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BREAD AND BREAD MAKING IN THE HOME

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FARMERS' BULLETIN 807

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the States Relations Service

A. C. TRUE, Director

Washington, D. C.

April, 1917

THIS BULLETIN attempts to describe in simple terms the general principles on which bread making is based and suggests an easy standard method for making yeast-raised wheat bread in the ordinary household. It also indicates how this standard recipe may be modified to make different types of yeast-raised bread, and gives a few other recipes for breads made from other cereals than wheat or raised by other means than yeast.

BREAD AND BREAD MAKING IN THE HOME.¹

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IMPORTANCE OF BREAD IN THE DIET.

The name "bread" is given to a very large number of foods, which differ considerably not only in appearance and taste but also in food value. In the United States wheat bread raised by means of yeast is most common, and whenever in this bulletin the word "bread" is used alone it may be taken to mean this kind. Other kinds are referred to by such terms as rice bread, rye bread, and self-rising bread.

Bread may be made out of wheat flour, water, yeast, and salt. Even when it contains no other ingredients than these, it has not always the same food value, pound for pound, for flours themselves differ in composition, and, moreover, some flours take up more water than others, the result being moister bread. Sometimes a little sugar or fat is added to the ingredients, and milk is often substituted for part of the water. These substances contribute somewhat to the nutritive value of the bread, but they are used in such small amounts that they are much less important than the flour. The food value of a pound of bread is, therefore, not far different from that of the flour used in making it.

The wheat flour used in making a pound of bread (about two-thirds of a pound, or 11 ounces) contains, in round numbers, half a pound of starch, which serves as fuel for the body; 1½ ounces of protein, which, in addition to serving as fuel, helps to build and repair the body machinery; and 1 ounce of water. The small portion that

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

NOTE.—This bulletin is of special interest to housekeepers.

remains contains fat and sugar, which, like starch, serve chiefly as fuel; cellulose, in the case of whole-wheat bread, which gives needed bulk to the diet and tends to prevent constipation; mineral substances, which help to make bones and teeth and have a large number of other uses; and certain newly discovered substances which are present in very small amounts in many foods and are believed to have an important part to play in keeping people well.

The many substances present in bread, or, rather, in the flour out of which it is made, and the very many uses to which they may be put in the body suggest, at first thought, that wheat alone must be a complete food for supplying every need of the human body. This is not true, since the nutritive materials are not supplied in the right proportion. Nor are they in any of the other cereals—rye, corn, oats, rice, barley—which are often used in bread making. All cereals contain so much starch that if they are used in quantities sufficient to keep the body in repair and in good running order they overload it with fuel. Or, to put it in another way, if used only in quantities sufficient to supply the fuel needed, they do not provide enough body-building and body-regulating material. They come so near to being complete foods, however, that in almost every household they are the largest single item in the diet, and in many households they might, in case of need, be used even more largely than they are. This would be an advantage from the standpoint of economy, considering the nourishment that they supply in comparison with their cost.

In most households the products of cereal grains are served partly as breakfast foods, side dishes with meat, and desserts, but chiefly in the form of bread. The quality of the bread served is, therefore, a very important matter, and the different substances used in its preparation must be considered not only as foods but also with reference to the parts they play in the process of bread making.

QUALITIES OF GOOD BREAD.

Good bread is often described as porous or as containing a large number of holes or cells, all of which are of about the same size and shape. It is better for some reasons to think of it as a mass of tiny bubbles made out of flour and water and hardened or fixed in shape by means of heat. This calls attention not only to the size of holes or cells, but also to the character of walls of the cells which in good bread are always very thin.

A loaf of bread should be light in weight, considering its size, and should have a symmetrical form and an unbroken, golden-brown crust. The crust should be smooth on top and should have a certain luster, to which the term "bloom" has been given.

The loaf as a whole, the crust and the crumb, should be elastic. The loaf, if pressed out of shape, as it often is when slices are cut from it, should regain its form when the pressure is removed. Bits of the crust, if bent a little between the fingers, should show the same power to rebound, as should also the cut surface of the loaf if pressed.

The crumb should be creamy white in color and should have a "sheen," which may be compared with the bloom of the crust. This sheen can best be seen by looking across a slice rather than directly down into it. The distribution of the holes, on the other hand, and the thickness of the walls can best be examined by cutting a very thin slice and holding it up to the light.

The flavor of the bread should be, as nearly as possible, the flavor of wheat developed or brought out by the use of salt. This flavor is not easy to describe but is familiar to those who have tasted the wheat kernel.

PRINCIPAL REQUIREMENTS IN BREAD MAKING.

Many points should be kept in mind in making bread. These include (1) choice of materials, (2) choice of utensils, (3) cleanliness, (4) proportions of ingredients, (5) measuring, mixing, and molding, (6) care of dough while it is rising, (7) care of bread while it is baking, and (8) care of loaves after they are taken from the oven.

MATERIALS.

Necessary materials: Flour, water, salt, yeast.

Materials occasionally used: Milk, sugar, fat.

FLOUR.

The fact that wheat dough can be made light or changed into a mass of thin-walled bubbles is due to the presence in wheat of a proteid substance known as gluten. Flour, when mixed with water, forms an elastic mass; this is due to the gluten, the particles of which tend to cling together when the dough is pulled or when it is stretched by the formation of bubbles of gas within it. Glutens, however, are not all alike. Some are far more elastic than others and can be more easily stretched. Some, too, are stronger than others, and for that reason break less easily when stretched. Good bread flour, therefore, has not only the right amount but also the right kind of gluten. This depends partly on the kind of wheat from which the flour is made and partly on the way it is milled.

