 | 2.2 | 77.9 | 66.3 | 394 | ..... | ..... | ..... | 8* |
| 0.5 | 7.8 | 0.3 | 77.7 | 78.2 | 394 | ..... | ..... | ..... | 32* |
| 0.2 | 6.6 | 1.8 | 79.4 | 53.9 | 396 | 11 | 22 | 1.39 | 8 |
| 0.2 | 7.5 | 0.5 | 78.7 | 75.7 | 402 | 12 | 8 | 0.50 | 24 |
| 0.1 | 8.7 | 0.4 | 78.5 | 43.2 | 402 | 14 | 37.5 | 2.33 | 6 |
| 0.0 | 6.8 | 1.3 | 79.9 | 68.3 | 398 | 7 | 14 | 0.88 | 8 |
| 0.4 | 9.0 | 1.0 | 75.4 | 70.9 | 416 | ..... | ..... | ..... | 30* |
| 0.1 | 7.9 | 0.4 | 77.9 | 74.5 | 406 | ..... | ..... | ..... | 31* |
| 0.3 | 9.4 | 0.4 | 75.0 | 70.8 | 392 | 43 | 9.5 | 0.54 | 74 |
| 0.2 | 7.8 | 2.9 | 76.8 | 59.5 | 389 | 10 | 16 | 1.03 | 10 |
| 1.0 | 16.2 | 2.1 | 63.1 | 55.1 | 430 | 17 | 10 | 0.58 | 24 |
| 1.0 | 15.1 | 2.0 | 64.0 | 55.6 | 432 | 10 | 8 | 0.46 | 20 |
| 0.6 | 14.9 | 1.9 | 65.4 | 59.1 | 434 | ..... | ..... | ..... | 28* |
| 1.0 | 13.8 | 2.0 | 64.5 | 58.8 | 438 | ..... | ..... | ..... | 32* |
| 0.9 | 15.6 | 1.8 | 64.6 | 56.7 | 424 | 10 | 8 | 0.48 | 20 |
| 0.8 | 16.1 | 1.7 | 64.1 | 59.2 | 436 | 14 | 11 | 0.63 | 20 |
| 0.8 | 13.7 | 1.9 | 64.1 | 57.0 | 449 | 110 | 22 | 1.22 | 80 |
| 0.6 | 17.2 | 1.8 | 63.7 | 56.6 | 425 | 15 | 12 | 0.71 | 20 |
| 0.3 | 15.1 | 1.8 | 64.9 | 56.8 | 455 | 95 | 19 | 1.04 | 80 |
| 0.9 | 15.6 | 1.6 | 64.9 | 58.4 | 431 | 9 | 7 | 0.42 | 20* |
| 0.8 | 15.8 | 1.9 | 64.0 | 59.7 | 434 | ..... | ..... | ..... | 25* |
| 1.0 | 16.3 | 2.0 | 61.1 | 57.4 | 417 | 10 | 8 | 0.48 | 20 |
| 0.9 | 15.9 | 1.9 | 64.5 | 56.7 | 429 | 10 | 8 | 0.47 | 20 |
| 0.7 | 12.8 | 1.8 | 67.7 | 60.5 | 456 | 50 | 50 | 2.74 | 16 |
| 0.4 | 13.3 | 1.7 | 64.9 | 56.8 | 456 | 25 | 13.5 | 0.74 | 30 |
| 0.9 | 16.5 | 2.0 | 64.0 | 58.0 | 428 | ..... | ..... | ..... | 34* |
| 0.7 | 14.3 | 1.9 | 64.8 | 59.0 | 432 | ..... | ..... | ..... | 30* |
| 0.2 | 7.2 | 0.3 | 80.7 | ..... | 405 | ..... | ..... | ..... | 16* |
| 0.2 | 7.8 | 0.4 | 78.9 | 78.2 | 397 | ..... | ..... | ..... | 15* |
| 0.1 | 7.6 | 0.6 | 80.2 | 74.1 | 403 | ..... | ..... | ..... | 17* |
| 0.2 | 10.1 | 3.7 | 80.7 | 57.4 | 418 | 15 | 40 | 2.39 | 6 |

* Net weight of package at date specified in the first column.

