VII. Vegetables and fruits as salads.
   Emphasize —
   A. Importance in the diet.
   B. Principles of preparation.
   C. Classification of salad dressings.
   D. Food value and cost.

SECTION V
PREPARATION AND USE OF CEREAL PRODUCTS

I. Cereal flours.
   A. Comparison of thickening power.
      Make a sauce with each of the flour substitutes, using 1/2 tablespoon with 1/2 cupful water and boiling for 1 minute. Compare as to consistency, texture, color, and flavor. Tabulate results and determine which is best fitted for conservation purposes under present local conditions.
   B. Apply these results in making some of the following types of sauces, which should be served in suitable combinations. List the ways in which each may be used.

Types of sauces:
1. Named according to the liquid used.
   a. White sauce — using milk (inaccurately called cream sauce).
   b. Cream sauce — using cream.
   c. Tomato sauce — using tomato juice.
I. Cereal flours (continued).

2. Named according to the treatment of the ingredients.
   Examples — drawn butter, brown sauce.

3. Named according to flavoring materials used.
   Examples — egg sauce, mushroom sauce.

C. Practical application.

1. Make white sauces thickened with the most suitable flour substitutes and use in the preparation of creamed vegetables, meat, or fish; macaroni, rice, or similar dishes.

2. Prepare puddings including some of each of the types below. The principles of proportion, and the methods of combining and cooking are the same as for sauces.
   a. Molded.
      (1) Thickened with cornstarch or other cereal to make a firm mold when cold; e.g., plain cornstarch pudding, chocolate cornstarch pudding.
      (2) With egg as part of the thickening; e.g., lemon cornstarch pudding, strawberry cornstarch pudding.

   b. Soft.
      (1) Plain — fruit pudding, using either fresh or dried fruits; e.g., "Norwegian prune pudding," "thickened prunes."
      (2) With egg; e.g., "soft lemon pudding," "floating island." 1

1 Recipes for the above or similar dishes can be found in Mrs. Allen's Cook Book, pp. 511-513, the Boston Cooking School Cook Book, pp. 411-412, and other standard cook books.
II. Doughs and batters using cereal flours.

The substitution of other cereal flours for wheat flour in dough and batter mixtures has presented one of the most difficult war-time problems in cooking.

A. Principle of substituting weight for weight.

1. Recipes have been worked out on the principle that a given weight of wheat flour may be replaced by an equal weight of a substitute. This does not mean that other methods of substitution may not be satisfactory. Some flours in equal weights may absorb more water than others.

2. The measures of equal weights of different materials will vary according to the character of the flour or meal. The weight of a standard cup of flours and meals is affected by many factors, such as the fineness of the material, whether it is sifted or unsifted and how the cup has been filled.

3. The table of weights and measures on page 335 has been adopted as a result of repeated weighings in the experimental laboratory of the Food Administration in cooperation with the Office of Home Economics of the Department of Agriculture, using flours available on the local market. The measures used in the succeeding recipes represent the weights in this table. For the benefit of those working with them, plus and minus signs are used to show that the measures are not exact; 8/9 of a cup, for instance, must be
II. Doughs and batters using cereal flours (continued). translated either into 1 cup or 7/8 of a cup, and the sign shows which has been done. There is, however, so much variation in the size of the measuring cup, and also so much difference in the ways of measuring, that there is no greater error in this translation from one fraction to another than is bound to occur in any use of measures.

4. It must be remembered that measures are not accurate and that more uniform results may be secured by weighing. Note especially the difference in the weights of bread and pastry flours. The amount of substitute to be used will depend upon the kind of flour used in the original recipe.

5. Weight of 1 cup of uncooked cereals.

Cornmeal, coarse............. 130 grams = approximately 5 oz.
Hominy grits................. 134 " " 5 oz.
Oats, rolled.................. 75 " " 3 oz.
Oats, fine, granulated....... 136 " " 5 oz.

6. Weight of 1 cup of cooked cereals.

Hominy...................... 258 grams = approximately 9 oz.
Oats, rolled.................. 257 " " 9 oz.
Rice......................... 270 " " 9 1/2 oz.

