

Wheat...The Staff of Life

Procedure

1. Introduce new vocabulary:

Grades 1-3

sprout
dormant
combine
harvest

Grades 4-6

bran
endosperm
germ
gluten

2. Read background information or have students read and discuss. Go through the sequence of production and processing as the wheat goes from the farm to the table.
Grades 1-3 can read "The Little Red Hen" in preparation for this lesson.
3. Activity: Show transparency of "A Grain of Wheat". Using handouts have students label the parts of the wheat kernel.
4. Activity: On "Wheat in the U.S." have students locate, label and color the top ten wheat producing states.
5. Activity: On "Wheat in Texas" have students locate and color the top ten wheat producing counties in Texas.
6. Activity, Grades 1-3: Make 5 or 6 sets of "The Story of Bread" task cards from colored construction paper and laminate. Have students work in groups of 3 or 4, placing the cards in the proper sequence.
7. Activity, Grades 4-6: Using the sheet "Wheat: From Field to Table" have students sequence the steps of wheat production and processing. Using the writing prompts have students write a descriptive paragraph about wheat.
8. Assessment: Successful completion of activity sheets.
Successful sequencing of the steps of wheat production and processing.
Writing assignments.

Extension

1. Have the class make "Bread in a Bag". With the assistance of parent volunteers. Instructions are included in this lesson.
2. Have students research the six different types of wheat grown in the U.S., and write an informative paper on the production and uses of each type.

Background Information

Wheat...The Staff of Life!

Wheat is called "the staff of life" because more foods are made from it than any other cereal grain. Wheat literally touches us daily from the numerous foods we eat! Just think of all the different foods you consume regularly that contain wheat. From bread, buns, rolls and pancakes to cereals, crackers and cookies - hardly a day goes by without wheat touching us in some way. Wheat is also used for cattle, poultry and other livestock feed. New uses of wheat are being found in the manufacturing of plastics and in aquaculture as feed for fish and shrimp.

Wheat is actually a grass. There are several varieties of wheat, but the most common one grown in Texas is Hard Red Winter Wheat.

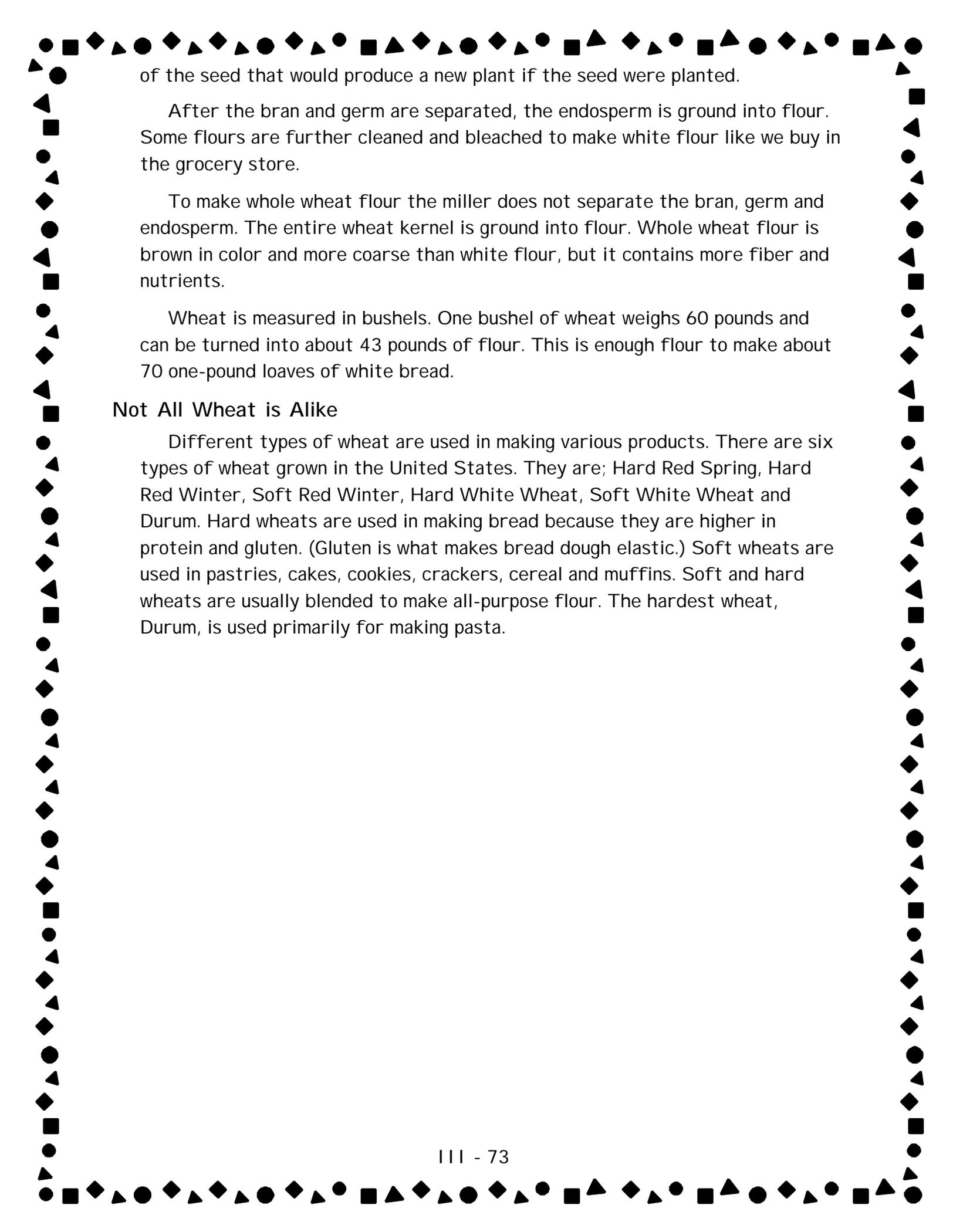
How is Wheat Grown?

The wheat seed is planted in the fall. After the seeds sprout they grow until cold weather causes the plant growth to slow or even stop for the winter. The plant is said to be dormant when it ceases to grow. During the fall and winter some farmers allow cattle to graze the wheat. They remove the cattle in the late winter so that when the temperature warms in the spring the wheat plants can continue growing and produce seed.

As the wheat grows it looks like green grass. A seed head begins forming. This is the grain the farmer will harvest. As the wheat matures or ripens it turns golden brown. In early summer the wheat is ready to harvest. The farmer uses a large machine called a combine to cut, separate and clean the grain. As the farmer drives the combine through the field the wheat kernels are collected and stored in a bin called a hopper. When the hopper is full the combine unloads the wheat onto a truck. When the truck is full it carries the wheat to a storage bin on the farm or hauls it to a grain elevator where it is stored until it can be delivered, by truck or rail car, to the processing plant. Some wheat will be delivered to a seaport where it will be loaded on a ship and sent to other countries. Texas wheat is sent to countries all over the world.

How is Wheat Processed?

The wheat is hauled to a processing plant called a flour mill. The mill cleans the wheat to remove sticks, stones and other foreign material. The wheat kernels are moistened with water to help separate the outer covering, called the bran, from the endosperm. The endosperm is the soft interior of the wheat kernel. The endosperm is then separated from the germ. The germ is the part

A decorative border composed of various geometric shapes including circles, squares, triangles, and diamonds, arranged in a repeating pattern around the perimeter of the page.

of the seed that would produce a new plant if the seed were planted.

After the bran and germ are separated, the endosperm is ground into flour. Some flours are further cleaned and bleached to make white flour like we buy in the grocery store.

To make whole wheat flour the miller does not separate the bran, germ and endosperm. The entire wheat kernel is ground into flour. Whole wheat flour is brown in color and more coarse than white flour, but it contains more fiber and nutrients.

Wheat is measured in bushels. One bushel of wheat weighs 60 pounds and can be turned into about 43 pounds of flour. This is enough flour to make about 70 one-pound loaves of white bread.

Not All Wheat is Alike

Different types of wheat are used in making various products. There are six types of wheat grown in the United States. They are; Hard Red Spring, Hard Red Winter, Soft Red Winter, Hard White Wheat, Soft White Wheat and Durum. Hard wheats are used in making bread because they are higher in protein and gluten. (Gluten is what makes bread dough elastic.) Soft wheats are used in pastries, cakes, cookies, crackers, cereal and muffins. Soft and hard wheats are usually blended to make all-purpose flour. The hardest wheat, Durum, is used primarily for making pasta.

What is Wheat?