Durum wheat, which is particularly suited for growth in dry climates and is much used in the preparation of macaroni, has a large percentage of gluten. It is not, however, generally used for bread making, because the quality of the gluten is different from

that of ordinary bread flour. In general, spring wheats, which are raised principally in climates where it is too cold for the wheat seeds to lie in the ground over winter, have more gluten than winter wheat, which is grown in milder climates. Both vary greatly, however, not only in the amount but also in the kind of gluten they contain. A "hard" winter-wheat flour may be as good for bread making as a spring-wheat flour.

The various parts of the wheat kernel differ more than the different kinds of wheat do. The outer coatings, often called "bran," are very rich in cellulose and in mineral substances, and are an important source of certain growth-regulating substances. The kernel, or the real seed, is divided into two parts—the germ, which is very small, and the endosperm, which forms about four-fifths of the entire weight of the seed and its coverings taken together. This endosperm contains all of the different kinds of nutrients present elsewhere in the berry—protein, mineral substances, and others—but, taken as a whole, it has a larger percentage of starch than any other part. The outer portion of the endosperm is, however, particularly rich in protein. It also contains coloring matter, and when included in flour gives to it a creamy white color.

In the old process of milling wheat all the parts of the berry were ground up together and the composition of the flour thus obtained was the same as that of the wheat from which it was made. If such flour was sifted in order to make a fine product, however, much of the bran was removed and with it much of the other nutritive material. Graham flour, made according to the original method recommended by Dr. Graham, was so finely ground that no sifting was necessary. This might have been truly called "whole-wheat flour." Small amounts of such flour may be prepared in the household by grinding wheat berries in a coffee mill or similar grinder and used in the preparation of breads. (See p. 18.)

In large, modern flour mills wheat is cleaned, tempered (i. e., moistened), and crushed between pairs of steel rollers. These pairs of rollers are adjustable much as the rubber rollers of a clothes wringer are. The wheat passes between a series of rollers, each pair being set closer than the pair before. As it does so the starchy portions which are in the center of the kernel break up first, because they are most brittle. These portions are sifted and the coarser parts returned to the mill. The same pressure that breaks the brittle parts flattens the bran, which has been toughened by tempering or moistening, and the germ, which, because it contains much fat, is oily rather than brittle. These parts can then be sifted out. By repeated grindings and siftings a white flour is finally obtained.

A good bread flour should be very fine, but when rubbed between the fingers should feel slightly granular, and if pressed in the palm

of the hand should fall apart easily, neither remaining tightly packed nor showing the imprint of the fingers.

Some poor qualities in bread (mustiness, for example) generally are due to the way in which flour has been kept; others (thickness of the cell walls and lack of luster, for example) to the fact that the flour was a poor bread flour in the beginning.

Flour should always be kept in a cool, dry place, away from dust, flies, and vermin, and, since it absorbs flavors easily, away from other foods or other supplies which have strong odors. This applies equally to the home and to the store.

Mustiness in bread is believed to be due to a mold, which is likely to get either into the flour or on the bread itself. Ropiness in bread, a condition particularly likely to occur in hot weather, is due to a common bacillus. Molds and bacilli are living organisms which can generally be killed by the heat of cooking. When, therefore, flour or bread has become infected with either, the receptacle in which it has been kept should be scalded and dried or otherwise sterilized before a new supply of flour is put into it.

In buying bread flour it is best to have a reliable dealer recommend one or more brands and to try them carefully until a flour is found out of which good bread can be made by following the directions given here (p. 14) or in a reliable cookbook. If good bread can not be made out of a given flour by one method it often can by another. For instance, some flours are better suited for the short method of bread making, which is here called "the straight-dough process," and others for the "long sponge method." Some doughs are improved by being kneaded twice before they are made into loaves, and some are better if kneaded only once. All reasonable efforts should be made to suit the method to the kind of flour before the flour is condemned.

YEAST.

Yeast as we use it is made up of a very large number of tiny plants, each one of which is far too small to be seen with the naked eye. These plants have the power to grow and multiply in dough, feeding on the materials it contains. In growing they change sugar of the kind that is present in flour, and also ordinary sugar, into a gas and alcohol. It is believed, too, that they increase the amount of sugar in the dough by producing it from the starch. If these yeast plants are well distributed throughout a mass of dough many bubbles with thin walls will be formed. If they are not well distributed there are likely to be no bubbles in some places and large bubbles with thick walls in others.

Yeast plants when deprived of water and food stop multiplying. They may be kept alive, however, under these circumstances, and

when water and food are again supplied to them they soon begin to increase in number and to act upon any sugar with which they come in contact. In a soft dough, or "sponge," they multiply rapidly at favorable temperatures. The purpose of the familiar process of setting a sponge, therefore, is to get a large number of yeast plants from a few.

Like all living bodies, yeast plants can be killed by heat; can be injured, if not killed, by extreme cold; and do their best work at certain temperatures. These temperatures, in the case of that variety of yeast commonly used in bread making, are between 75° and 90° Fahrenheit, the most favorable temperature being about 86°.

In practical bread making the fact must be kept in mind that dough, even if prepared by cleanly methods, always contains not only yeast plants but also bacteria, which are likely to make the bread sour or to spoil its flavor in some other way. Many of these bacteria are particularly active at the higher temperatures favorable for the yeast plant. For this reason as high a temperature as 86° should never be adopted, unless every process connected with bread making from sponge setting to the final rising in the pans can be pushed through without delay. In most households, where interruptions in bread making are almost unavoidable, a somewhat lower temperature (75° to 80°) is better, even when the bread is made by day and the dough can be watched. Even at these temperatures the entire process of bread making can be carried out in five hours, provided enough yeast is used. When the sponge or dough is to stand as long as overnight, a good temperature is 68° to 70°. Even then a temperature of 65° may be safer, provided it can be maintained and there is no danger of its falling below this point. At these lower temperatures yeast works slowly, to be sure, but so, too, do bacteria.

