



# BREAD IN A BAG

**GRADE LEVEL:** 4-5

**SUBJECT:** Science

**NATIONAL STANDARD(S):**

(3-5) SC: 10.1-5, 14.1, 15.2-4

**THEME:** Processing

**FOOD AND FIBER TOPIC:** I-B,E; II-D; III-E; IV-B; V-B,E

## LEARNER OBJECTIVES:

Student will learn how processing adds value to agricultural products by making bread in a bag.

## VOCABULARY

**bran**—The outer layer of a wheat kernel which is included in whole wheat flour for additional fiber

**endosperm**—The white, inner part of a wheat kernel that is ground for white flour.

**germ**—The embryo or sprouting section of a wheat kernel that is high in oil.

**gluten**—A protein in wheat which allows bread dough to rise and stretch.

**gross profit**—Total income before expenses are subtracted.

**mill**—To grind into flour or meal.

**net profit**—The final profit after all expenses have been subtracted.

**value-added products**—A product that has been through some kind of processing which adds value to it.

**yeast**—Tiny plants which produce carbon dioxide to make bread rise and beverages ferment, classified as fungi.

## BACKGROUND

Nearly all agricultural products must be processed in some way before we can use them. Pork is processed into sausage. Wool is processed into sweaters and its lanolin into hand lotions. Timber is processed into furniture and lumber for construction.

Wheat is processed into bread, rolls, muffins, buns, cereals, crackers, spaghetti, macaroni, cakes and cookies. The wheat goes through rollers that scrape off the outer bran layer and break the endosperm. It continues through a series of rollers and sifters until it is fine enough for flour, and the bran and germ have been separated. For whole-wheat flour, the bran and sometimes the germ remain with the ground endosperm.

After it has been ground into flour, it goes through another stage of processing where it is mixed with other ingredients and baked into bread and other baked goods or shaped into pasta. Each step of the processing adds more value to the final product. For that reason, a product that has been processed is called a “value-added” product. Consumers are willing to pay more for wheat when it is sold as bread than they would be if it were sold as wheat kernels.

## STEP-BY-STEP INSTRUCTIONS

1. If possible, acquire a handful of wheat kernels from a local farmer or seed dealer. Hand them out so students can feel them and see what they look like. Share background information.
2. Draw a wheat kernel on the chalkboard, or use the worksheet illustration on an overhead projector. Discuss the endosperm, bran and germ of the kernel. Explain that normally in wheat processing, the bran and germ are removed, and the endosperm is ground into flour.
3. Guide students through the steps of the recipe on the following page to make bread in a bag.
4. While measuring and mixing dough, discuss scientific process with students and have them hypothesize or predict what occurs in the breadmaking process, i.e. Why sugar is necessary, why use warm water, what makes the bread rise, etc.
5. Hand out student worksheets and have students complete them.

## RELATED ACTIVITIES

1. While you wait for the bread to rise and bake, have students make butter to eat with it. Divide your class into groups of four or five, and provide each group with one half-pint carton of whipping cream (at room temperature), one pint jar with a tight-fitting lid, a large spoon and a small bowl. Have students pour the whipping cream into the quart jars, screw the lids on tightly and take turns shaking the jar. When the cream separates noticeably, have students pour the buttermilk off into a large bowl. Have students transfer the butter to a small bowl with the spoon and add one teaspoonful of salt.
2. Bring in examples of some products in their raw forms and in different stages of processing (unshelled peanuts/salted peanuts/peanut butter/peanut butter candy, fresh tomatoes/canned tomatoes/tomato sauce/ketchup, corn on the cob/canned corn/ corn chips) and have students discuss the advantages and disadvantages of buying foods in their raw and processed forms (including discussion of cost, nutritional value, convenience, taste, etc.)
3. Bring examples of fresh and processed foods so students can have a tasting party. Have them decide which foods taste better processed and which taste better fresh.
4. Substitute different kinds of flour in the bread recipe. During process, examine different flour doughs for similarities and differences. After baking, hold a taste test to determine the best tasting bread.

## RESOURCES

### *Student Books*

- Curtis, N. (1992). I Wonder How Bread Is Made. Lerner.
- DePaola, T. (1989). Tony's Bread. Putman.
- Duyff, R. (1987). The Bread That Grew. Milliken.
- Gershator, D, & P. (1995). Bread Is For Eating. Trumpet.
- Galdone, P. (1973). Little Red Hen. Seabury.

Stevens, C. (1975). How to Make Possum's Honey Bread. Seabury.

Wolff, F. (1993). Seven Loaves of Bread. Tambourine.

#### ***Teacher Resources***

Little Red Hen (Thematic Unit); Teacher Created Materials, Inc. 1989; #302 Literature Activities For Young Children, Book 3; pp. 72-79.

Red Star Yeast and Products, Consumer Service Department; 433 E. Michigan St.; Milwaukee, WI 53202 "Exploring Yeast, from Budding to Baking," a multi-disciplinary educational tool including a cookbook, some copy masters, projects and an experiment card (one copy available).

Retail Bakers of America, Education Director; Suite 250; 6525 Belcrest Road; Hyattsville, MD 20782 "Is Baking the Career For You?" (single copy available).