TABLE I.—CEREAL

| Date of Analysis. | Brand. | Analysis. | |
|-------------------------------------|---------------------------------------|-----------|------|
| | | Water. | Fat. |
| <i>Rice Preparations—Continued.</i> | | | |
| 1915 | Kellogg's Toasted Rice Flakes..... | 4.7 | 0.4 |
| 1909 | Milk Rice..... | 12.3 | 0.2 |
| 1909 | Quaker Puffed Rice..... | 12.2 | 0.2 |
| <i>Rye Preparation.</i> | | | |
| 1915 | Kellogg's Toasted Rye Flakes..... | 8.1 | 1.5 |
| <i>Wheat Preparations.</i> | | | |
| 1917 | Alber's Wheat Flakes Mush..... | 11.5 | 2.1 |
| 1913 | Brusson Farine au Gluten..... | 10.9 | 0.6 |
| 1910 | Brusson Gluten Semolina..... | 9.7 | 0.5 |
| 1915 | Cero-Vita..... | 4.6 | 0.7 |
| 1917 | Cinnamon Rusks..... | 9.9 | 7.2 |
| 1909 | Cream of Wheat..... | 13.1 | 0.9 |
| 1913 | Cresco Grits..... | 11.1 | 1.4 |
| 1914 | Crystal Wheat..... | 9.5 | 2.0 |
| 1914 | Dieto Rusks..... | 6.4 | 9.1 |
| 1909 | Force..... | 10.7 | 1.1 |
| 1917 | F S Farina (Quaker Farina)..... | 13.7 | 0.9 |
| 1909 | Grandmother's A. & P. Farina..... | 12.9 | 0.6 |
| 1911 | Granola..... | 6.1 | 0.8 |
| 1914 | Granose Biscuit..... | 11.3 | 1.6 |
| 1915 | Granose Flakes..... | 6.0 | 3.9 |
| 1909 | Grape Nuts..... | 10.3 | 0.6 |
| 1909 | Hecker's Farina..... | 12.7 | 0.7 |
| 1909 | Holland Rusk..... | 11.0 | 5.1 |
| 1914 | Hoyt's Gum Gluten Breakfast Food..... | 6.5 | 0.9 |
| 1914 | Hoyt's Gum Gluten Granules..... | 6.6 | 0.7 |
| 1913 | Jireh Frumenty..... | 6.2 | 1.7 |
| 1913 | Jireh Whole Wheat Farina..... | 6.2 | 2.3 |
| 1912 | Kellogg's Breakfast Toast..... | 7.7 | 1.9 |
| 1917 | Kellogg's Krumbles..... | 10.0 | 1.2 |
| 1915 | Kellogg's Toasted Wheat Biscuit..... | 5.8 | 1.4 |
| 1915 | Kellogg's Toasted Wheat Flakes..... | 5.2 | 1.1 |
| 1915 | Kellogg's Zwieback..... | 6.2 | 1.6 |
| 1909 | Leggett's Premier Farina..... | 14.1 | 0.9 |
| 1909 | Malt Breakfast Food..... | 9.6 | 1.5 |
| 1914 | Manana Gluten Breakfast Food..... | 7.6 | 2.0 |
| 1909 | Mapl-Flake..... | 10.8 | 1.2 |
| 1917 | Mother's Wheat Hearts..... | 13.5 | 1.1 |
| 1909 | Pettijohn's Breakfast Food..... | 10.3 | 2.0 |
| 1909 | Pillsbury's Best Cereal..... | 11.3 | 0.7 |
| 1909 | Quaker Cracked Wheat..... | 11.7 | 2.3 |
| 1917 | Quaker Puffed Wheat..... | 11.5 | 1.8 |
| 1909 | Quaker Wheat Berries..... | 9.8 | 2.0 |
| 1909 | Ralston Health Food..... | 12.4 | 1.7 |
| 1917 | Ralston Wheat Food..... | 11.9 | 1.8 |

BREAKFAST FOODS—Continued.