The kinds of yeast most commonly used are compressed, dry, and liquid yeast. The first-named is very convenient, for in this form the yeast plants are active and ready to begin their work. However, it is not easy to keep it long in good condition and so is commonly purchased fresh each time it is needed. When in good condition compressed yeast is soft and yet brittle and is the same color throughout, a creamy white. It should have no odor except that of yeast, which is familiar to most people but difficult to describe. Compressed yeast may now be obtained by parcel post either from manufacturers or from dealers. It is, therefore, no longer out of reach of those who are far from markets.

Dry yeast can be kept for a long time. It is, however, less active than compressed yeast, and for this reason is not convenient when the bread making must be hastened, but only in the long process or "sponge" method described on page 16. Dry yeast is often kept on hand, particularly by housekeepers who are not within easy reach

of the markets, for use when other kinds of yeast are not readily obtainable.

Liquid yeast, like compressed yeast, is in active condition. It is easily made at home, and in a cool place can be kept for about two weeks. Its ingredients are water, yeast, and a substance which will serve as food for the yeast plants. This food is usually potato or hops. The following recipe, adapted from a State agricultural college publication,¹ will be found satisfactory.

LIQUID YEAST.

4 medium-sized potatoes, washed and pared.	1 teaspoon salt.
1 quart hot water.	1 cake dry yeast soaked in $\frac{1}{4}$ cup luke- warm water, or
$\frac{1}{4}$ cup sugar.	1 cake compressed yeast.

Grate or grind the potatoes directly into the water (a food grinder is convenient for the purpose). Boil about five minutes, stirring constantly. Add the sugar and salt and allow the mixture to cool. When lukewarm add the yeast. Keep at ordinary room temperature (about 70°) for 24 hours, when it will be ready for use. This yeast should be kept in a cool, dark place. An earthen jar or enamel-ware pail is a good container for it and should be scalded before the yeast is put into it.

In making bread a small amount of dough may be saved for use in place of yeast at the next baking. The same care, however, must be taken with it as with liquid yeast; it must be kept covered and in a cool place.

MILK.

Whole or skim milk may be substituted for part or all of the water used in making bread. It should be scalded thoroughly before use. When the long or overnight process is followed, it is well not to use milk in the sponge, for it is likely to turn sour.

FAT.

Fat, if used, may be butter, lard, beef fat, cottonseed oil, or any other of the ordinary fats used in cooking. It should, however, be wholesome, of good quality, and in good condition. Bread is so little improved by the addition of fat that it is a mistake to run the slightest risk of injuring its flavor by using fat of questionable quality.

UTENSILS.

The necessary utensils are mixing bowl, measuring spoons, measuring cup (of standard size, holding about half a pint), mixing

¹ Oreg. Agr. Col. Club Circ. 6 (1916).

spoon or knife, and baking pans. (Fig. 1.) Utensils desirable under some circumstances, particularly when several loaves are to be made, are bread mixer for kneading, molding board, bread raiser, and bread rack.

MIXING BOWL AND BREAD MIXER.

One or two loaves of bread can be kneaded in the bowl in which they are mixed, which "saves dishes." If more loaves are to be made, a bread mixer may be used. Care should be taken, however, to use one of the right size for the amount of dough to be made. When a bread mixer is intended for use in making four loaves it is not reasonable to expect it to be convenient for use in making one loaf. Even when several loaves are made at a time, neither bread mixer nor board is absolutely necessary, for the dough can still be conveniently molded in the bowl if it is first divided into two or three portions.

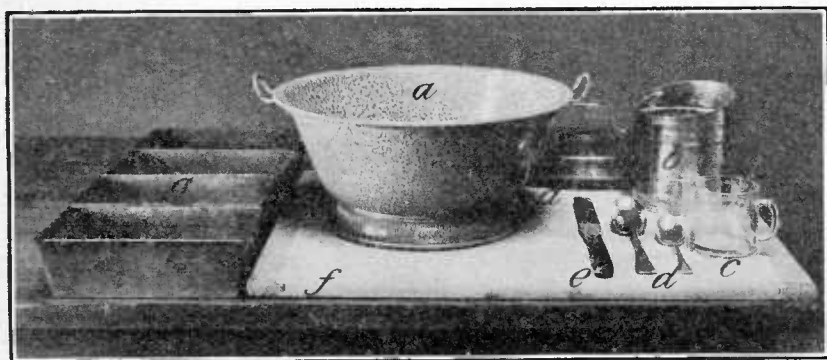


FIG. 1.—Utensils used in bread making: *a*, Bread pan and cover; *b*, flour sieve; *c*, measuring cup; *d*, large and small spoons; *e*, knife or spatula; *f*, bread board; *g*, baking pans.

BREAD RAISERS.

A bread raiser or bread cabinet where an even temperature can be kept is valuable in laboratory work. In the home, if available, it can be used for the dough or for the sponge and also, in cold weather, for bringing the flour to the desired temperature before it is made into dough.

A fireless cooker may be used in place of a cabinet for controlling the temperature of the dough while it is rising, or, in cold weather, dough may be placed in an ordinary unheated oven with some warm water near it in a stone crock or other receptacle in which water cools slowly. A teakettle is convenient for the purpose.

PANS.

Pans holding $1\frac{1}{2}$ quarts are convenient because they are of the right size for a loaf made with 1 cupful of liquid. The loaves made in them have, too, a good proportion of crust and crumb. About 3 inches in height, 8 inches in length, and $3\frac{1}{2}$ inches in breadth are good dimensions. If too low, the pans do not support the sides of the loaf properly and make it necessary to use a stiff dough. Some housekeepers use pans twice as wide as those mentioned, which hold two loaves, but, except for a slight saving of labor, these are less desirable, for the loaves are not of good shape, and each has one crustless side.

The material for the pans is of less importance than the size. It may be tin, sheet iron, aluminum, or heat-resistant glass. It is desirable, however, that all the pans used at one baking be of the same material, for heat passes through some materials more rapidly than through others. Seamless pans are easiest to keep clean.