The kernel of wheat is sometimes called the wheat berry. The kernel is the seed from which the wheat plant grows. Each tiny seed contains three distinct parts that are separated during the milling process to produce flour.

Endosperm

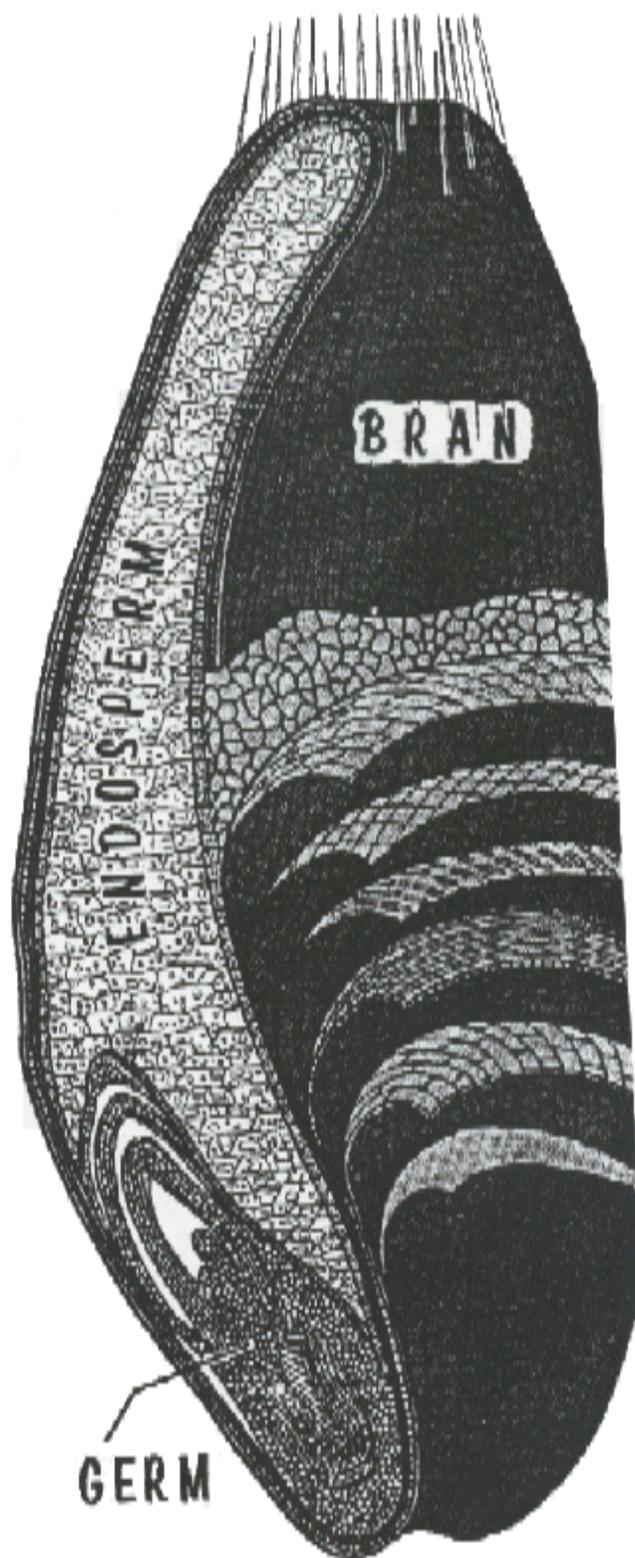
The endosperm makes up the largest part of the wheat kernel: about 83%. It is the part of the kernel that is made into white flour.

Bran

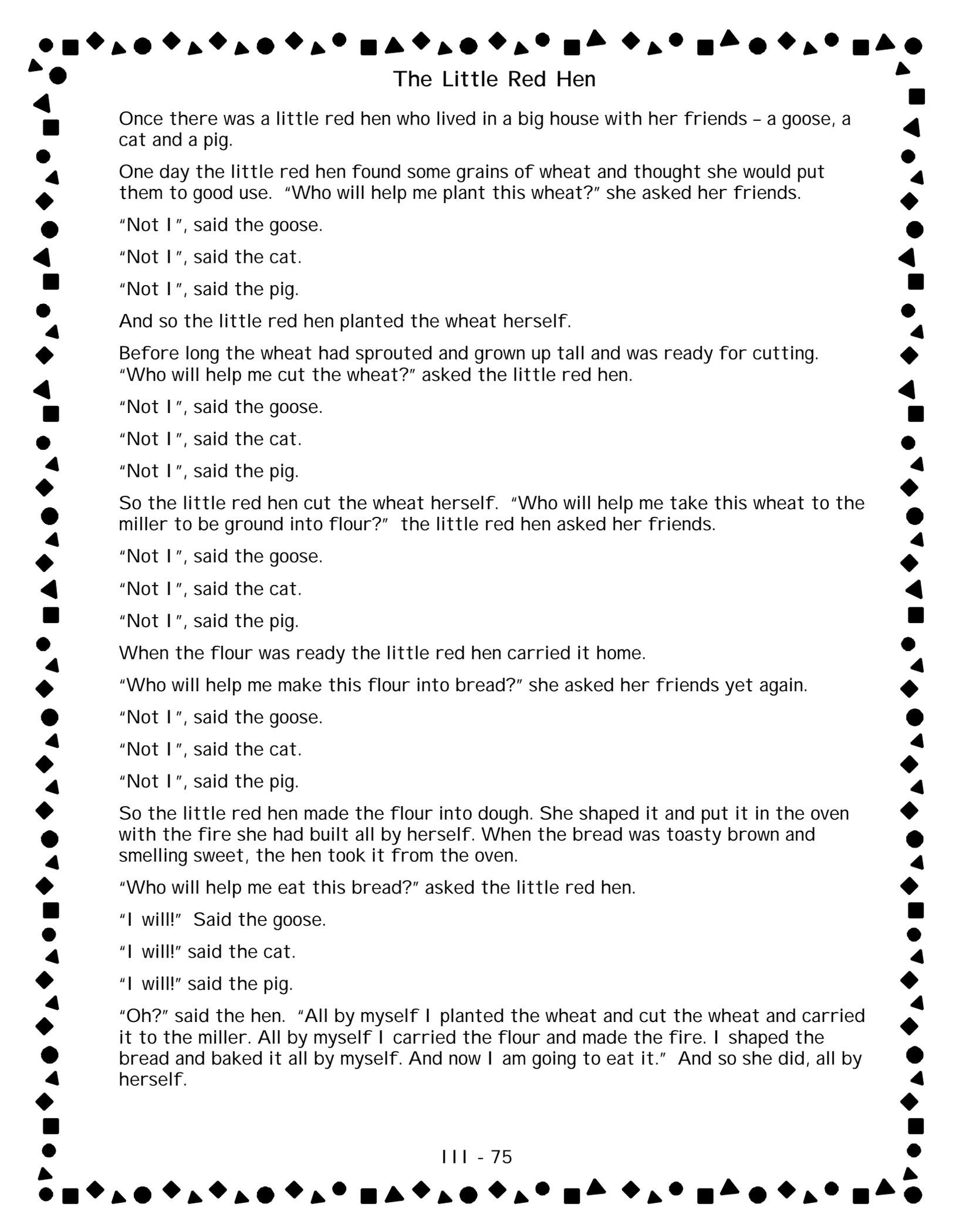
The bran is the covering of the kernel and makes up about 14½% of the kernel weight. Bran is removed when wheat is made into white flour but is ground with the endosperm in whole wheat flour.

Germ

The germ is tiny and makes up only 2½% of the kernel weight. The germ is the embryo or sprouting section of the seed. It is separated from the bran and endosperm during the milling process for white flour, but remains in whole wheat flour.



A Kernel of Wheat (magnified)



The Little Red Hen

Once there was a little red hen who lived in a big house with her friends – a goose, a cat and a pig.

One day the little red hen found some grains of wheat and thought she would put them to good use. “Who will help me plant this wheat?” she asked her friends.

“Not I”, said the goose.

“Not I”, said the cat.

“Not I”, said the pig.

And so the little red hen planted the wheat herself.

Before long the wheat had sprouted and grown up tall and was ready for cutting. “Who will help me cut the wheat?” asked the little red hen.

“Not I”, said the goose.

“Not I”, said the cat.

“Not I”, said the pig.

So the little red hen cut the wheat herself. “Who will help me take this wheat to the miller to be ground into flour?” the little red hen asked her friends.

“Not I”, said the goose.