| Crude fiber. | Pounds per hundred. | | | | Calories per $\frac{1}{4}$ lb. | Cost in 1917. | | | Net weight of package. |
|--------------|---------------------|------|---------------------------------|---------|--------------------------------|---------------|------------|-------------------|------------------------|
| | Protein (N x 6.25). | Ash. | Carbohydrates other than fiber. | Starch. | | Per package. | Per pound. | Per 100 calories. | |
| 0.2 | 10.0 | 3.4 | 81.3 | 55.7 | 422 | cts. 15 | cts. 30 | cts. 1.78 | ozs. 8 |
| 0.2 | 6.9 | 3.2 | 77.2 | 62.6 | 387 | .... | .... | .... | 8* |
| 0.1 | 7.6 | 0.4 | 79.5 | 61.8 | 400 | 14 | 56 | 3.50 | 4 |
| 0.6 | 11.4 | 2.2 | 76.2 | 45.7 | 416 | 15 | 30 | 1.80 | 8 |
| 0.3 | 11.1 | 1.6 | 73.4 | 59.2 | 408 | 15 | 10 | 0.61 | 24 |
| 0.2 | 33.9 | 0.6 | 53.8 | 48.8 | 407 | .... | .... | .... | 9* |
| 0.3 | 17.2 | 0.7 | 71.6 | 64.9 | 411 | .... | .... | .... | 30* |
| 0.3 | 8.9 | 3.5 | 82.0 | 52.3 | 423 | 15 | 30 | 1.77 | 8 |
| 0.2 | 10.3 | 0.7 | 71.7 | 49.5 | 449 | 18 | 21 | 1.17 | 14 |
| 0.2 | 11.5 | 0.6 | 73.7 | 71.1 | 399 | 22 | 12.5 | 0.78 | 28 |
| 0.5 | 17.8 | 0.6 | 68.6 | 54.1 | 409 | .... | .... | .... | 32* |
| 1.7 | 11.3 | 1.9 | 73.6 | .... | 408 | 20 | 14.5 | 0.89 | 22 |
| 1.0 | 15.9 | 1.5 | 66.1 | 52.1 | 469 | 60 | 76 | 4.05 | 13 |
| 1.1 | 10.6 | 2.8 | 73.7 | 59.9 | 397 | 11 | 17.5 | 1.10 | 10 |
| 0.2 | 10.2 | 0.4 | 74.6 | 63.9 | 397 | 10 | 11 | 0.69 | 14.5 |
| 0.1 | 10.8 | 0.6 | 75.0 | 71.7 | 398 | .... | .... | .... | 16* |
| 0.6 | 13.9 | 2.3 | 76.3 | 45.2 | 421 | 20 | 24.5 | 1.46 | 13 |
| 1.8 | 10.3 | 3.9 | 71.1 | .... | 389 | 15 | 60 | 3.86 | 4 |
| 0.5 | 10.3 | 3.9 | 75.4 | 55.5 | 432 | 15 | 40 | 2.31 | 6 |
| 1.5 | 11.5 | 1.9 | 74.2 | 36.3 | 398 | 13 | 16 | 1.01 | 13 |
| 0.1 | 10.0 | 0.6 | 75.9 | 71.2 | 400 | 14 | 14 | 0.88 | 16 |
| 0.1 | 12.1 | 1.3 | 70.4 | 55.8 | 430 | 11 | 29 | 1.69 | 6 |
| 0.3 | 45.4 | 0.6 | 46.3 | 39.2 | 429 | 35 | 35 | 2.04 | 16 |
| 0.5 | 42.7 | 0.7 | 48.8 | 41.9 | 425 | 35 | 35 | 2.06 | 16 |
| 1.1 | 12.3 | 1.4 | 77.3 | 65.4 | 427 | .... | .... | .... | 24* |
| 2.2 | 12.9 | 1.8 | 74.6 | 59.5 | 424 | .... | .... | .... | 24* |
| 0.3 | 13.6 | 1.6 | 74.9 | 57.4 | 424 | 20 | 35.5 | 2.09 | 9 |
| 1.9 | 12.0 | 2.6 | 72.3 | 59.0 | 398 | 8 | 16 | 1.01 | 8 |
| 1.5 | 14.2 | 2.4 | 74.7 | 45.8 | 421 | 12 | 19 | 1.13 | 10 |
| 1.2 | 9.3 | 2.7 | 80.5 | 57.0 | 422 | 15 | 30 | 1.78 | 8 |
| 0.2 | 14.3 | 1.6 | 76.1 | 60.4 | 384 | 25 | 28.5 | 1.86 | 14 |
| 0.1 | 11.1 | 0.5 | 73.3 | 71.0 | 395 | .... | .... | .... | 16* |
| 1.0 | 13.8 | 1.4 | 72.7 | 53.5 | 411 | 22 | 12.5 | 0.76 | 28 |
| 1.7 | 42.6 | 2.5 | 43.6 | 29.9 | 415 | 25 | 40 | 2.41 | 10 |
| 1.2 | 9.3 | 2.8 | 74.7 | 58.3 | 396 | .... | .... | .... | 11* |
| 0.2 | 10.7 | 0.4 | 74.1 | 65.0 | 399 | 15 | 8 | 0.50 | 29 |
| 2.0 | 9.1 | 1.7 | 74.9 | 64.0 | 405 | 18 | 12 | 0.74 | 24 |
| 0.1 | 11.5 | 0.5 | 75.9 | 74.1 | 407 | .... | .... | .... | 32* |
| 1.7 | 9.3 | 1.7 | 73.3 | 63.6 | 401 | 25 | 15.5 | 0.97 | 26 |
| 1.6 | 13.1 | 1.8 | 70.2 | 29.5 | 399 | 15 | 60 | 3.76 | 4 |
| 1.2 | 14.0 | 1.4 | 71.6 | 57.1 | 412 | .... | .... | .... | 8* |
| 1.1 | 11.9 | 1.4 | 71.5 | 64.4 | 399 | .... | .... | .... | 29* |
| 0.8 | 11.3 | 1.1 | 73.1 | 62.8 | 404 | 22 | 15 | 0.94 | 24 |