BREAD RACK.

The bread rack consists of wire netting supported on short legs. On this bread can be cooled quickly. A substitute can be made easily at home by stretching wire netting over a wooden frame.

CLEANLINESS.

Everything connected with the process of bread making should be scrupulously clean. This is true of all forms of cookery, to be sure, but there is a special reason in the case of bread making. Dirt almost always contains bacteria, and these are likely to produce in dough substances which spoil the flavor of the bread. Yeast has no flavor which survives the cooking, and the substances which it produces, carbon dioxide and alcohol, are driven off by the heat of the oven. Bacteria, on the other hand, are likely to produce sour or rancid substances which are not removed by baking. All utensils, therefore, should be clean; the liquids should be scalded; the dry materials should be kept from the dust; liquid yeast should be kept cold and well covered; the hands should be washed and the nails cleaned before they touch the dough. Wooden toothpicks, which can be used for cleaning the nails and then thrown away, are a convenient part of the equipment for bread making.

MEASURING, MIXING, AND MOLDING.

In this bulletin it is recommended that for every loaf of bread there should be an allowance of 1 level teaspoonful of salt; 1 level tablespoonful of sugar, and 1 cupful of liquid, which should include any liquid there may be in the yeast. Butter or other fat, if used,

should never exceed 1 level tablespoonful for a loaf. Yeast should be $\frac{1}{8}$ of a cake of compressed yeast, or 2 tablespoonfuls of liquid yeast, if the overnight sponge method of making bread is followed, and $\frac{1}{4}$ cake of compressed yeast or $\frac{1}{4}$ cupful of liquid yeast if the short "straight-dough" method is followed. If it is desirable to hasten the process, somewhat more yeast may be used. The amount of flour differs with every brand, but is always very close to 3 cupfuls or $\frac{3}{4}$ of a pound for each cupful of liquid. The required amount is sometimes more than 3 cups and in exceptional cases runs below 3 cups.

The water used should be as pure as for drinking purposes; if milk is used it should be scalded. The liquid is usually poured hot over the sugar, salt, and fat in the mixing bowl, though some housekeepers put in the salt and the fat later, because they tend to retard the action of the yeast. If the sponge method of bread making is followed, the yeast and about half of the flour ($1\frac{1}{2}$ cups for each cup of liquid) are added to the liquid as soon as it has become lukewarm. This sponge usually is made at night, kept at a temperature of 65° to 70° till morning, and then made into a stiff dough.

In the "straight-dough" or short-day process, all, instead of half, of the flour is added in the beginning. From this point, when a stiff dough is made, this process and the "sponge" process are carried through in exactly the same way.

In making stiff dough out of the sponge or out of the liquid containing yeast, the flour should be added gradually, and what is more important, the dough should be beaten thoroughly, or, when it gets too stiff for this, kneaded, after each addition of flour. If this is not done, too much flour is likely to be added and this spoils the texture of the bread. The time to stop putting in flour is when the dough can be kneaded without sticking either to the hands or to the board, even when they are unfloured. If for any reason more flour than this is added, the dough should be softened again by means of water or milk.

Dough is allowed to rise once, and sometimes twice, before it is made into loaves. If it is to be allowed to rise twice, the first kneading should be only sufficient to mix the ingredients, and the second should be continued 10 or 15 minutes. If the dough is allowed to rise only once, it should be kneaded for 10 or 15 minutes when it is first mixed. A second kneading is believed to improve the flavor and texture of the bread.

In making the dough, the first portions of flour may be mixed with the liquid by means of a flat knife or spoon. The knife has an advantage over the spoon because it is flexible and can be used for scraping the dough from the sides of the bowl. Kneading is simply

another form of mixing, its purpose being to move one part of the dough over another and thus to bring new parts of flour and liquid into contact. It is better done with the balls of the hands than with the fingers, which often pierce the dough without accomplishing much in the way of mixing.

TEMPERATURE AND CARE OF THE RISING DOUGH.

Dough rises most rapidly at a temperature of about 86° F., and if it can be watched carefully, so that there is no loss of time at any point, this is the best temperature. Under most other circumstances a somewhat lower temperature, about 80° F., is better. It is easy to keep the right temperature if the dough is put into a bread raiser or a fireless cooker and a thermometer is used. Experienced housekeepers, to be sure, recognize quite well the right temperature for raising and baking bread by the sense of feeling, but uniform results are most easily obtained by the use of a thermometer. Inexperienced bread makers will do well to ask themselves whether they know the feeling of water or air at 80° or 86° F., and if they do not, to use a thermometer for a time at least. By doing this they can learn very quickly what experience alone would take a long time to teach.

Dough should be kept covered while it is rising, for otherwise a crust will form on top of it and interfere with the expansion. Some housekeepers brush the dough over with melted fat, but this is not necessary if the dough is well covered.

Beginners often have difficulty in telling whether the dough is ready to be divided into loaves and put into pans. A good rule is to measure its volume. When it is ready to be made into loaves, the dough for each loaf, if made out of hard-wheat flour, should amount to 3 pints; if made from soft flour, to about 2½ pints.

The levels to which these masses of dough will reach in the mixing bowl can easily be determined beforehand and marked. For illustration: If one loaf of bread is to be made, before mixing it pour 3 pints of water into the mixing bowl and mark the point to which the water comes. This will indicate the height to which the dough should rise.

When recipes direct that dough be allowed to double or treble in volume it is convenient to have a measuring glass to determine the expansion. An ordinary tumbler will do, but a glass of smaller diameter, like a small jelly glass, is better. Before the dough is set to rise tear off a small piece and pack it in the glass. Note the height to which it comes and mark the place it will reach when its volume has doubled or trebled, as the case may be. Put this beside the large loaves of bread and use it as an indicator.

SHAPING THE LOAVES.