“Not I”, said the cat.

“Not I”, said the pig.

When the flour was ready the little red hen carried it home.

“Who will help me make this flour into bread?” she asked her friends yet again.

“Not I”, said the goose.

“Not I”, said the cat.

“Not I”, said the pig.

So the little red hen made the flour into dough. She shaped it and put it in the oven with the fire she had built all by herself. When the bread was toasty brown and smelling sweet, the hen took it from the oven.

“Who will help me eat this bread?” asked the little red hen.

“I will!” Said the goose.

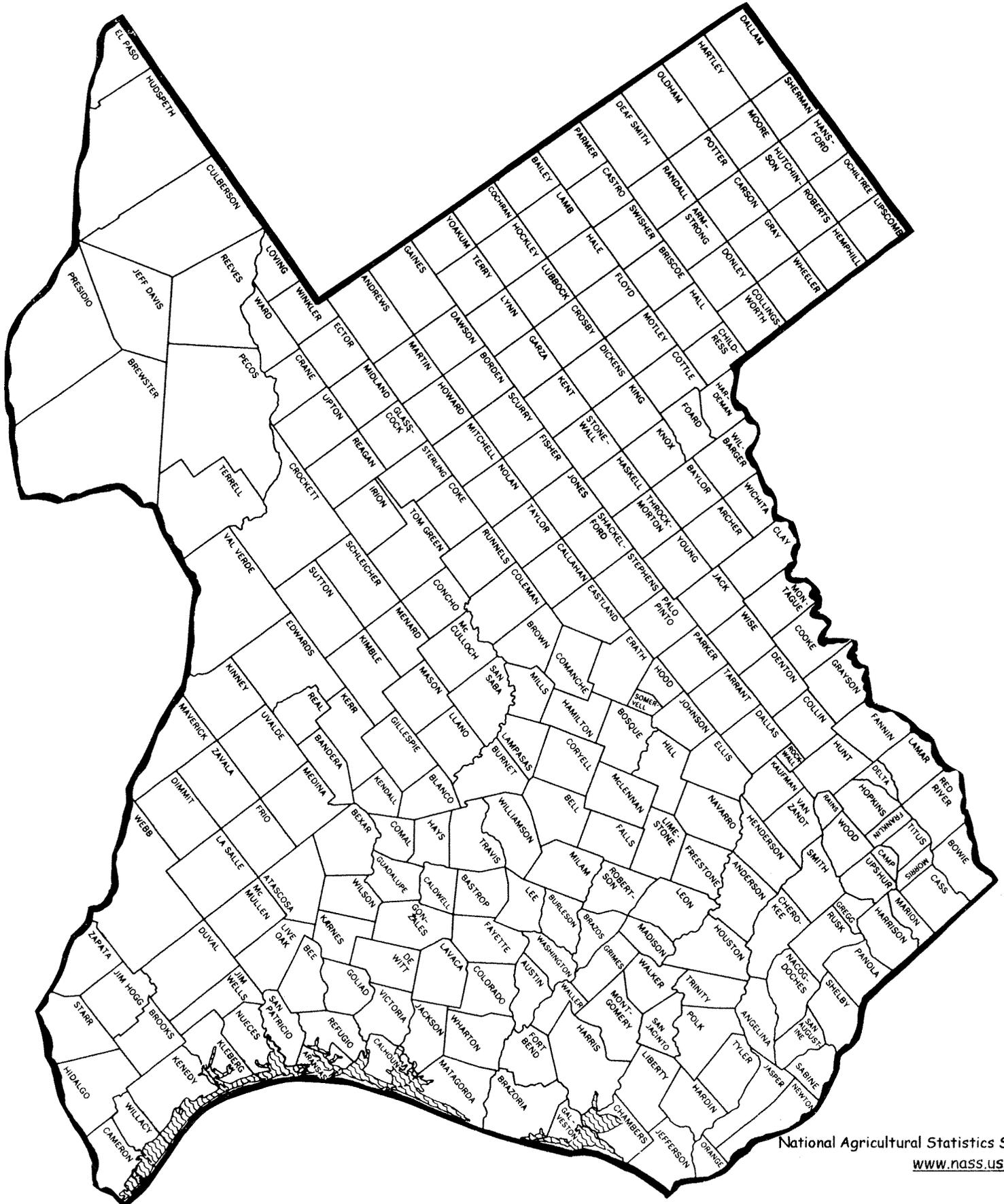
“I will!” said the cat.

“I will!” said the pig.

“Oh?” said the hen. “All by myself I planted the wheat and cut the wheat and carried it to the miller. All by myself I carried the flour and made the fire. I shaped the bread and baked it all by myself. And now I am going to eat it.” And so she did, all by herself.

Wheat in Texas

Wheat is grown in many parts of Texas but the area that produces the most is the Texas Panhandle. The top ten wheat producing counties in Texas in 2004 were Sherman, Hansford, Castro, Deaf Smith, Hartley, Knox, Parmer, Dallam, Ochiltree and Wilbarger. On the Texas Map locate and color the ten counties that produced the most wheat.



National Agricultural Statistics Service
www.nass.usda.gov

Wheat in the United States

Most of the wheat grown in Texas is called Winter Wheat. Other states also grow Winter Wheat. The top 10 Winter Wheat producing states in 2005 were Kansas, Oklahoma, Washington, Texas, Montana, Nebraska, Idaho, South Dakota, Ohio and Colorado. Texas ranked 4th in Winter Wheat production. On the U. S. map locate, label and color the ten states that produced the most Winter Wheat.



Wheat — From Field to Table

Planting. Hard red winter wheat, the primary U.S. wheat produced, exported and domestically consumed, is planted in early fall (mid-September through October) and harvested in the summer.



Emergence soon after planting. Wheat normally emerges about a week after planting.

Winter dormancy. The hard red winter wheat remains dormant through the winter. This is known as the tillering period. This lasts from October through spring.



Spring. During the spring, the wheat begins its major growth, which includes jointing, stem extension, booting, and heading. Heading is the last stage before ripening and harvest. This occurs in the spring through the early part of June.

Changing color. During late May, the wheat starts to turn from green to golden colors.



Ready for Harvest. In Texas, during late May or early June, the wheat begins to turn from its green color to yellow to gold. Hot summer temperatures can accelerate this period. Harvesting will begin soon.

Harvest. The Texas harvest normally begins in mid-June and continues through the early part of July. Often, harvest ends before Independence Day. But depending on weather conditions such as heavy rains and muddy fields, harvest work can be delayed for weeks and continue through July.



Grain storage. Views of wheat storage facilities. Includes local country elevators, sub-terminals, terminal elevators, special 100-car unit train loading facilities for shipment to distant export ports.

Wheat transportation. Views of wheat being transported to local country elevators, sub-terminals, terminal elevators, special 100-car unit train loading facilities for shipment to distant export ports, mills, bakeries and other end uses.



Export ship loading. Scenes of ocean-going ships being loaded with wheat at Texas Gulf of Mexico ports.

Post-Harvest. Wheat straw and stubble are removed from the field.



Wheat...From Field to Table

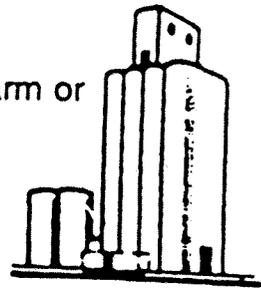
WHEAT FARM

the farmer harvests the wheat



GRAIN ELEVATOR

the grain is stored on the farm or shipped to the elevator and stored until needed

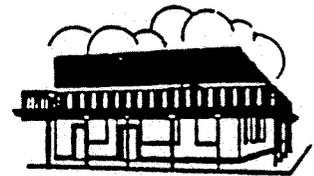


OTHER

milk, yeast, salt, sugar, etc.