The weights of cooked material will vary considerably according to the way the material is cooked and packed in the cup. The weight of the rice given is for that cooked in a double boiler with four times its volume of water; no water was unabsorbed at the end of the cooking and the grains were soft but whole. Steamed rice lightly piled in a cup may weigh as little as 148 grams (5 1/3 oz.).
### 7. Equivalent Weights and Measures

1 cup = \( \frac{1}{4} \) quart = 237 c.c.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Wheat flour</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bread</td>
<td>Pastry</td>
</tr>
<tr>
<td>1 cup</td>
<td>40 oz.</td>
<td>3( \frac{1}{2} ) oz.</td>
</tr>
<tr>
<td>1.13 gr.</td>
<td>100 gr.</td>
<td>76 gr.</td>
</tr>
<tr>
<td>Oz.</td>
<td>Cups</td>
<td>Cups</td>
</tr>
<tr>
<td>1</td>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{4} ) (+)</td>
</tr>
<tr>
<td>2</td>
<td>( \frac{1}{2} )</td>
<td>( \frac{1}{2} ) (+)</td>
</tr>
<tr>
<td>3</td>
<td>( \frac{3}{4} )</td>
<td>( \frac{3}{8} ) (-)</td>
</tr>
<tr>
<td>3( \frac{1}{2} )</td>
<td>( \frac{7}{8} )</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1( \frac{1}{8} )</td>
</tr>
<tr>
<td>5</td>
<td>1( \frac{3}{4} )</td>
<td>1( \frac{3}{8} ) (+)</td>
</tr>
<tr>
<td>6</td>
<td>1( \frac{1}{2} )</td>
<td>1( \frac{1}{8} ) (+)</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>2( \frac{1}{4} )</td>
</tr>
<tr>
<td>10</td>
<td>2( \frac{1}{2} )</td>
<td>2( \frac{7}{8} )</td>
</tr>
</tbody>
</table>

(+) indicates generous measure. (-) indicates a scant measure.

### B. Quick breads.

**Purpose:** To show the use of wheat flour substitutes in quick breads.

**1. Muffins.**

a. Proportions. A wide variation may be made in the proportion of materials used
II. Doughs and batters using cereal flours (continued). in muffins. The following are suited to the average taste and may be used as a basis for substitution. If sour milk is used instead of sweet, the amount of flour should be reduced to 1 3/4 cups, with 1/2 teaspoon of soda and 2 teaspoons of baking powder instead of 4 teaspoons of baking powder.

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Flour</th>
<th>Fat</th>
<th>Sugar</th>
<th>Egg</th>
<th>B.P.</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet milk</td>
<td>1 c.</td>
<td>2 c.</td>
<td>1 T.</td>
<td>1 T.</td>
<td>4 t.</td>
<td>1/4 t.</td>
</tr>
</tbody>
</table>

If a softer texture is desired, 1 3/4 cups, or even 1 1/2 cups of flour is all that is necessary.

Substitution should be based in terms of percentage, by weight, of the flour used in the type recipe.

For example, the 2 cups of bread flour in the muffin recipe weighs 226 grams, or about 8 ounces. (1 standard cup measures 1/4 quart or 237 c.c.)

25% substitution requires 56 grams or 2 ounces of the substitute.
50% substitution requires 113 grams or 4 ounces of the substitute.
75% substitution requires 169 grams or 6 ounces of the substitute.

b. Substitutions to save wheat.

(1) Flours and meals.

Show that successful muffins may be made using different proportions of wheat flour and meal substitutes.

Instead of the 2 cups of wheat flour given in the type recipe use the following proportions by measure, all of which are equal to 75% substitution by weight:
II. Doughs and batters using cereal flours (continued).

(a) Barley muffins.....1/2 c. wheat flour, 2 1/4 c. barley flour
(b) Buckwheat muffins...1/2 c. " " 1 3/8 c. buckwheat flour
(c) Corn muffins......1/2 c. " " 1 1/2 c. corn flour
(d) Cornmeal muffins...1/2 c. " " 1 3/8 c. cornmeal (fine)
    Cornmeal muffins...1/2 c. " " 1 1/8 c. cornmeal (coarse)
(e) Rice muffins......1/2 c. " " 1 1/8 c. rice meal (coarse)
(f) Or, by weight, 50 grams (2 ounces) of wheat flour and 226 grams (6 ounces) of any of the substitutes.

For the softer muffins use a total of 7 ounces instead of 8 ounces. These will require greater skill in handling.

(2) Uncooked cereals.

Show that only 25% of cereal in this condition can be substituted to make a satisfactory muffin.

Instead of the 2 cups of wheat flour in the type recipe, use the following proportions:

OATMEAL MUFFINS

1 1/2 cups wheat flour, 3/4 cup rolled oats.