When the dough has risen sufficiently, cut or tear it into the required number of loaves. Take each piece of dough in the hands and work it lightly in such a way as to stretch the underside, which is to become the top of the loaf. In forming the loaf, make no effort to fit it to the shape of the pan, for in rising it will fill out the corners. Strive merely to form it into an oblong piece with a smooth surface.

BAKING.

Loaves made with 1 cupful of liquid each should be baked 50 minutes. They should begin to brown in about 15 minutes. After that time the temperature of the oven should be lowered so that the loaves will bake slowly. The temperature should be 400° or 425° F. to begin with, should be increased to 425° F., and then dropped gradually to about 380° F. The surest way to get these temperatures is by means of an oven thermometer or an oven gauge. In the absence of these the following test may be made: Put into the oven a small piece of white paper, a white cracker, or half a level teaspoonful of flour spread in a layer $\frac{1}{4}$ or $\frac{1}{8}$ inch thick on a tin plate. If it becomes a light golden brown in 5 minutes, the oven is about right in temperature to begin the baking.

If possible, pans should be so placed in the oven that the air will circulate around them. If they touch each other or the sides of the oven, the loaves will rise unevenly and be of unsightly shape. If the oven is crowded, it may be necessary to change the position of the pans occasionally to insure well-shaped loaves.

CARE OF BREAD AFTER BAKING.

The best way to care for bread after it is taken from the oven is to place the loaves, uncovered, on a bread rack or similar utensil, preferably where the wind will blow on them. Or the loaves may be placed across the edges of the empty bread pans in such a way that almost their entire surface is exposed. This method of caring for fresh bread, however, can be followed only in a place which is free from dust and flies; otherwise the bread must be covered.

The practice, common in the past, of wrapping warm bread in cloths to soften the crust, is losing favor because it is likely to spoil the flavor of the bread.

RECIPES FOR MAKING BREAD.

Directions for making wheat bread by several slightly different processes are given below. Under the first recipes, that for the short or straight process, the exact amounts for one, two, three, and four loaves are given, and these, with very slight changes, are the right

Boil the water or scald the milk. Put the sugar and salt (and fat, if used) into a mixing bowl. Pour the hot liquid over it and allow it to become lukewarm. Mix the yeast with a little of the lukewarm liquid and add it to the rest of the liquid. If convenient, set this aside in a warm place, not over 86° F., for one hour; if not convenient to set it aside, add the flour at once, putting in a little at a time and kneading until the dough is of such consistency that it sticks neither to the bowl nor to the hands. This requires about 10 minutes. Cover, and allow to rise 1½ hours at a temperature of 86°; it may be better to set it at a lower temperature (see p. 13), but the lower the temperature the longer the time required for the rising. Cut down the dough from the sides of the bowl; grease the hands slightly. Knead a little and set aside to rise again for one hour. With a good bread flour, the dough would treble its bulk in each rising. With a soft wheat flour, it should not rise much beyond twice its volume. Divide into portions, mold, and place in greased pans of standard size (1½ quarts). Allow to rise until a light touch will make a slight dent. With good bread flour this happens when the dough reaches the top of the pans. Bake 50 minutes. (See directions for baking, p. 14.)

SHORT SPONGE METHOD.

Bread can be made during the day by what is known as the "short sponge" method. All the ingredients are the same as for the "short or straight-dough" process, but only half of the flour is added at first. When this mixture, which is called a "sponge," is so light that it will fall at the slightest touch, it is ready for the addition of the rest of the flour.

OVERNIGHT SPONGE METHOD.

Use the same proportions as for the short process, except in the case of the yeast, which should be one-eighth cake of compressed yeast or 2 tablespoonfuls of liquid yeast for each loaf. Use water rather than milk. In the evening mix the yeast with water, salt, and half of the flour, and beat thoroughly. Cover and place at a temperature of 65° to 70° F., or that of an ordinary room. In the morning add the sugar and the rest of the flour and proceed as in the case of the short process.

OVERNIGHT STRAIGHT-DOUGH METHOD.

Use the same ingredients as for the overnight sponge method, but put in all the ingredients at night.

RAISED BISCUIT.

Part of the dough prepared for wheat bread can be baked in the form of biscuits. Enough dough for one loaf, or that made from 1 cup of liquid, will make 24 small biscuits. Cut or pull small pieces from the dough and form them in the same way the loaves are formed. Hold the dough in one hand and shape it with the fingers of the other hand. The stroke should be light and from the outside inward, in order to stretch the bottom of the dough, which is to be the top of the biscuit. The biscuits may be placed either close together or some distance apart in the pan; in either case they should be rubbed over with melted butter. Allow them to treble their bulk and then bake them. The oven should be hotter than for baking bread, and they should begin to brown at the end of 5 minutes and should be done in 20 minutes.

PARKER HOUSE ROLLS.

2 cups milk.		1 teaspoon salt.
3 tablespoons butter.		1 cake compressed yeast.
2 tablespoons sugar.		Flour.

Put the butter, sugar, and salt in a mixing bowl. Scald the milk and pour it into the bowl. When it is lukewarm add the yeast, mixing it with a little of the liquid first. Add 3 cups of flour, beat thoroughly, cover, and let the dough rise until it doubles its bulk. Cut down the dough and add flour gradually until the mixture can be molded without sticking either to the hand or to the bowl. Let it rise again until about twice its original bulk and roll it on a floured board and cut it with a biscuit cutter. Brush the pieces over with fat, crease each piece through the center with a knife and fold it over. Let it rise again and bake in a hot oven about 15 minutes.

BAKING-POWDER BISCUIT.

2 cups pastry flour.		2 tablespoons butter or other fat.
4 teaspoons baking powder.		About $\frac{3}{4}$ cup milk, water, or a mixture
1 $\frac{1}{2}$ teaspoons salt.		of the two.