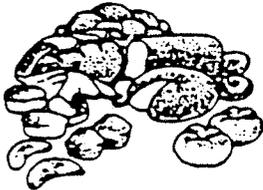
MILL

the wheat is made into flour



BAKERY

flour and ingredients are baked into bread



WHOLESALER

wholesale distribution center ships to retail outlets

SUPERMARKET

RESTAURANT

YOU

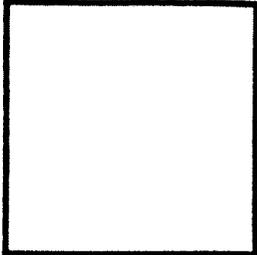


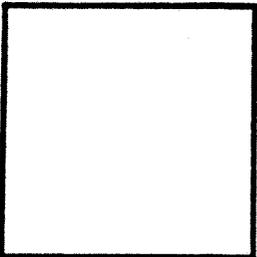
Write a descriptive paragraph about one of the following:

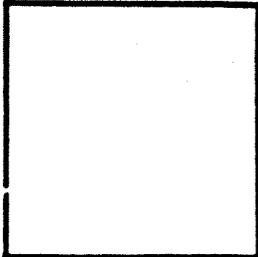
- a loaf of bread baking
- a wheat field about to be harvested
- a kernel of wheat
- the smells of a bakery
- a new wheat plant, sprouting after dormancy during the winter
- the taste of a favorite breakfast cereal

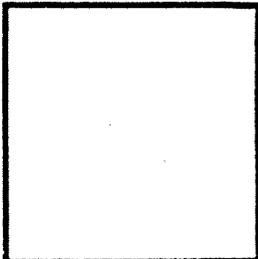
MAKING BREAD

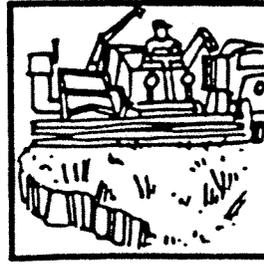
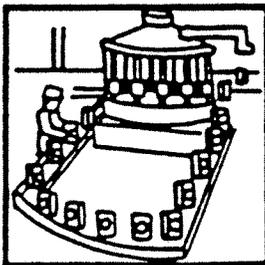
Many people help us get our food. Some of these people are shown in the pictures at the bottom of the page. Cut out the pictures. Paste them in the boxes in the sentence that describes their jobs.

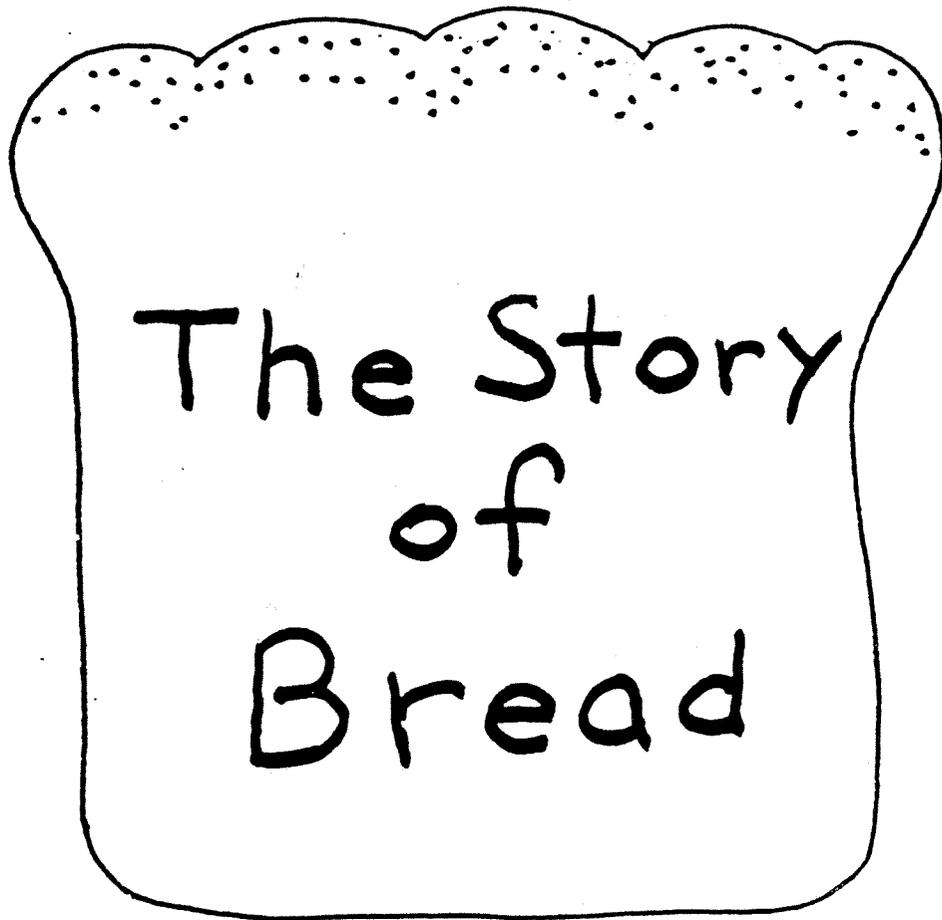
1. The  grows the wheat.

2. The  grinds the wheat into flour, and puts it into bags.

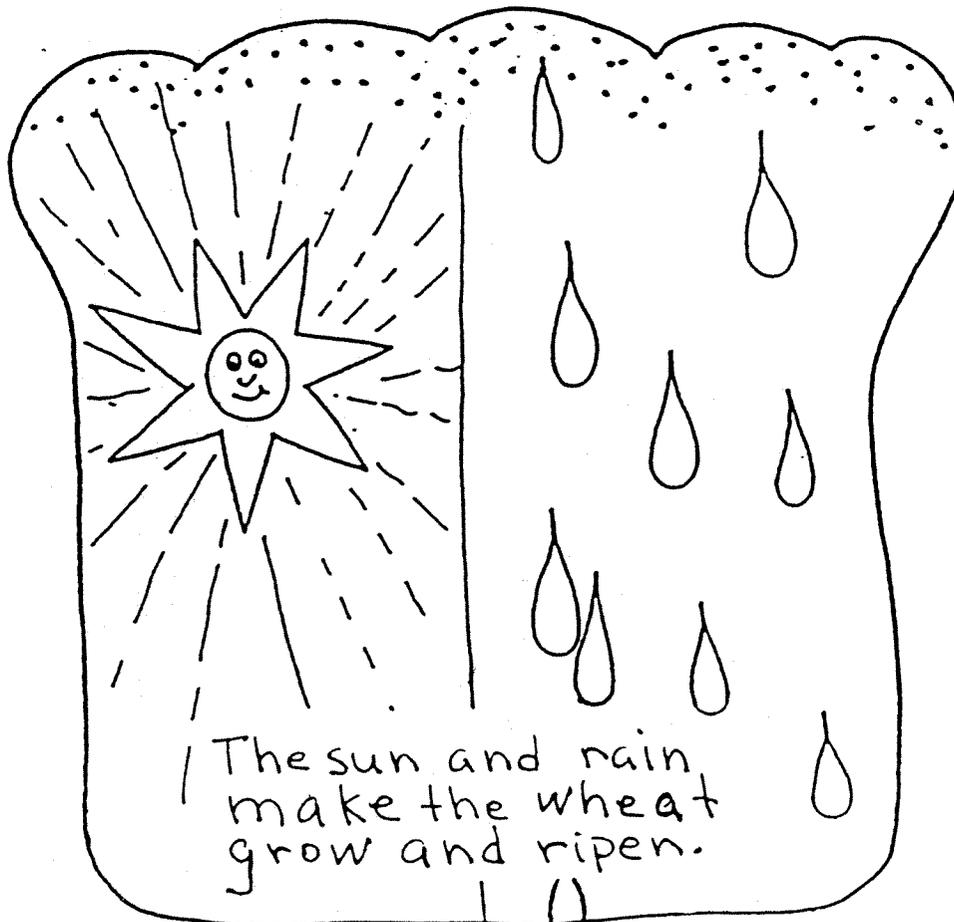
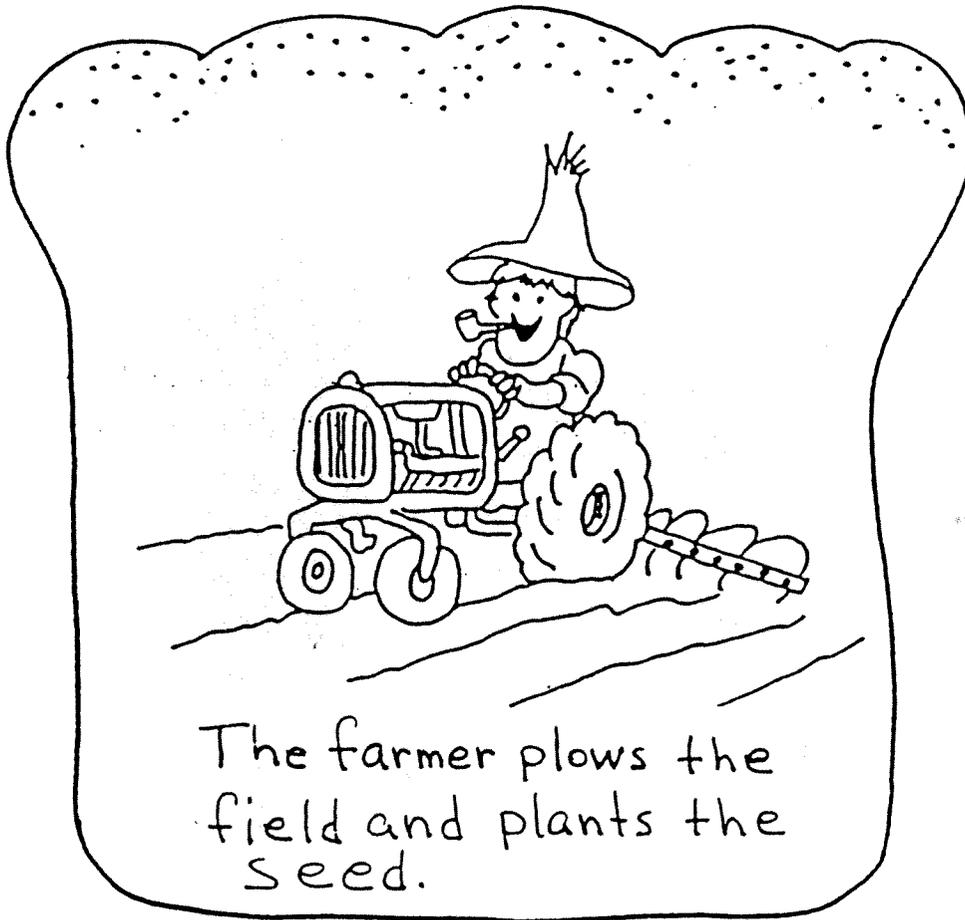
3. The  brings the bags of flour to your school