Method—Heat the 1 cup of liquid to boiling, pour over the oats, let stand until cool, then mix muffins as usual.

Other uncooked cereals are not satisfactory.

(3) Cooked cereals. In using cooked cereals as wheat flour substitutes allowance must be made for the water which they have taken up in cooking. This is an uncertain factor, as the amount will differ according to the method of cooking. The following proportions are
II. Doughs and batters using cereal flours (continued). for well-cooked, but not "mushy" cereals.

(a) Instead of the 1 cup of liquid and the 2 cups of flour in the type recipe, use the following proportions:

H hominy grits — 2 tablespoons liquid, 1 1/2 cups wheat flour, and 1 cup of cooked hominy, equal to 1/3 cup uncooked.

O oats, rolled — No liquid, 1 1/2 cups wheat flour and 1 1/3 cups cooked rolled oats, equal to 3/4 cup uncooked.

R rice, 1/3 cup liquid, 1 1/2 cups wheat flour, 3/4 cup of cooked rice, equal to 1/4 cup uncooked.

(b) Notes.

Only 25% by weight of the whole cereals can be used to make a good light muffin. By grinding the rolled oats in a meat chopper, a meal can be made which will allow 75% substitution as in (a).

A combination of two or more of the cereal substitutes is usually more satisfactory than one used alone.

With cooked cereals and potato, the mixture is very stiff, almost like biscuit dough because the moisture is held by the cereal. It must be thoroughly mixed.
II. Doughs and batters using cereal flours (continued).

Rice flour muffins are improved by increasing both the egg and baking powder one half.

The basic recipe makes 8 large muffins (2 3/4" × 2 × 1 1/8") or 16 small (1 3/4 × 1 1/4 × 3/4). The latter are more desirable, because they are more thoroughly baked. Bake about 30 minutes at 205° C. (400 F.) which is a moderately hot oven.

c. Modifications to save other materials.

(1) Reduce the amounts of fat and sugar.
(2) Substitute vegetable fats for animal fats.
(3) Use corn sirup instead of sugar.
(4) Omit eggs.

These modifications may alter the quality of the muffins somewhat, but should not do so markedly.

The size of the class and the laboratory conditions must determine the number of variations which should be made. The work should be carefully planned so that the results of the class work will indicate clearly to the whole class the differences due to the variations. Each member of the class should begin to acquire skill in the handling of doughs and batters.

2. Griddle cakes.
II. Doughs and batters using cereal flours (continued).

Typical proportions for griddle cakes:

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Flour</th>
<th>Fat</th>
<th>Sugar</th>
<th>Egg</th>
<th>Leavening</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet milk</td>
<td>1 1/2 c.</td>
<td>1 tbsp.</td>
<td>1 tbsp.</td>
<td>1</td>
<td>3 tbsp.</td>
<td>1/4 tbsp.</td>
</tr>
<tr>
<td>Sour milk</td>
<td>1 1/4 c.</td>
<td>1 tbsp.</td>
<td>1 tbsp.</td>
<td>(1/2 tbsp. soda)</td>
<td>(1 tsp. B.P.)</td>
<td>1/4 tsp.</td>
</tr>
</tbody>
</table>

a. If a thinner mixture is preferred, 1 1/4 cups of flour with sweet milk and 1 1/8 cups with sour milk can be used.

b. Compare with the proportions for muffins. Why do they differ?

c. Make the same substitutions in the proportions for griddle cakes as were made for muffins and determine the desirability of each.

d. For future use the results in this lesson should be recorded either in tabular or in recipe form, so that they will be easily available for practical use.

3. Corn breads.

a. Those made from corn meal, liquid, and salt with a possible addition of fat and sugar.

b. Those which include eggs.

c. Those which use cooked corn meal.

d. Those which use corn meal alone.

Select recipes representing each of the above groups from U.S. Department of Agriculture, Farmers’ Bulletin 565, *Corn Meal as a Food*. Note the points in which the program of the Food Administration requires changes in ingredients and make the necessary substitutions.
II. Doughs and batters using cereal flours (continued).

C. Cakes.

1. Types of cakes.

a. Sponge cakes.

**GENERAL PROPORTIONS**

Showing typical variations using pastry flour.

(1) 4 eggs, 1 cup sugar, 1 cup flour, 1 tbsp. lemon juice, 1 tsp. salt
(2) 5 eggs, 1 1/4 c. 1 6 3 c. 1 1/2 c. 1 1/2 tsp.
(3) 6 eggs, 1 1/2 c. 1 6 3 3 c. 1 1/2 c. 1

b. "Butter" cakes. (Many other fats may be used instead of butter.)