Mix and sift the dry ingredients. Work in the fat with a fork or with the fingers. Add the liquid gradually, making a dough that is of the right consistency to roll out easily. Turn out on a floured board and roll to one-half inch in thickness. Cut with a biscuit cutter, place in a buttered pan, and bake in a hot oven about 15 minutes.

An easier way is to add so much liquid that the biscuits can be dropped from a spoon on the baking tin. This saves the use of board and rolling pin.

Baking-powder biscuits and many other kinds of bread that are served hot contain more fat than ordinary wheat bread does and are usually eaten with more butter. These facts should be taken into

consideration in planning meals, particularly those which are to be kept within a given fuel value.

MIXED WHEAT FLOUR BREADS.

The recipes given above for white bread can be followed in making bread out of part graham and part white flour. The usual proportions are either one part of graham to two parts of white, or half graham and half white. In all cases, however, white flour should be used for making the sponge. In place of the sugar an equal amount of molasses may be used. Such bread will not rise quite as much as bread made of white flour only.

WHOLE-WHEAT OR GRAHAM BREAD.

1½ cups lukewarm milk.		3 cups whole-wheat or graham flour.
3 tablespoons brown sugar.		½ yeast cake.
1½ teaspoons salt.		

Scald the milk, together with the sugar and salt. When lukewarm, add the yeast, mixing it first with a little of the milk. Add the flour, beat well, and let it double its volume. Beat it thoroughly, put into a pan, and let it rise. In a pan of standard size it should come nearly to the top.

The above recipe may be used in preparing bread from home-ground meal (see p. 6). There are many households, particularly in the country, where clean whole wheat can be obtained at moderate cost. If ground in the ordinary coffee mill, such wheat makes a coarse bread, not very light in texture, but of such good flavor that it may well be used occasionally to give variety to the diet. It is useful, too, in places where good bran can not be obtained easily and where coarse breads are desired as a means of preventing constipation.

In making such bread with a view to economy the housekeeper should compute what it will cost her per loaf, including labor and fuel, as compared with other breads she makes. Skim milk instead of whole milk can be used; homemade yeast, either liquid or dry cakes, is a possibility; and some might like the bread with less sugar or unsweetened. Another recipe which has been worked out follows:

HOME-GROUND WHEAT BREAD.

1½ cups water or skim milk.		3 cups home-ground wheat flour (for
1½ teaspoons salt.		preparation see p. 6.)
1 tablespoon sugar.		½ cake dry yeast or 1 gill of liquid yeast.

Set a sponge at night, using half of the flour. In the morning add the rest of the flour, beat well, put into a greased pan, allow to rise until it doubles its bulk, and bake. (For particulars as to setting the sponge, etc., see directions for making wheat bread, p. 12.)

SELF-RISING BREAD.

This bread, which is commonly called by the misleading name of "salt-rising bread," has been known in one form or another for generations. It has been a particular favorite when and where it was difficult to get satisfactory yeast.

1 cup milk.

2 tablespoons white corn meal.

1 teaspoon salt.

1 tablespoon sugar.

Butter (if used), 1 tablespoon.

Flour.

Scald the milk. Allow it to cool until it is lukewarm; then add the salt, sugar, and corn meal. Place in a fruit can or a heavy crock or pitcher and surround by water at about 120° F. Water at this temperature is the hottest in which the hand can be held without inconvenience, and can be secured by mixing nearly equal parts of boiling water and tap water (unless the tap water is unusually warm). Allow the mixture to stand for 6 or 7 hours, or until it shows signs of fermentation. If it has fermented sufficiently, the gas can be heard as it escapes. This leaven contains enough liquid for one loaf. If more loaves are needed, add 1 cupful of water, 1 teaspoonful of salt, 1 tablespoonful of sugar, and 1 tablespoonful of butter for each additional loaf. Make a soft sponge by adding a cupful of flour for each loaf to be made. Beat thoroughly and put the sponge again at the temperature of about 120° F. When it is very light, add more flour gradually until the dough is so stiff that it can be kneaded without sticking to the hands or to the board. Knead 10 or 15 minutes, put at once into the pans, allow to rise until about two and one-half times its original bulk, and bake. Self-rising bread is never so light as the bread raised with yeast. A loaf made with one cupful of liquid therefore will come not quite up to the top of a pan of standard size.

POTATO BREAD.

The following recipes for potato bread have been so made as to use a large amount of potato as compared with flour. Excellent bread can be made with less potato. In making recipes it should be remembered that a pound of mashed potato contains about 1½ cupfuls of water and starch and other substances about equivalent for the purpose to those in 1 cupful of wheat flour.

STRAIGHT-DOUGH METHOD.

FOUR 1-POUND LOAVES.

3 pounds boiled and peeled potatoes
(equivalent to about 3½ pounds
water and 3 cups flour).

2½ pounds bread flour.

1½ level tablespoons salt.

3 level tablespoons sugar.

2 cakes compressed yeast.

4 tablespoons water.

Clean thoroughly and boil, without paring, 12 potatoes of medium size, allowing them to become very soft. Pour off the water, peel and mash the potatoes while hot, being careful to leave no lumps. Take 3 pounds, or 5 solidly packed half-pint cupfuls of mashed potato, and when at the temperature of lukewarm water add to it the yeast, rubbed smooth with 3 tablespoonfuls of lukewarm water. Rinse the cup in which the yeast was mixed with another tablespoonful of water and add to the potato. Next add the salt, the sugar, and about 4 ounces of the flour, or 1 scant half pint of sifted flour. Mix thoroughly with the hand, but do not add any more water at this stage. Let this mixture rise until it has become very light, which should take about two hours if the sponge is at a temperature of about 86° F. To this well-risen sponge, which will now be found to be very soft, add the remainder of the flour, kneading thoroughly until a smooth and elastic dough has been formed. The dough must be very stiff, since the boiled potato contains a large amount of water, which causes the dough to soften as it ferments. Therefore add no more water to the dough unless it is absolutely necessary. Set back to rise until it has trebled in volume, which will require another hour or two. Divide the dough into four parts, mold them separately, and place in greased pans which have been warmed slightly. Allow the loaves to rise until they have doubled in volume and bake 45 minutes at a temperature of 400° to 425° F.