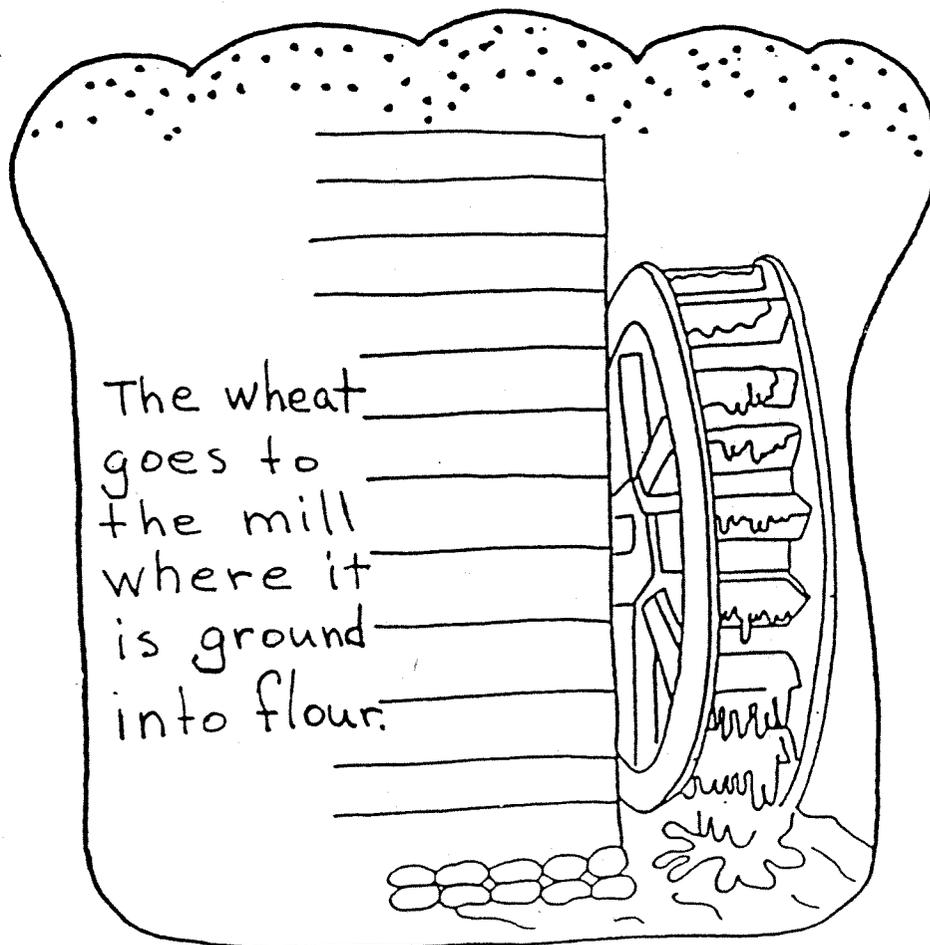
4. The  bakes the bread for your lunch.