**GENERAL PROPORTIONS**

Showing typical variations, using pastry flour.

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Fat</th>
<th>Egg</th>
<th>B.P.</th>
<th>Flour</th>
<th>Sugar</th>
<th>Flavor</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain</td>
<td>1 c.</td>
<td>1/4 c.</td>
<td>1</td>
<td>6</td>
<td>3 c.</td>
<td>1 1/2 c.</td>
<td>1 1/2 tsp.</td>
</tr>
<tr>
<td>Rich</td>
<td>3/4 c.</td>
<td>1/2 c.</td>
<td>3</td>
<td>4</td>
<td>3 c.</td>
<td>1 1/2 c.</td>
<td>1</td>
</tr>
<tr>
<td>Very rich</td>
<td>1 1/2 c.</td>
<td>1 6</td>
<td>3</td>
<td>3 c.</td>
<td>1 1/2 c.</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

For methods of mixing see standard cook books.

c. Note the degree in which the above recipes violate the conservation program. If cakes are to be used at all in war-time, only very simple ones should be made, substituting as far as possible —

(1) For wheat flour — other cereal flours, substituting on the basis of the weight of pastry flour.

(2) For animal fat — vegetable fats.

(3) For sugar —

Reduce the amount of sugar. Use one-half sugar and one-half corn sirup.
II. Doughs and batters using cereal flours (*continued*).

(Note — If sirup is used in sufficient quantity to make cake sweet, it also makes it heavy. See quantitative relation between corn sirup and sugar, p. 330.)

When sirup is used, the addition of raisins, citron, and other fruits increases the sweetness. Honey, maple sirup, and molasses are also used in special cases.

2. Proportions for war cakes.

a. Sponge cakes.

(1) As substitutes for wheat flour, rice, corn, potatoes, and barley flours may be used, alone or in combination, in amounts equal to the weight of the wheat flour.

(2) For the 1 cup of flour in sponge cake (*a* above) the following substitutions can be made:

Barley flour...... 1 1/8 cups.
Corn flour....... 7/8 cup.
Oat and rice...... 1/2 cup oat flour.
               1/4 cup rice “
Oat and corn...... 1/2 cup oat flour.
               1/4 cup corn “

All of these are equal to 100% substitution by weight on the basis of pastry flour.

(3) Calculate measures which would be equal to 33 1/3% and 50% substitutes.
II. Doughs and batters using cereal flours (continued).

b. Variation of proportions in plain "butter" cakes.

By reference to weights of flour substitutes given in the muffin lesson, vary the proportions for plain or rich cake, using the cereal flours in amounts ranging from 50% to 100%.

c. Other cakes made with wheat flour substitutes.

(Sirup substituted for half the sugar on the basis of its sugar content (41%). 1 cup sirup (11 1/2 oz.) = 4 3/4 oz. sugar.

**CHOCOLATE CAKE (1)**

50% rice flour  
50% barley flour  
50% sirup on basis of glucose content. See p. 330.

1/2 cup fat  
2/3 cup sugar (about 4 3/4 oz.)  
1 cup sirup (about 11 1/2 oz.)  
3 eggs  
3/4 cup milk  
1 teaspoon salt

1 cup rice flour  
2 cups barley flour  
6 teaspoons baking powder  
1 teaspoon cinnamon  
1 teaspoon vanilla  
2 squares chocolate

Cream the fat, sugar, and egg yolk. Add the sirup and mix well. Add alternately the liquid, and the dry ingredients sifted together. Add flavoring and melted chocolate. Fold in the well-beaten egg white. Bake about 1 hour, starting in a moderate oven (350° F.-177° C.). After 20 minutes raise the temperature to 400° F.-205° C.

**CHOCOLATE CAKE (2)**

75% buckwheat flour  
25% ground rolled oats  
(50% sirup on basis of glucose content.)

1/2 cup fat  
2/3 cup sugar (4 3/4 oz.)  
1 3/4 cups buckwheat flour  
1/2 cup ground rolled oats
FOOD AND THE WAR

Chocolate Cake (2) (continued).

1 cup sirup (11 1/2 oz.) 6 teaspoons baking powder
3 eggs 1 teaspoon cinnamon
3/4 cup milk 2 squares chocolate
1 teaspoon salt 1 teaspoon vanilla

Mix and bake as above.