SPONGE METHOD.

FOUR 1-POUND LOAVES.

3 pounds boiled and peeled potatoes (equivalent to about 3¾ pounds water and 3 cups flour).	1½ level tablespoons salt.
	3 level tablespoons sugar.
	1 cake compressed yeast.
2½ pounds bread flour.	4 tablespoons water.

Clean, boil, peel, and mash the potatoes as directed for the straight-dough method. In the evening take 1½ pounds, or 2½ solidly packed half-pint cupfuls, of the cool mashed potato, add to it the salt, 4 ounces of flour (or 1 scant half-pint cupful), and the yeast, rubbed smooth with water, reserving 1 spoonful to rinse the cup. In the morning add the remainder of the potato, the sugar, and the rest of the flour. Knead thoroughly until a smooth and very stiff dough is formed. Set away at 80° to 86° F. for about two hours, or until the dough has trebled in volume. Make into 4 loaves and proceed as in the straight-dough method.

POTATO ROLLS.

Very palatable rolls can be made from a similar mixture of boiled potatoes and flour by adding fat and sugar. The following proportions will yield about 1 dozen small rolls:

8 ounces boiled and peeled potatoes.	2 tablespoons lukewarm water, milk, or cream.
6 ounces or $1\frac{1}{2}$ cups sifted flour.	2 tablespoons sugar.
$\frac{1}{2}$ cake compressed yeast.	2 tablespoons butter.
$\frac{1}{4}$ level teaspoon salt.	

Boil, peel, and mash the potatoes as directed for bread making. Add to this the salt, the yeast rubbed smooth and mixed with the water, or other liquid, and lastly 2 tablespoons flour. Set this mixture to rise at about 86° F. and allow it to rise till a touch will cause it to fall. Add to this sponge the butter, the sugar, and the remainder of the flour, and, if necessary, enough more flour to make a very stiff dough. Knead thoroughly until a smooth dough has been formed which is no longer sticky. Set back to rise again, and when the dough has trebled in volume knead lightly, form into small balls, and place, not too close together, in greased pans. Let rise until double in volume and bake 20 minutes in a moderately hot oven (about 400° F.).

CORN-MEAL-AND-WHEAT BREAD.

$1\frac{1}{2}$ cups milk, water, or a mixture of the two.	$\frac{1}{4}$ cup liquid yeast.
$\frac{1}{2}$ cake compressed yeast,	$1\frac{1}{2}$ teaspoons salt.
or	1 tablespoon sugar.
$1\frac{1}{4}$ cups milk, water, or a mixture of the two.	Butter (if used), 1 tablespoon.
	1 cup corn meal.
	2 cups wheat flour.

Pour $1\frac{1}{4}$ cupfuls of the water over the corn meal, salt, sugar, and fat (if used), and heat the mixture gradually to the boiling point or nearly to it and cook 20 minutes. This cooking can be done best in a double boiler. The water is sufficient only to soften the meal a little. Allow the meal to cool to about the temperature of the room and add the flour and yeast, mixed with the rest of the water, or the $\frac{1}{4}$ cupful of liquid yeast. Mold thoroughly, let rise until it doubles its bulk, make into a loaf, place in a pan of standard size, allow to rise until it nearly fills the pan, and bake 45 or 50 minutes.

RICE BREAD.

1 cup lukewarm water, milk, or a mix- ture of the two.	1 tablespoon sugar.
1 cup uncooked rice.	Butter (if used), 1 tablespoon or less.
$1\frac{1}{4}$ teaspoons salt.	$\frac{1}{2}$ cake compressed yeast.
	2 cups wheat flour.

Steam the rice with one-half of the liquid until it is soft. This is done better in a steamer than in a double boiler, for the liquid is so small in amount that the rice does not become soft readily and the presence of the steam helps. Put the sugar, salt, and fat (if used) into the mixing bowl and pour over them the remaining liquid ($\frac{1}{2}$ cupful). When the mixture has become lukewarm add the yeast and $\frac{1}{2}$ cupful of flour. Allow this sponge to rise until very light. Add the boiled rice, which should have been cooled until lukewarm, and the rest of the flour. This dough is so thick that some pressure is required to work in the last portions of the flour. Allow the dough to rise until it has doubled its bulk, form into a loaf, place in a pan of standard size, allow it to rise until it nearly reaches the top of the pan, and bake.

RYE BREAD.

1 quart milk.
2 tablespoons sugar.
4 teaspoons salt.
2 tablespoons butter.

1 cake compressed yeast.
3 cups flour (1 cup being wheat and the remainder rye).

Follow the directions for making wheat bread according to the short process until after the bread has been molded the second time. At this point the dough should be placed in a 6-quart bowl lined with a cloth into which flour has been rubbed. When the dough has risen to the top of the bowl turn out on a hot sheet iron (a dripping pan inverted will do), over which 1 tablespoonful of flour has been sprinkled, and put it immediately into a very hot oven. After 10 minutes lower the temperature somewhat and bake for 1 hour. This recipe, which is used by permission of Mrs. Edith M. Thomas,¹ is a modification of an old German household method of making rye bread.

NUT BREAD.

1 egg.
1 cup milk.
 $\frac{1}{2}$ cup sugar.
3 cups flour.
3 teaspoons baking powder.

1 teaspoon salt.
1 cup English walnut or pecan or hickory nut meats, cut into small pieces.

Sift together the flour, baking powder, salt, and sugar, and add the milk, the egg well beaten, and the nut meats. Place in a well-buttered pan and let rise one hour. Bake three-quarters of an hour in a moderate oven.