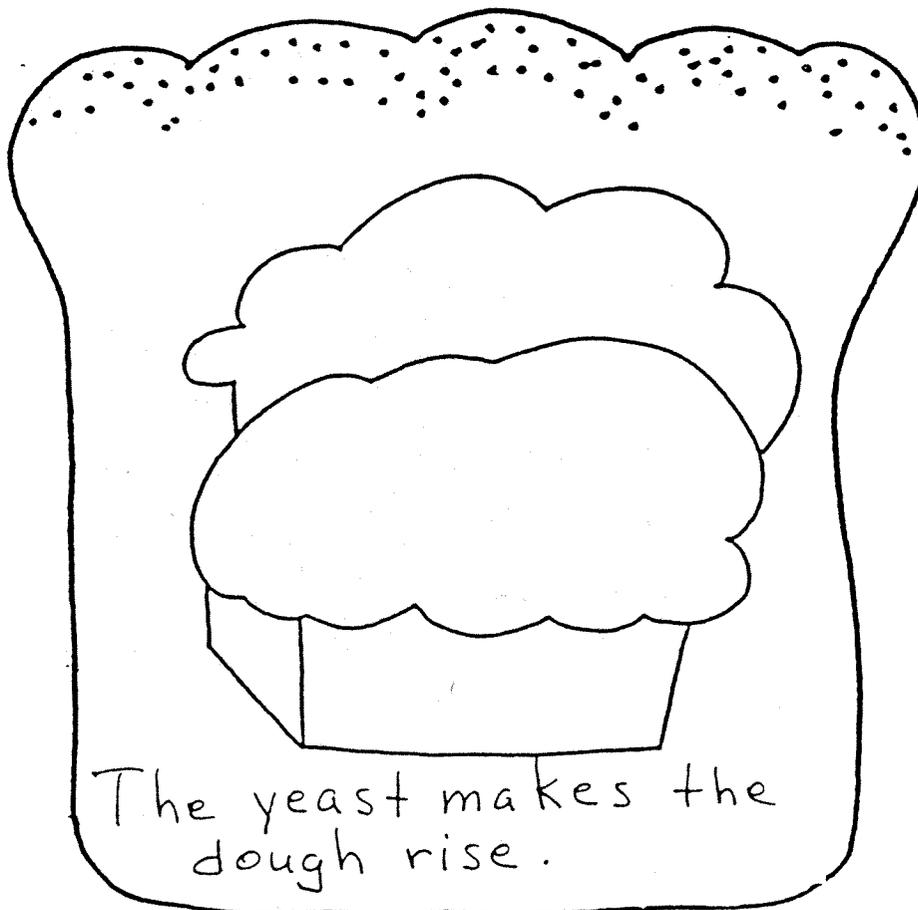




Teaching the Economics of American Agriculture,
the Food & Fiber System

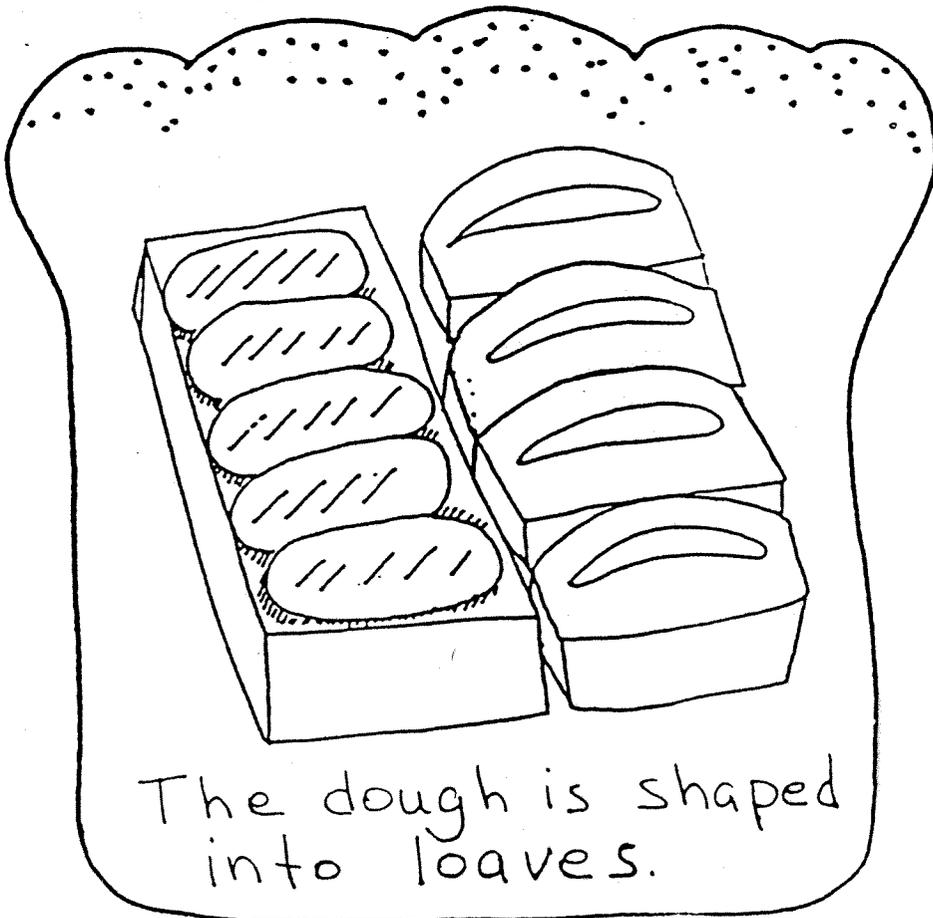








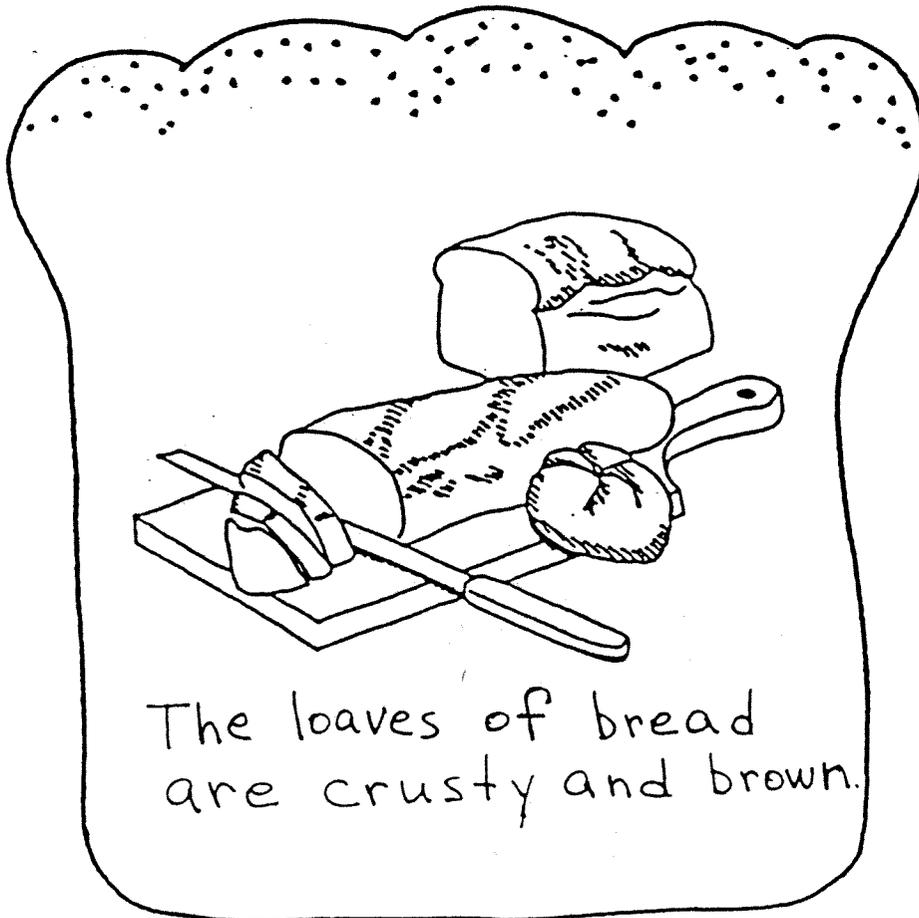
The baker
kneads
the dough



The dough is shaped
into loaves.



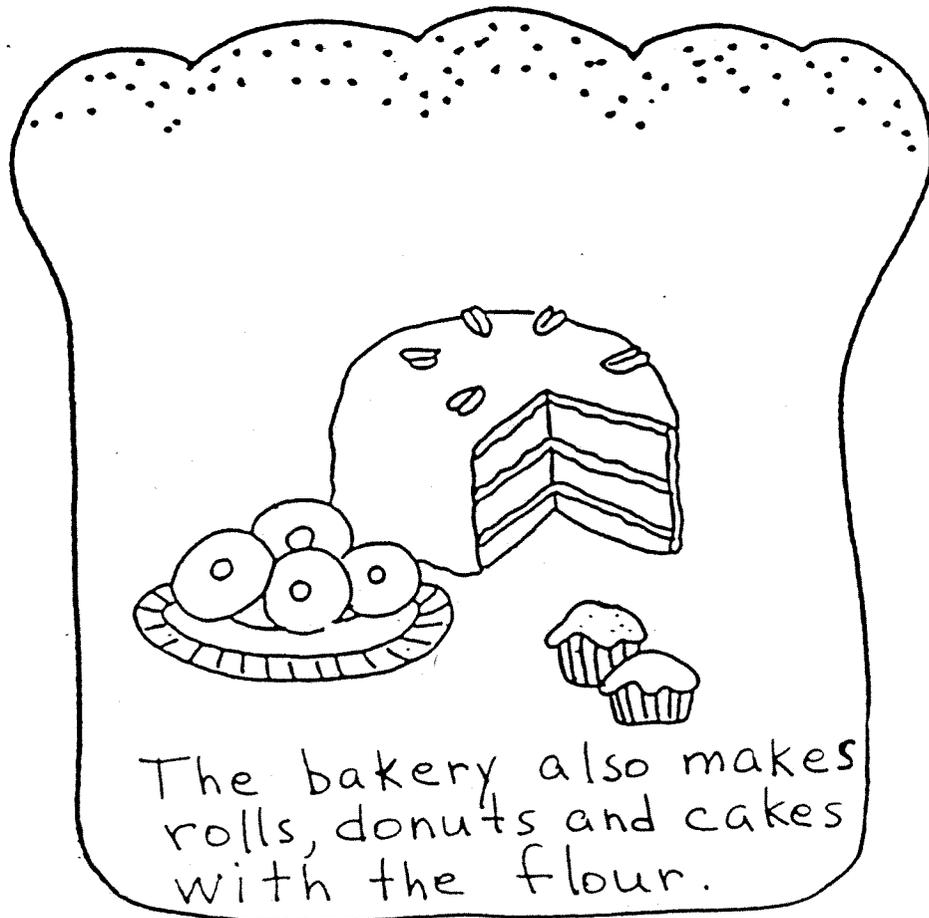
The loaves are baked
in a hot oven.



The loaves of bread
are crusty and brown.