Spice Cake (1)

100% barley flour
50% sirup on basis of glucose content. See p. 330.

1/2 cup fat 6 teaspoons baking powder
2/3 cup sugar (about 4 3/4 oz.) 1 teaspoon salt
1 cup sirup (11 1/2 oz.) 1 teaspoon cinnamon
3 eggs 1/2 teaspoon cloves
3/4 cup milk 1 teaspoon allspice
1 teaspoon vanilla 3 3/4 cups barley flour
1 cup raisins

Method — Cream the fat, sugar, and egg yolk. Add the sirup and mix well. Add alternately the liquid, and the dry ingredients sifted together. Add the flavoring and fold in the well-beaten egg whites. Bake for 1 hour in a moderate oven (170° C. - 350° F.). After 20 minutes raise the temperature to (205° C. - 400° F.).

Spice Cake (2)

50% rice flour 50% buckwheat
50% sirup on basis of glucose content. See p. 330.

1/2 cup fat 6 teaspoons baking powder
2/3 cup sugar (about 4 3/4 oz.) 1 teaspoon salt
1 cup sirup (11 1/2 oz.) 1 teaspoon cinnamon
3 eggs 1/2 teaspoon cloves
3/4 cup milk (6 oz.) 1 teaspoon allspice
1 teaspoon vanilla 1 cup rice flour
1 teaspoon ginger 1 cup buckwheat

Mix and bake as above.

d. Cakes containing no egg and a minimum of fat.
(1) **Canadian War Cake**

**Recipe**

2 cups brown sugar  
2 cups hot water  
2 tablespoons fat  
1 lb. seedless raisins  
1 teaspoon salt  
1 “ cinnamon  
1 “ cloves  
3 cups flour

**Substitutes**

3/4 cup molasses or 1 cup corn sirup  
2 tablespoons corn oil  
3 cups of barley flour

Boil all except the flour for 5 minutes after bubbling begins. When cold, add 1 scant teaspoon of soda dissolved in 1 teaspoon of warm water. When cool stir in flour. Bake in 2 loaves for 45 minutes in a slow oven. This cake is better if allowed to age for a few days or a week before using.

(2) **Gingerbread**

Prepare gingerbread from the following recipe:

1 cup cornmeal  
1 cup wheat flour  
2 teaspoons cinnamon  
2 teaspoons ginger  
1/2 teaspoon salt

1 teaspoon baking powder  
1 teaspoon baking soda  
1 cup molasses  
1 cup sour milk or buttermilk  
2 tablespoons fat

Sift the dry ingredients and add molasses, milk, and fat. Beat well and pour into a greased pan. Bake 25 minutes. Notice that this recipe uses corn meal or half the wheat flour ordinarily used.

(a) Compare this with other recipes in any standard cook book and note conservation features.

(b) Substitute rye flour for the 1 cup of wheat flour.

(c) Substitute barley flour for the 1 cup of wheat flour.
II. Doughs and batters using cereal flours (*continued*).

(3) Frostings add greatly to the consumption of sugar. As conservation measures, either omit altogether, or before baking sprinkle the cake lightly with a mixture of spice and sugar, or place split almonds or other nuts on top.

(4) Calculate the fuel value of a piece of sponge cake, of plain cake, very rich cake, or plain cake frosted.

Assume that sponge cake in the proportions given may be cut into 16 pieces, and that the butter cakes may be cut into 24 pieces.

D. Biscuits.

1. By class demonstration, show methods of mixing and the proportions of liquid in drop biscuits and in molded biscuits.

**GENERAL PROPORTIONS FOR BISCUITS**

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Flour</th>
<th>Fat</th>
<th>Baking powder</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be determined</td>
<td>1 c.</td>
<td>1 tsp.</td>
<td>2 tsp.</td>
<td>1/4 tsp.</td>
</tr>
</tbody>
</table>

a. Drop biscuits.

Using wheat flour (white) with proportions given above, sift the dry materials, mix in the fat thoroughly, and add enough liquid (note the amount) to make a dough which is too soft to be handled. Drop by spoonfuls on an oiled pan and bake in a hot oven (225° C.).

b. Molded biscuits.

Repeat a, but add enough liquid (note
II. Doughs and batters using cereal flours (continued). The amount) to make a soft dough. Mix barely enough to combine the ingredients. The dough should not look smooth. Cut out one biscuit (1). Knead the rest of the dough slightly—until it looks smooth. Cut out two biscuits (2 and 3). Knead the remainder of the dough very thoroughly. Cut into biscuits (4).