ROLLED-OATS BREAD.

2 cups boiling water.
 $\frac{1}{2}$ cup brown sugar.
2 teaspoons salt.
1 yeast cake.

$\frac{1}{4}$ cup lukewarm water.
1 $\frac{1}{2}$ cups rolled oats.
5 cups flour.

¹Mary at the Farm and Book of Recipes. By Edith M. Thomas. Norristown, Pa.: 1915, p. 171.

Dissolve the yeast cake in the lukewarm water. Pour the boiling water over the rolled oats, salt, and sugar, and let stand until lukewarm; add the dissolved yeast and flour. Let rise until very light, beat thoroughly, and turn into two buttered bread pans. When the loaves have doubled their volume bake them an hour in a moderate oven.

HOW TO JUDGE BREAD.

Expert bread makers and judges agree very closely upon the qualities of good bread, and the bread which they grade high suits the taste of the great majority of people. Even those who do not like it at first come in time to prefer it to the kinds of bread that are graded lower.

It is well for inexperienced housekeepers who wish to be good bread makers to have their bread judged once or twice by experts, because some qualities, which are difficult to describe in words can be demonstrated easily to the eye. Opportunities for this often are given at fairs, exhibitions, schools, etc. It is even more helpful, however, for beginners to learn how to judge their own bread skillfully, for by this means they are able to trace good or bad qualities to their causes quickly and thus to judge not only the bread itself but also the methods that have been followed in making it. (Fig. 2.)

There are many good score cards for bread judging. They differ somewhat in detail, to be sure, but a loaf of bread judged by one of them usually will receive about the same mark that it would if judged by any of the others. The score card used in the Bureau of Chemistry, United States Department of Agriculture, for ordinary yeast raised white bread, is as follows:



FIG. 2.—Good bread is a very important part of the diet. Housekeepers should learn to judge and score their bread. See score card on page 24.

Judging the quality of bread—A bread score card.

		Points.
1. General appearance.....	{ Shape	5
	{ Smoothness of crust.....	5
	{ Depth and evenness of color....	5
2. Lightness		10
3. Crust..	{ Thickness	5
	{ Quality (crispness and elasticity)	5
4. Crumb	{ Color	10
	{ Texture (size and uniformity of cells, thinness of cell walls) ..	15
	{ Elasticity (softness and springiness)	15
5. Flavor (taste and odor)		25
Total		100

NUTRITIVE VALUE OF BREAD AND ITS PLACE IN THE DIET.

Setting aside convenience, cost, and other such matters, it makes no difference whether the nutritive material of cereals is contributed to the diet in the form of bread or breakfast cereals, side dishes with meat, or desserts. In any case they may be used to the extent of nearly a pound a day in the diet of a man at moderate muscular work and to the extent of about 3 pounds a day in the diet of the typical family—father, mother, and three children between babyhood and adolescence. This would be equal to more than a pound of bread in the case of the man and $4\frac{1}{2}$ pounds in the case of the family. Even if used to this extent cereals would not necessarily crowd out other foods—meats, eggs, milk, fruits, vegetables, butter, sugar, etc., needed to complete the ration or to make it taste good.

The amount of protein in breads and other cereal foods is too low as compared with fuel to make them perfectly balanced foods. The protein may be increased somewhat by the use of milk instead of water. The milk used in making a loaf of bread, even if it is skimmed milk, adds as much protein as there is contained in one egg, about one-third of an ounce of sugar, and a considerable amount of mineral matter. There is no object, however, in using milk for this purpose if it costs more than the same amount of food in some other form, or if the milk itself can be more attractively served in some other way.

Those substances which serve only as fuel are represented in wheat chiefly by the starch, though there is a little fat and often a little sugar. Experience has shown a very general preference for eating bread with butter or other fat material. This increases its fuel value and serves to lessen the proportion of body-building material. In the same way the use of fat in the preparation of breads or biscuits tends to decrease the amount of body-building material in proportion to fuel. A given weight, therefore, of bread and butter, or of bread containing a considerable amount of fat requires more protein-rich

food (flesh foods, eggs, milk, cheese, or the like) to "balance it" than the same weight of plain bread does. These facts should be kept in mind in planning meals.

So far as mineral matter is concerned, bread is particularly rich in phosphorus. It should be supplemented, however, by something which contains more lime and iron, especially in the case of children. Milk provides the lime, and fresh fruits and vegetables the iron. If the latter are served in reasonable abundance, the kind of bread used is not a matter of great importance. If, on the other hand, fresh fruits and vegetables can not be obtained, it is considered desirable to use whole-grain flour in order to bring up the amount of mineral matters and of cellulose and to be sure of a sufficient supply of certain important growth-regulating substances.

The use of flours which contain more or less of the bran is often recommended on the ground that they are better sources of protein, mineral substances, cellulose, and growth stimulating or regulatory substances. It is true that they have more of these substances as compared with starch than white flours have. Side by side with this fact, however, should be considered the fact that they are not quite so thoroughly assimilated as white flours, or, in other words, a larger amount of them escape digestion. This offsets any advantage which they have over white flours as sources of protein, but not, according to recent theories of nutrition, as sources of mineral substances and growth-regulating substances. When, therefore, these flours can be obtained at the same or nearly the same price as white flours they merit consideration as sources of mineral and growth-regulating substances in comparison with milk, fruits, vegetables, and others. Even if one thus replaces some milk, fruit, and vegetables, it is not wise to omit them entirely.

To sum up, bread is the largest single item in the diet of the great majority of people. It should not, however, be the only item and, if it is to be rounded out into a satisfying ration, it must be accompanied by reasonable quantities of fruits and vegetables and of foods richer than it is itself in protein, in fat, and in sugar. In the case of little children, the protein-rich food should be milk. It is probable that if bread were uniformly well made it would be used in even larger quantities than at present, and this from the standpoint of economy would be a great advantage.

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