#### ***Related Internet Websites***

Bread recipes: <http://www.cs.cmu.edu/~mjw/recipes/bread/>

The Village Bakery, advise on making various kinds of bread. <http://www.countrylife.net/bread/>

University of Nebraska Wheat Laboratory: information on types of wheat and components <http://ianrwww.unl.edu/ianr/agronomy/wheatlab/index.htm>

Fleischmann's Yeast: <http://www.breadworld.com/>

### **EVALUATION**

Answers for the worksheet are as follows: 1. 2,775 bushels (37 bushels per acre times 75 acres); 2. \$4,860 (1,800 bushels times \$2.70 per bushel); 3. \$30 (\$3,900 minus {\$1,634 divided by \$1,032 plus \$688 plus \$516}); 4. 82 bushels (5,740 loaves divided by 70 loaves); 5. 1,520 pounds (2,000 pounds times .76); 6. \$123 (\$210 minus \$87); 7. 12,960 buns (18 times 12 times 60).

### **ACKNOWLEDGMENT**

This lesson adapted from National FFA Food For America, 5632 Mt. Vernon Memorial Highway, P.O. Box 15160, Alexandria, VA 22309-0160.

# BREAD IN A BAG

This recipe makes two large loaves or four small loaves of bread. Enlist a few adult volunteers to help measure and mix, and ask the school cafeteria staff to assist with baking. Before beginning, have students cover a few desks with clean butcher paper for quick cleanup of the work area. Then have students wash their hands. Have volunteers fill large bowls with warm water and warm milk (105°-115° F) from which students will measure out the amounts needed.

Combine in a two-gallon heavy-duty freezer bag:

- 1 cup all-purpose flour
- 2 packages yeast
- 1 cup warm water
- 2 tablespoons sugar

Squeeze upper part of the bag to force any air out. Close the top of the bag tightly. Mix well by working the bag with your fingers until all the ingredients are completely blended. Allow mixture to rest for 15 minutes.

Add:

- 1 1/4 cups warm milk
- 1 tablespoon salt
- 2 tablespoons shortening, softened

Mix well by working the bag with your fingers. Gradually add 5-6 cups of all-purpose flour. Add enough flour to make the dough stiff or until it pulls away from the bag. Turn dough onto floured surface. Divide the dough in half. Knead each half five minutes or until it is smooth and elastic. Add more flour if the dough is too sticky.

Cover the dough with a plastic bag, and let it rise for 10 minutes.

Flatten dough into a 12 X 7-inch rectangle. Starting from a narrow end, roll dough toward you. Pinch edges to seal. Tuck the ends under. Press each end to seal.

Place seam side down in a greased 9 X 5 X 3-inch pan. Repeat for other loaf. Cover loosely with plastic bag, and let rise in a warm place until it doubles (about 45 to 60 minutes). Uncover. Bake in 400 degree oven for 35 to 45 minutes. Remove from pans. Cool on wire racks.

If you prefer, this amount of dough can be flattened into a 7 1/2 X 5-inch rectangle and placed in four 5 3/4 X 3 1/4 X 2-inch baby loaf pans. Baking time is slightly shorter.

As you go through the various processes, lead a discussion about the bread-making in which you ask the following questions:

- Why does the bread dough rise?* (Yeast is a living plant that gives off gases when it is moistened with warm liquid. Wheat flour has gluten that allows the dough to stretch like a balloon.)
- What other kinds of flour are there besides all-purpose?* (Whole-wheat flour contains the bran and sometimes the germ of the wheat kernel. Cake flour is fine flour from soft wheat. Rye flour is from the rye plant and must be mixed with wheat flour to form dough that will rise correctly. Bread flour has a higher gluten content than all-purpose flour and is used specifically for baking breads. Unbleached flour is white flour that has not been artificially whitened.)
- What products besides bread are made from flour?* (Rolls, muffins, buns, cereals, crackers, spaghetti, macaroni, cakes, cookies and much more.)

Name \_\_\_\_\_

# Bread in a Bag

Complete the math problems below.

1. An acre is about the size of a football field. Joe raised 37 bushels per acre of wheat in his 75-acre field. How many total bushels of wheat did he produce? \_\_\_\_\_
2. Ann has 1,800 bushels of wheat stored in a bin on the farm and decides to sell it at \$2.70 per bushel. How much money will she make? \_\_\_\_\_
3. John sold 1,500 bushels of wheat for \$3,900. His expenses for that wheat were \$1,634 for land rent; \$1,032 for seed, fertilizer and pesticides; \$688 for fuel, machinery repairs and equipment depreciation; and \$516 for taxes, interest and other expenses. How much money did John have left after he paid his expenses? \_\_\_\_\_
4. One bushel of wheat can produce 70 loaves of bread. How many bushels are needed to produce 5,740 loaves? \_\_\_\_\_
5. After milling, the weight of the flour is 76 percent of the original weight of the wheat. how many pounds of flour can be milled from 2,000 pounds (one ton) of wheat?
6. One ton of wheat costs \$87, and one ton of flour costs \$210. How much value was added to the wheat by processing it into flour? \_\_\_\_\_
7. A large bakery can produce 18 dozen hamburger buns per minute. How many buns can be produced per hour? \_\_\_\_\_