Bake biscuits (1), (2), and (3) immediately in a hot oven (225° C.). Let (3) stand a half-hour, then bake at same temperature as others. Reserve these biscuits, which should show characteristic differences, to compare with those made with wheat flour substitutes.

2. Use of the substitutes.
   a. Use those available in your locality, choosing one of each type.

<table>
<thead>
<tr>
<th>Flours</th>
<th>Meals</th>
<th>Whole cereal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>Corn</td>
<td>Rolled oats</td>
</tr>
<tr>
<td>Rice</td>
<td>Oatmeal</td>
<td>Rice</td>
</tr>
<tr>
<td>Barley</td>
<td>Kafir corn</td>
<td></td>
</tr>
<tr>
<td>Buckwheat</td>
<td>Feterita</td>
<td></td>
</tr>
</tbody>
</table>

   b. Proportions.

   For either drop or molded biscuits as much as 75% to 100% of the flour and meal substitutes may be used.

E. Pastry.

This subject may include a comparison of the qualities of the different kinds of fats, the amounts of each required to produce tender crusts and their economic values.
II. Doughs and batters using cereal flours (continued).

1. Principles and proportions in pastry are similar to those in biscuits except that a larger proportion of fat is used.

**General Proportions**

<table>
<thead>
<tr>
<th></th>
<th>Liquid</th>
<th>Fat</th>
<th>Flour</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain</td>
<td>1/4 c.</td>
<td>1 c.</td>
<td>1/4 tsp</td>
<td></td>
</tr>
<tr>
<td>Rich</td>
<td>1/3 c.</td>
<td>1 c.</td>
<td>1/4 tsp</td>
<td></td>
</tr>
</tbody>
</table>

2. Tenderness of pastry depends —
   a. Upon the amount and kind of fat used.
   b. Upon the amount of water — the smaller the quantity of water used, the more tender will be the crust.
   c. Upon the handling of the dough; too much or too heavy kneading toughens the pastry.

   a. For wheat flour, use from 50% to 100% of rice, corn, oat, or barley flours, or a mixture of two or more.
   b. For lard, butter, or fat compounds, use 1 to 2 tablespoons of vegetable oil in place of 1/4 cup of the solid fats. With the oil, very little water is needed; e.g., from 1 1/2 to 2 tablespoons for 1 cup of flour and 2 tablespoons of oil.

4. Emphasize the use of the one-crust pie.

F. Bread.

1. Purpose.
II. Doughs and batters using cereal flours (continued).
   a. To compare the properties of different grades of wheat flour, if these are on the market, with those of suggested substitutes.
   b. To compare the character of the different kinds of yeast.
   c. To demonstrate the different methods used in bread-making.

2. Gluten test.
   May be done as a class demonstration.
   a. To 2 tablespoons of flour add water to make a stiff dough which can be worked in the hand. Wash this in cold water until the liquid is clear, noting the changes. When the ball no longer gives the iodine test for starch, bake in a hot oven. Repeat, using such grades of flour as are available.
   b. Repeat a, with rye, barley, and other wheat substitutes. Compare the results with a. Why does wheat give the best flour for bread-making?

3. Yeast.
   a. Examine under the microscope samples of dry, compressed, and liquid yeast.

   **Proportions**
   1 cup potato water.
   \( \frac{1}{2} \) cup dry yeast.
   2 tablespoons corn sirup.
   2 tablespoons flour.
   1 cup mashed potatoes.

   Cool the potatoes and 1 cup of the water
II. Doughs and batters using cereal flours (continued),
in which they were cooked until lukewarm. Soften the yeast in part of the liquid and combine all the materials, mixing thoroughly. Keep at an even temperature (about 30° C.) overnight (10 to 14 hours).

Other flour substitutes may be used instead of the potato, but at least water in which potatoes have been cooked should be used, as it contains substances which favor the growth of yeast.

Measure the volume of the liquid yeast after it has fermented. What amount of this yeast should be used if a loaf of bread is to be made on the basis of one-half cup of water, using only that present in the liquid yeast? The yeast starter made in this demonstration should be reserved for use by the class at the next lesson.

4. Processes of bread-making.


(1) Long process — overnight process, requiring 12 to 16 hours.
   (a) Starter, sponge, and dough.
   (b) Sponge and dough.
   (c) Off-hand dough.