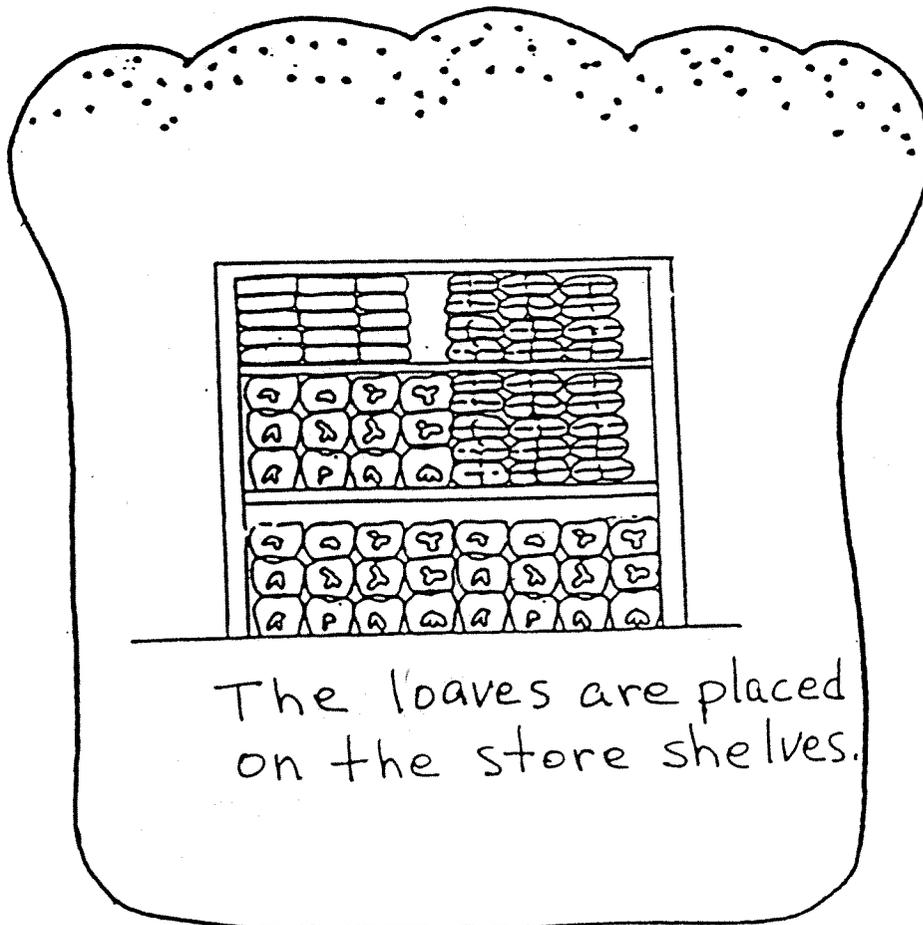


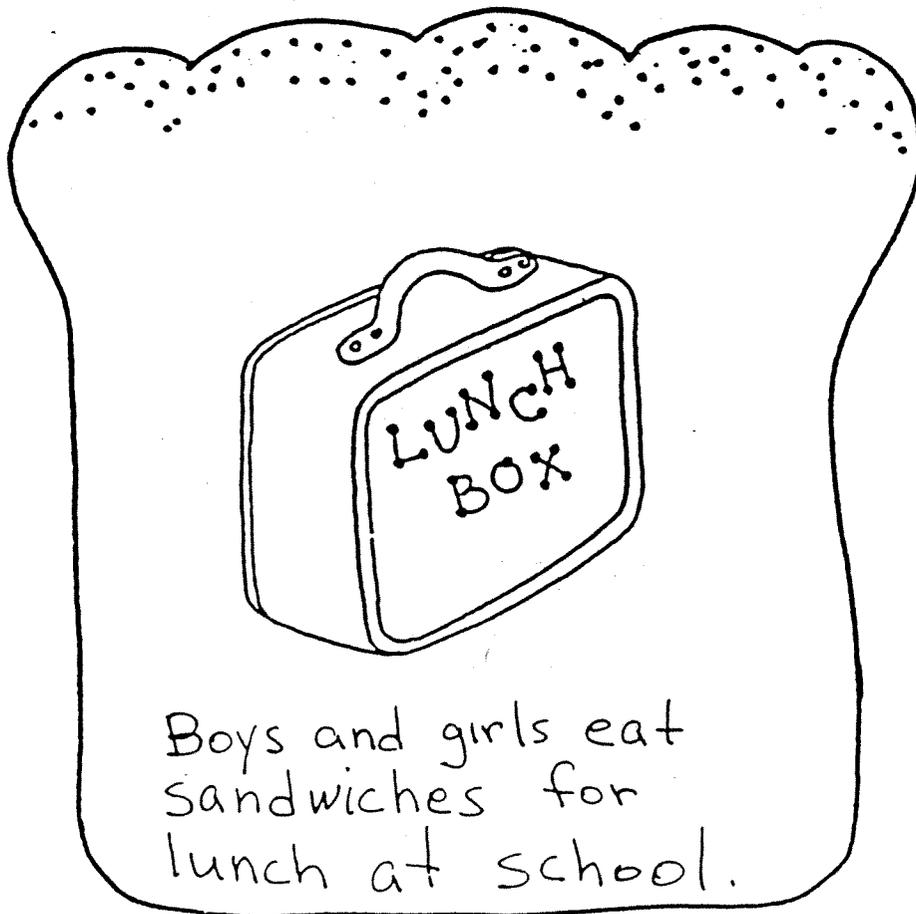
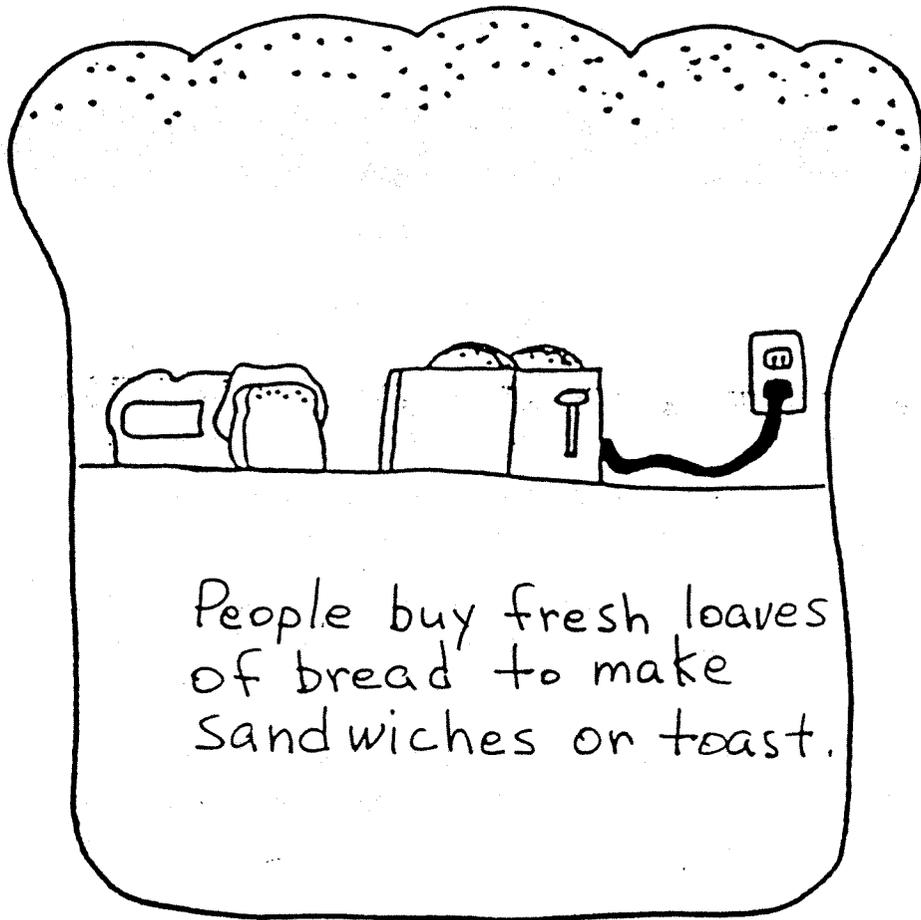
Some loaves are
cut and wrapped.



The bakery also makes
rolls, donuts and cakes
with the flour.







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Wheat...The Staff of Life

Instructions for

Bread in a Bag

Wheat - long known as the staff of life - has served mankind through history as the main staple for diets all over the world. It is the most versatile grain known to man.

Wheat covers more of the earth's surface than any other food crop. Wheat varieties are grouped into classes which are determined by the wheat kernels.

The flour from the varieties of wheat is not all the same - each class has its own characteristic. Some make the best dough for bread, while others make cakes that are light, and others are used to make the best pasta products.