* Net weight of package at date specified in the first column.

TABLE I.—CEREAL

| Date of Analysis. | Brand. | | |
|------------------------------------------------------------|---------------------------------------------|--------|------|
| | | Water. | Fat. |
| <i>Wheat Preparations—Continued.</i> | | | |
| 1915 | Sanitas Granuto..... | 4.9 | 1.7 |
| 1909 | Saxon Wheat Food..... | 9.8 | 1.7 |
| 1909 | Shredded Wheat Biscuit..... | 8.5 | 1.4 |
| 1909 | Street's Perfection Farina..... | 13.1 | 1.1 |
| 1909 | Triscuit..... | 10.3 | 1.4 |
| 1917 | Vitos..... | 11.6 | 1.0 |
| 1909 | Wheatena..... | 10.4 | 2.8 |
| 1909 | Wheatlet..... | 12.2 | 1.6 |
| 1909 | Zest..... | 10.7 | 1.2 |
| <i>Wheat Bran.</i> | | | |
| 1914 | Ballard's Obelisk Sanitary Edible Bran..... | 11.5 | 5.4 |
| 1917 | Culp's Capitol Health Bran..... | 11.2 | 4.3 |
| 1914 | Health Food Co.'s Wheat Bran..... | 11.6 | 4.1 |
| 1914 | Jireh Wheat Bran..... | 11.1 | 4.8 |
| 1914 | Johnson's Educator Wheat Bran..... | 11.6 | 4.7 |
| 1914 | Kellogg's Sterilized Wheat Bran..... | 9.6 | 5.2 |
| <i>Wheat Bran Biscuit and other Laxative Preparations.</i> | | | |
| 1914 | Bran Biskue..... | 8.5 | 13.1 |
| 1917 | Bran-eata Biscuit..... | 9.8 | 0.9 |
| 1917 | Bran Zos..... | 11.9 | 2.5 |
| 1914 | Brose Good Health Breakfast Food..... | 10.1 | 4.3 |
| 1917 | Cerag..... | 9.2 | 0.9 |
| 1910 | Cerena..... | 7.2 | 11.4 |
| 1914 | Christian's Laxative Bread..... | 9.9 | 1.4 |
| 1909 | Christian's Laxative Cereal Flakes..... | 13.0 | 1.4 |
| 1914 | Colax..... | 13.1 | 0.8 |
| 1914 | Dietetic Bran Biscuit..... | 9.3 | 5.0 |
| 1914 | Educator Bran Cookies..... | 7.1 | 14.5 |
| 1914 | Educator Bran Meal..... | 11.8 | 2.8 |
| 1915 | F. B. A. Laxative Health Biscuit..... | 11.1 | 1.7 |
| 1917 | Fruit Nut Cereal..... | 7.3 | 1.2 |
| 1914 | Good Health Biscuit (Kellogg)..... | 10.9 | 1.2 |
| 1914 | Health Food Wafers..... | 9.7 | 7.9 |
| 1917 | India (Digestive) Biscuit..... | 8.7 | 2.2 |
| 1915 | Laxa..... | 6.6 | 2.8 |
| 1914 | Laxative Biscuit (Kellogg)..... | 9.4 | 10.8 |
| 1914 | Mansfield's Agar Agar Wafers..... | 7.9 | 12.0 |
| 1914 | Oval Digestive Biscuit (H. & P.)..... | 8.8 | 16.3 |
| 1915 | Uncle Sam Health Food..... | 6.3 | 24.4 |
| 1917 | Zim..... | 13.2 | 1.7 |
| <i>Miscellaneous Preparations.</i> | | | |
| 1914 | Dieto Nut Cereal..... | 5.0 | 18.4 |
| 1914 | Dieto Wheat and Barley Cereal..... | 6.8 | 2.2 |
| 1906 | Jireh Wheat Nuts..... | 7.6 | 15.6 |