(2) Short process — requiring only 4 to 6 hours.
   (a) Sponge and dough.
   (b) Off-hand dough.

b. Proportions (these should make an 18 to 20 ounce loaf).
II. Doughs and batters using cereal flours (continued).

(1) Long process — sponge method.

\[
\begin{align*}
\text{1/4 cup liquid} & \quad \text{or 1/2 cup liquid and liq-} \\
\text{1/4 cake dry yeast} & \quad \text{uid yeast as in B, 2, above,} \\
& \quad \text{to give 1/2 cup water.} \\
\text{1 tablespoon corn sirup.} \\
\text{1 teaspoon salt.} \\
\text{1 tablespoon vegetable oil.} \\
\text{3 to 4 cups flour.}
\end{align*}
\]

Heat the liquid to \(37^\circ\text{C.}\) and add 1 1/2 cups flour, the sirup, and the yeast. Beat thoroughly and set to rise at an even temperature (30° to 32° C.) overnight. In the morning, add 1 tablespoon fat, 1 teaspoon salt, and the remainder of the flour. Knead thoroughly. Place in bread bowl and allow to rise until double in bulk. Cut or knead down, allow to rise again, and mold into loaves. When it has doubled in bulk, bake about 45 minutes (even temperature 195° C. for 10 minutes, then lowered to 185° C.).

(2) Long process with a starter and sponge.

Starter —

\[
\begin{align*}
\text{3/4 cup water or potato water} & \quad \text{to make about} \\
\text{1/2 cup mashed potato} & \quad \text{1 cup liquid.} \\
\text{1/4 cake dry yeast.} \\
\text{1 tablespoon corn sirup.} \\
\text{1 tablespoon flour.}
\end{align*}
\]

When the water is lukewarm (37° C.) mix all the ingredients thoroughly. Keep overnight at an even temperature (30°-32° C.). In the morning, add 1
II. Doughs and batters using cereal flours (continued).

cup flour, beat well and allow to rise for 1 hour. Then add 1 tablespoon fat, 1 teaspoon salt, and knead in enough flour to make a dough that does not stick to the hands (2 cups). Allow to rise, knead down, let rise again, and mold into loaves. Place in pans and when double in bulk bake (at a temperature of 195° C. lowering to 185° C. after 10 minutes) about 45 minutes.

(3) Short process.

Proportions the same as in b, (1), above, but substitute 1/2 cake compressed yeast for 1/4 cake dry yeast.

(a) Sponge method. Soften the yeast in part of the liquid. Make a sponge and follow directions in b, (2), above.

(b) Off-hand method. Soften the yeast in part of the liquid, combine all the ingredients to make a dough, and proceed as usual.

5. Demonstration.

a. Plans for demonstration.

The bread made in this demonstration should be carefully made into model loaves for comparison with the Victory breads to be shown later.

In order to show each step of the process, have ready at the beginning of the demonstration the following items:
II. Doughs and batters using cereal flours (continued).

(1) All material, carefully measured (or weighed) for 1 loaf of bread. (See b, (1), below.) The proportions given below will make a good-sized loaf.

(2) A sponge, light and ready to be made into a stiff dough. Use proportions given in b, (1), above. (P. 351.)

(3) A dough which has risen and is ready to be made into the loaf. Use twice the amounts given in b, (1), above. It is desirable also to have a loaf which has risen and is ready to be baked, and a baked loaf, but for purposes of economy this may be omitted.

b. Procedure.

(1) Make a sponge of 1 cup of liquid at 37° C., 1 tablespoon sirup, 1/2 cake compressed yeast, and 1 1/2 cups flour. Beat thoroughly. Show the consistency and explain that this is to be set to rise at an even, warm temperature.

Use this as an illustration of the sponge process, explaining the differences when the dry and compressed yeasts are used.

Emphasize the fact that it is advisable to make the sponge even for the so-called short process. The quality of the bread is improved and the time is not materially lengthened, if 1/2 hour is allowed for the sponge rising, instead of using the off-hand method.
II. Doughs and batters using cereal flours (continued).

Without allowing the above sponge to rise, add 1 teaspoon salt and enough flour (about 1 1/2 cups) to make a stiff dough. This will serve to illustrate the off-hand method. Let the dough rise, mold, and bake it as in the other processes.

(2) Take the sponge (see a, (2), above) which is well risen, add 1 teaspoon salt and flour (about 1 1/2 cups) to make a dough that can be handled easily. Rub lightly with fat and set aside to rise.