BREAKFAST FOODS—Continued.

| Pounds per hundred. | | | | | Calories per ¼ lb. | Cost in 1917. | | | Net weight of package. |
|---------------------|---------------------|------|---------------------------------|---------|--------------------|---------------|------------|-------------------|------------------------|
| Crude fiber. | Protein (N x 6.25). | Ash. | Carbohydrates other than fiber. | Starch. | | Per package. | Per pound. | Per 100 calories. | |
| 0.4 | 10.1 | 1.3 | 81.6 | 43.4 | 437 | cts. 20 | cts. 23 | cts. 1.32 | ozs. 14 |
| 0.5 | 12.8 | 0.8 | 74.4 | 69.6 | 416 | 22 | 13.5 | 0.81 | 26 |
| 2.6 | 11.0 | 1.5 | 75.0 | 63.1 | 408 | 12 | 16 | 0.98 | 12 |
| 0.1 | 10.3 | 0.5 | 74.9 | 71.1 | 401 | .... | .... | .... | 16* |
| 1.7 | 11.0 | 1.7 | 73.9 | 60.8 | 403 | 12 | 20 | 1.24 | 9.5 |
| 0.2 | 11.1 | 0.5 | 75.6 | 68.7 | 417 | 15 | 8.5 | 0.51 | 28 |
| 0.6 | 11.3 | 0.7 | 74.2 | 69.8 | 420 | 18 | 15 | 0.89 | 19 |
| 0.3 | 12.8 | 0.8 | 72.3 | 66.2 | 406 | .... | .... | .... | 28* |
| 1.2 | 9.0 | 2.6 | 75.3 | 60.1 | 398 | .... | .... | .... | 11.5* |
| 5.6 | 17.3 | 4.5 | 55.7 | .... | 390 | 25 | 9.5 | 0.61 | 42 |
| 8.2 | 13.4 | 5.3 | 57.6 | .... | 369 | 15 | 8.5 | 0.58 | 28 |
| 8.2 | 14.3 | 5.6 | 56.2 | .... | 364 | 10 | 12.5 | 0.86 | 13 |
| 6.3 | 16.8 | 4.3 | 56.7 | .... | 385 | 10 | 6.5 | 0.42 | 24 |
| 7.8 | 15.4 | 6.1 | 54.4 | .... | 368 | 15 | 12 | 0.82 | 20 |
| 8.5 | 16.3 | 6.0 | 54.4 | .... | 377 | 25 | 23.5 | 1.56 | 17 |
| 2.2 | 12.1 | 3.1 | 61.0 | .... | 469 | 15 | 15 | 0.80 | 16 |
| 3.6 | 9.1 | 4.4 | 72.2 | 21.0 | 381 | 15 | 24 | 1.57 | 10 |
| 3.8 | 13.2 | 3.0 | 65.6 | 46.2 | 386 | 15 | 12 | 0.78 | 20 |
| 3.1 | 14.4 | 2.6 | 65.5 | .... | 410 | 20 | 20 | 1.22 | 16 |
| 2.0 | 11.3 | 3.6 | 73.0 | 20.8 | .... | 15 | 24 | .... | 10 |
| 2.4 | 27.8 | 4.9 | 46.3 | 25.1 | 456 | 25 | 25 | 1.37 | 16* |
| 1.3 | 10.0 | 2.8 | 74.6 | .... | 401 | 25 | 30 | 1.87 | 13* |
| 1.0 | 10.4 | 1.7 | 72.5 | 61.2 | 393 | .... | .... | .... | 21* |
| 0.1 | 1.1 | 2.1 | 82.8 | .... | .... | 100 | 26.7 | .... | 6 |
| 1.7 | 9.9 | 5.0 | 69.1 | .... | 413 | 25 | 38 | 2.30 | 10.5 |
| 1.5 | 8.9 | 3.3 | 64.7 | .... | 486 | 25 | 50 | 2.57 | 8 |
| 3.8 | 12.3 | 2.9 | 66.4 | .... | 389 | 20 | 7.5 | 0.48 | 42 |
| 0.7 | 6.1 | 3.1 | 77.3 | .... | 398 | .... | .... | .... | .... |
| 2.4 | 13.5 | 3.2 | 72.4 | 36.5 | 405 | 15 | 21 | 1.30 | 11 |
| 1.5 | 7.7 | 4.2 | 74.5 | .... | 389 | 15 | 40 | 2.57 | 6 |
| 1.4 | 10.0 | 5.3 | 65.7 | .... | 427 | 15 | 17.5 | 1.03 | 13.5 |
| 5.2 | 12.8 | 5.0 | 66.1 | .... | 383 | 25 | 33 | 2.15 | 12 |
| 6.6 | 12.4 | 5.0 | 66.6 | .... | .... | 50 | 106 | .... | 7.5 |
| 2.4 | 16.7 | 3.0 | 57.7 | .... | 451 | .... | .... | .... | 3 |
| 0.8 | 7.1 | 2.3 | 69.9 | .... | 475 | 23 | 73.5 | 3.87 | 5 |
| 0.5 | 7.8 | 2.1 | 64.5 | .... | 499 | 15 | 30 | 1.50 | 8 |
| 4.0 | 21.3 | 3.1 | 40.9 | .... | 538 | 28 | 25 | 1.16 | 18 |
| 1.5 | 7.4 | 2.0 | 74.2 | 6.2 | 391 | 15 | 20 | 1.28 | 9 |
| 1.2 | 21.6 | 2.0 | 51.8 | 39.5 | 525 | 30 | 34 | 1.62 | 14 |
| 2.0 | 11.6 | 1.7 | 75.7 | 61.4 | 410 | .... | .... | .... | 36* |
| 1.0 | 19.0 | 2.3 | 54.5 | 50.1 | 496 | 30 | 30 | 1.51 | 16 |