(3) Use the dough (see a, (3), above) which should have risen twice, to illustrate the following processes:

(a) Cutting or kneading down the dough for the second rising.

(b) Kneading and forming the loaf. Use half the dough.

(c) Forming different shapes of rolls.

Brush with fat, allow to rise, and bake. Keep all conditions absolutely uniform, so that the finished loaves may be compared. Save these loaves also to compare with Victory Breads.

G. Victory breads.

1. Purpose.

To show the use of wheat flour substitutes in making yeast breads and rolls.
II. Doughs and batters using cereal flours (continued).

2. Wheat-saving substitutes include:

a. Cereals.

Whole — rolled oats, rice, barley, hominy.
Cracked — rice, granulated oat meal, pearl barley, hominy grits.
Meals — corn, peanut meal, kaffir corn meal, milo meal, barley meal, soy bean meal, shorts, middlings.
Flours — corn, cornstarch, barley, potato, sweet potato, milo, feterita, banana.

b. Vegetables.

Legumes — peas, beans.
Other vegetables — potatoes, sweet potatoes, dasheens, pumpkins, squashes.

c. Miscellaneous.

Alfalfa, bran, bread crumbs.

3. Make as many types of bread as conditions permit, selecting those wheat flour substitutes which are easily obtainable, and substituting a definite percentage by weight of the flour in the type recipe. Include at least one from each of the following groups to show different methods of treatment.

It is not satisfactory to attempt to carry through the bread-making process in one laboratory period.

Because of the importance of the subject, arrangements should be made to have the
II. Doughs and batters using cereal flours (continued). Students come into the laboratory at such intervals during the day as will be necessary to carry on the process normally.

Each student should make bread by both the long and short processes and should have experience in using both dry and compressed yeast.

4. Preparation of substitute.
   a. Cereals.
      (1) Whole — type, rolled oats.
          (a) Scalded with the liquid to be used in making the bread.
          (b) Well cooked. Weigh the water and the cereal to be used in the bread (reserve enough water to soften the yeast). Cook thoroughly. Weigh and add enough water to restore to the original weight. Proceed as usual.

      (2) Meals — type, corn meal.
          (a) Scalded (see above).
          (b) Well cooked (see above).
          (c) Sifted with flour — no special treatment.

      (3) Flours — type, corn, barley, or rice. Sift with the wheat flour.

   b. Vegetables.
      (1) Legumes — type, beans.
II. Doughs and batters using cereal flours (*continued*).

(a) Cook thoroughly and mash, using the hull and pulp.

(b) Put through sieve or potato ricer, discarding the hull.

(2) Other vegetables — type, white potato. Use mashed.

c. Miscellaneous.

(1) Shorts, middlings, etc., sifted with the flour.

(2) Bread crumbs, softened in water before incorporating. If very fine they may be sifted with flour.

5. Victory bread must contain at least 25% of some substitute. On account of the high moisture content of potatoes, 4 pounds of potatoes will be considered the equivalent of 1 pound of other substitutes.

6. Proportions and methods.

Weigh the amount of flour which was required to make a loaf of bread in the previous lesson. Substitute for 25% of this, an equal weight of any of the above materials. Other ingredients are the same as previously given, with such modifications of methods as are required by the treatment of the substitute. If time permits, make other samples, using 33 1/3%.

For conservation purposes, fat is reduced to a minimum or omitted entirely. Enough
II. Doughs and batters using cereal flours (continued). Corn sirup may be used to favor the growth of yeast.  

7. Victory rolls.

Convert the Victory bread recipes and those used in A into proportions suitable for rolls by adding fat and sugar in the proportions allowed to commercial bakers.

1% of vegetable shortening, either vegetable fats or oils or fat compounds containing not more than 15% of animal fats.

3 1/2% of corn sugar or 3% of cane or beet sugar. (Expressed in per cent of total flour or meal or any mixture thereof.)

Shape and bake in typical roll forms: Parker House, finger, cinnamon.

SECTION VI
ADEQUATE DIET

I. Purpose.

To show the application of the principles of adequate feeding in the preparation of meals for the day.

II. Meals should be shown in amounts suitable for a man at moderate muscular work; a woman at moderate muscular work; and a child of 12, based upon the following table for a man at moderate muscular work.

1 For the effect of substitution of different amounts of flours see Sprague, E. C., and Laughlin, E., "Breads from Unusual Flours," American Food Journal, 12, p. 673. 1917.