* Net weight of package at date specified in the first column.

TABLE I.—CEREAL

| Date of Analysis. | Brand. | | |
|----------------------------------------------|---------------------------|--------|------|
| | | Water. | Fat. |
| <i>Miscellaneous Preparations—Continued.</i> | | | |
| 1917 | Malabar Manoca..... | 13.3 | 0.1 |
| 1917 | Post Tavern Porridge..... | 12.7 | 0.8 |
| 1913 | Post Tavern Special..... | 9.9 | 1.1 |
| 1917 | Sea Moss Farina..... | 15.6 | 0.3 |
| 1917 | Sunbeam Tapioca..... | 13.5 | 0.1 |
| 1913 | Trix..... | 6.2 | 0.2 |

It appears from the facts given in this bulletin that cereal breakfast foods can be bought uncooked, partially cooked, or ready to serve. The difference in prices between the three kinds is in some cases very great, but in others so little that their extra cost probably is not more than the cost of fuel which would be used for cooking the raw meals.

The greater popularity of wheat foods is indicated by the fact that 48 wheat foods, besides 29 wheat laxative preparations have been found in one market, 18 of corn, 17 of oats, 7 of rice, 2 of barley and 1 of rye.

Attention is called to the relative food value and cost of these preparations and the more general use of oat and corn foods is suggested.

OATMEAL and "ROLLED OATS," sold in bulk or in various package forms, are the most nutritious and, considering their food value, the cheapest of the cereals. The uncooked oat preparations sell generally now for from 7 to 12 cents a pound. They contain from 1½ to 2 times as much protein, 3.9 times as much fat and 120 more calories—or heat producers—per pound than other commonly used cereals, and the ratio of protein to non-protein calories is what is required in a complete ration.

WHEAT, CRACKED or FLAKED, is, next to oats, the richest in protein, but one of the most expensive cereal foods. A very large number of preparations made from wheat are on the mar-

BREAKFAST FOODS—*Concluded.*

| Pounds per hundred. | | | | | Calories per ¼ lb. | Cost in 1917. | | | Net weight of package. |
|---------------------|------------------------|------|---------------------------------------|---------|--------------------|---------------|------------|----------------------|------------------------|
| Crude fiber. | Protein (N x 6.25). | Ash. | Carbohydrates other than fiber. | Starch. | | Per package. | Per pound. | Per 100 calories. | |
| 0.6 | 0.6 | 1.3 | 84.1 | .... | 388 | cts. 22 | cts. 22 | cts. 1.42 | ozs. 16 |
| 0.2 | 10.3 | 1.5 | 74.5 | 67.2 | 396 | 18 | 10 | 0.63 | 28 |
| 0.3 | 10.9 | 0.9 | 76.9 | 69.3 | 413 | 14 | 8 | 0.48 | 28 |
| 1.5 | 9.1 | 13.6 | 59.9 | .... | .... | 30 | 120 | .... | 4 |
| 0.1 | 0.6 | 0.2 | 85.5 | .... | 396 | 20 | 20 | 1.26 | 16 |
| 0.3 | 14.5 | 1.5 | 77.3 | 48.6 | 422 | 15 | 16 | 0.95 | 15 |

* Net weight of package at date specified in the first column.

ket, none of them probably superior, considering both cost and composition, to plain cracked wheat (easily made at home by crushing whole wheat very coarse in a coffee mill).

CORN PRODUCTS, such as MEAL, FLAKES, HOMINY and SAMP, all have about the same composition and nutritive value. They are inferior in nutritive value to either wheat or oats, while their average cost at present is greater than that of oat products.

RICE GRAIN, RICE FLAKES and PUFFED RICE, have less protein and fat than any other cereal, have about the same heat value as corn or wheat products and at present are relatively very expensive.

It is clear that oats used as a breakfast cereal, not only conserves wheat, but furnishes a richer food at a lower price. The other cereals, corn and rice, one cheap, the other expensive, have about the same fuel value as wheat, but generally contain less protein or flesh-forming material. Wheat is, however, the most generally satisfactory cereal food. Some people cannot constantly use corn meal as a breakfast food without digestive trouble, but occasional use of it furnishes acceptable variety. Oats are much more generally satisfactory for constant daily use.

All the grain preparations require long cooking; three hours in a double boiler is not too much, and this will naturally be done at any time in the day when the stove is being used for other purposes as well.

RELATIVE COST OF BREAKFAST FOODS PER SERVING (IN CENTS).

| | |
|------------------------------|------------|
| <i>Corn.</i> | |
| Washington Crisps. | _____ .67 |
| Corn meal, in bulk. | _____ .71 |
| Corn flakes, Quaker. | _____ .79 |
| Corn meal, Quaker. | _____ .81 |
| Hominy, Sunbeams. | _____ .88 |
| Roman Meal. | _____ 1.00 |
| Corn flakes, Jersey. | _____ 1.07 |
| Corn flakes, Kellogg's. | _____ 1.07 |
| Hominy, Hecker's Cream. | _____ 1.13 |
| Post Toasties. | _____ 1.24 |
| Corn puffs, Quaker. | _____ 1.83 |
| <i>Oats.</i> | |
| Oats, rolled, in bulk. | _____ .55 |
| Oat meal, in bulk. | _____ .61 |
| Oats, rolled, Bufaeco. | _____ .67 |
| Oats, rolled, Hecker's. | _____ .67 |
| Oats, rolled, Purity. | _____ .67 |
| Oats, rolled, Quaker. | _____ .67 |
| Oat meal, Bestovotes. | _____ .74 |
| Oats, rolled, H-O. | _____ .92 |
| Oats, rolled, Leggett's. | _____ 1.01 |
| Oats, rolled, Scott's. | _____ 1.38 |
| Oat meal, McCann's. | _____ 1.79 |
| Oat meal, Keen & Robinson's. | _____ 1.91 |
| Groats, Robinson's. | _____ 3.50 |

RELATIVE COST OF BREAKFAST FOODS PER SERVING (IN CENTS)—*Concluded.*

| | |
|-----------------------------|------------|
| <i>Miscellaneous.</i> | |
| Post Tavern Porridge. | _____ .89 |
| Fruit Nut Cereal. | _____ 1.52 |
| <i>RICE.</i> | |
| Rice, broken, in bulk. | _____ .88 |
| Rice, small, in bulk. | _____ 1.09 |
| Rice, head, in bulk. | _____ 1.31 |
| Rice flakes, Kellogg's. | _____ 1.37 |
| Rice, puffed, Quaker. | _____ 2.45 |
| <i>Wheat.</i> | |
| Wheat flakes, Alber's. | _____ .64 |
| Mother's Wheat Hearts. | _____ .73 |
| Vitos. | _____ .82 |
| Farina, Quaker (F S). | _____ .99 |
| Shredded Wheat. | _____ 1.00 |
| Ralston Wheat Food. | _____ 1.13 |
| Grape-Nuts. | _____ 1.16 |
| Cream of Wheat. | _____ 1.21 |
| Farina, Hecker's Cream. | _____ 1.32 |
| Crystal Wheat. | _____ 1.37 |
| Force. | _____ 1.40 |
| Wheatena. | _____ 1.42 |
| Wheat flakes, Kellogg's. | _____ 1.46 |
| Triscuit. | _____ 1.50 |
| Pettijohn's Breakfast Food. | _____ 1.54 |
| Wheat, cracked, Quaker. | _____ 1.80 |
| Wheat, puffed, Quaker. | _____ 1.99 |
| Kellogg's Krumbles. | _____ 2.05 |

RELATIVE COST OF BREAKFAST FOODS PER 100 CALORIES (IN CENTS).

| | |
|------------------------------|------------|
| <i>Corn.</i> | |
| Corn meal in bulk. | _____ 44 |
| Corn meal, Quaker. | _____ .50 |
| Hominy, Sunbeam. | _____ .54 |
| Roman Meal. | _____ .63 |
| Hominy, Hecker's Cream. | _____ .75 |
| Corn flakes, Quaker. | _____ .88 |
| Washington Crisps. | _____ 1.03 |
| Corn flakes, Jersey. | _____ 1.08 |
| Post Toasties. | _____ 1.39 |
| Corn flakes, Kellogg's. | _____ 1.40 |
| Corn puffs, Quaker. | _____ 2.33 |
| <i>Oats.</i> | |
| Oats, rolled, in bulk. | _____ .39 |
| Oat meal, in bulk. | _____ .39 |
| Oats, rolled, Bufceco. | _____ .46 |
| Oats, rolled, Hecker's. | _____ .46 |
| Oats, rolled, Purity. | _____ .46 |
| Oats, rolled, Quaker. | _____ .47 |
| Oat meal, Bestovotes. | _____ .58 |
| Oats, rolled, H-O. | _____ .63 |
| Oats, rolled, Leggett's. | _____ .71 |
| Oats, rolled, Scott's. | _____ .74 |
| Oat meal, McCann's. | _____ 1.04 |
| Oat meal, Keen & Robinson's. | _____ 1.22 |
| Groats, Robinson's. | _____ 2.76 |

RELATIVE COST OF BREAKFAST FOODS PER 100 CALORIES (IN CENTS)—*Concluded.*

| | |
|-----------------------------|------------|
| <i>Rice.</i> | |
| Rice, broken, in bulk. | _____ 50 |
| Rice, small, in bulk. | _____ .63 |
| Rice, head, in bulk. | _____ .75 |
| Rice flakes, Kellogg's. | _____ 1.78 |
| Rice, puffed, Quaker. | _____ 3.50 |
| <i>Wheat.</i> | |
| Mother's Wheat Hearts. | _____ .50 |
| Vitos. | _____ .51 |
| Wheat flakes, Alber's. | _____ .61 |
| Farina, Quaker (F S). | _____ .69 |
| Pettijohn's Breakfast Food. | _____ .74 |
| Cream of Wheat | _____ .78 |
| Farina, Hecker's Cream. | _____ .88 |
| Crystal Wheat. | _____ .89 |
| Wheatena. | _____ .89 |
| Ralston Wheat Food. | _____ .94 |
| Wheat, cracked, Quaker. | _____ .97 |
| Shredded Wheat. | _____ .98 |
| Grape-Nuts. | _____ 1.01 |
| Kellogg's Krumbles. | _____ 1.01 |
| Force. | _____ 1.10 |
| Triscuit. | _____ 1.24 |
| Wheat flakes, Kellogg's. | _____ 1.78 |
| Wheat, puffed, Quaker. | _____ 3.62 |