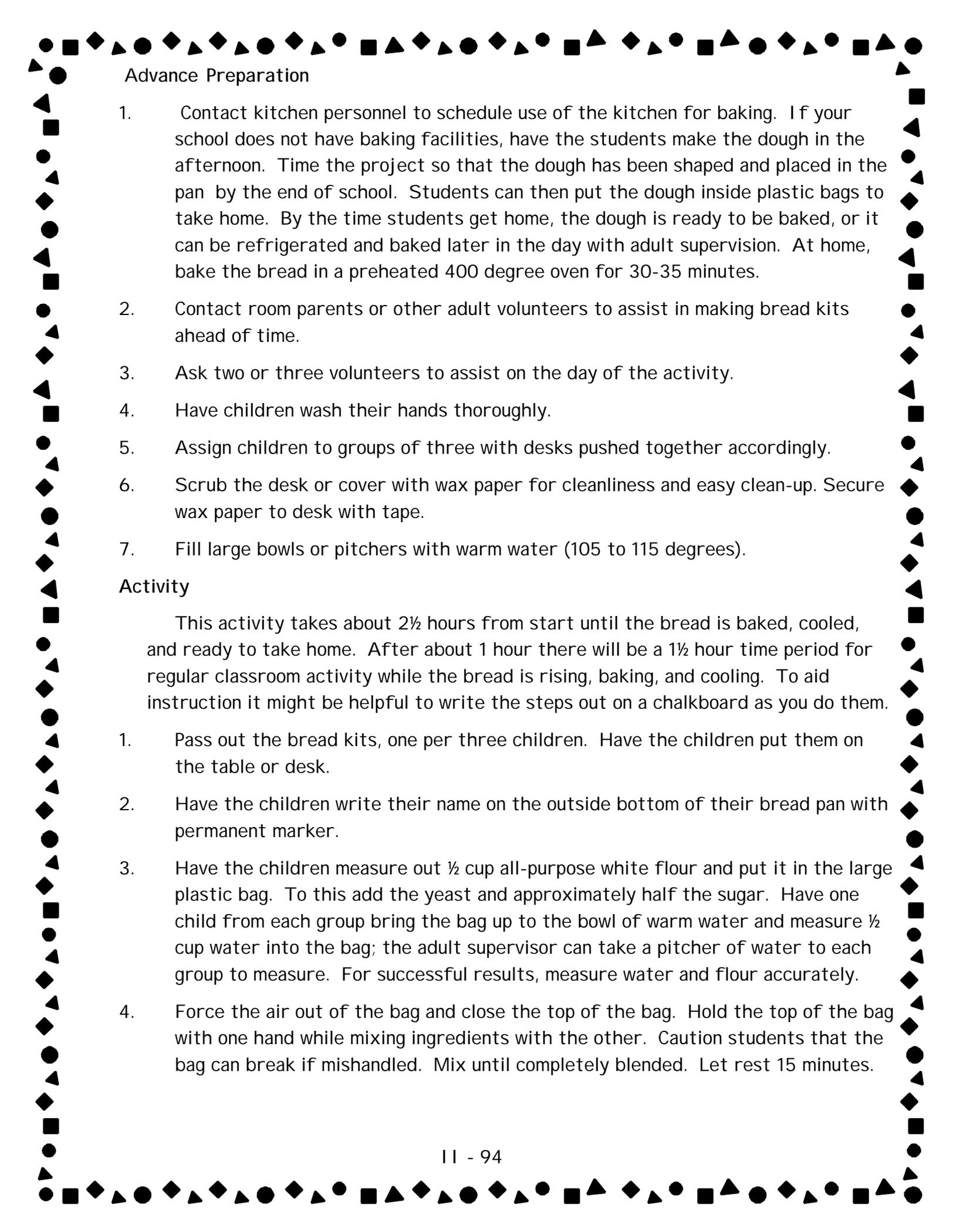
Many people do not have connections to agriculture and farm life, therefore, they may not know where their food comes from. This program was designed to teach elementary students the journey of wheat from the farmers' fields to their table.

Objectives

1. To acquaint children with the process of growing wheat through the final product of wheat based foods.
2. To give children hands-on experience in making bread.
3. To increase awareness of wheat's role in the world's food supply and its value to the diet.

Materials Needed

1. Bread-making kits*, one per three students.
2. Two measuring cups for dry ingredients - $\frac{1}{2}$ cup and 1 cup, and 1 cup liquid measuring cup.
3. Bowl scraper.
4. Bowls or pitchers for warm water.
5. Permanent markers.
6. Kernel of Wheat picture and Food Guide Pyramid, one per child.
7. Bread recipe, one per child.
8. Wheat fact sheets, one per child.
9. Wheat kernels and/or wheat stalks. Check with your county Extension Agent of County Farm Bureau.



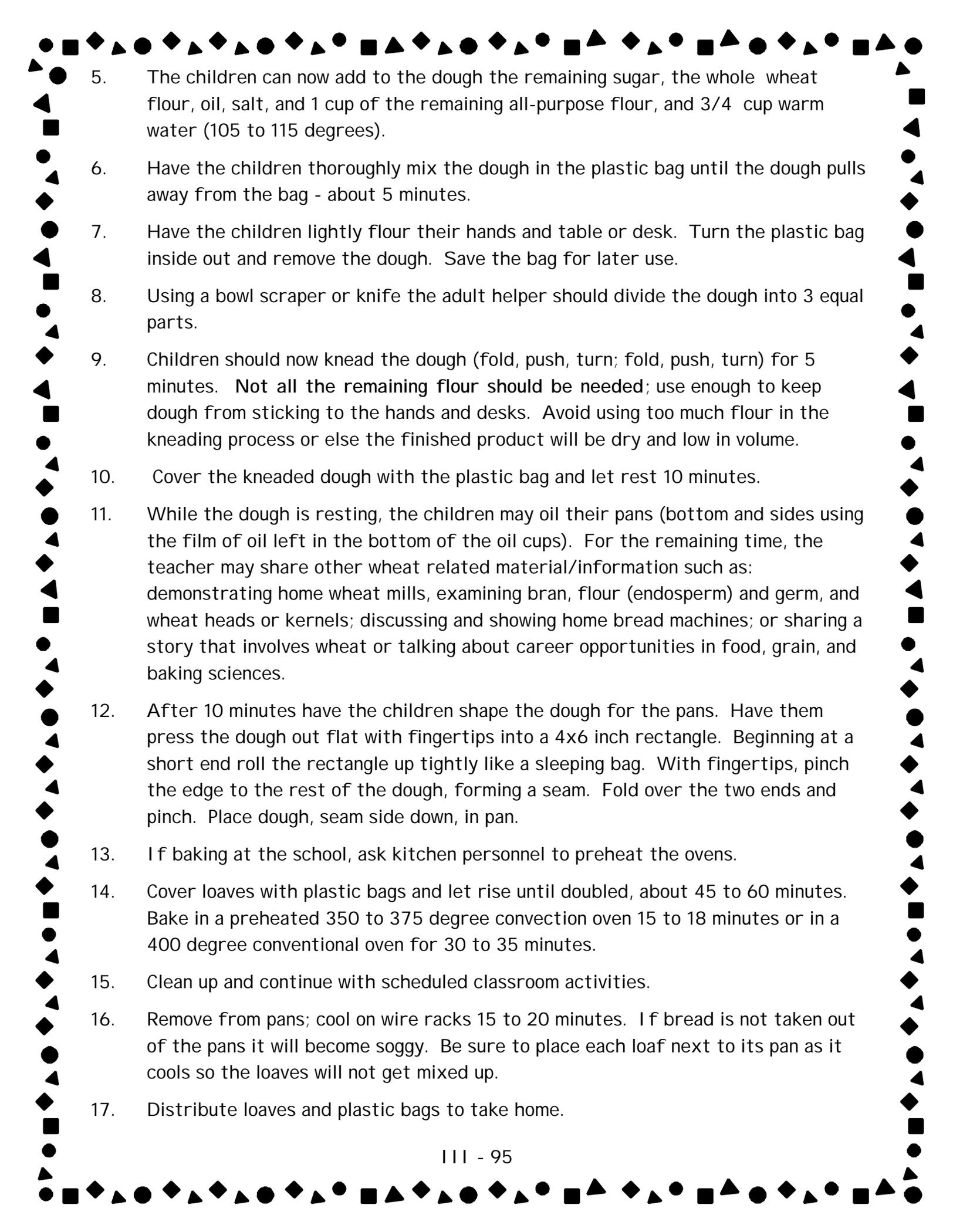
Advance Preparation

1. Contact kitchen personnel to schedule use of the kitchen for baking. If your school does not have baking facilities, have the students make the dough in the afternoon. Time the project so that the dough has been shaped and placed in the pan by the end of school. Students can then put the dough inside plastic bags to take home. By the time students get home, the dough is ready to be baked, or it can be refrigerated and baked later in the day with adult supervision. At home, bake the bread in a preheated 400 degree oven for 30-35 minutes.
2. Contact room parents or other adult volunteers to assist in making bread kits ahead of time.
3. Ask two or three volunteers to assist on the day of the activity.
4. Have children wash their hands thoroughly.
5. Assign children to groups of three with desks pushed together accordingly.
6. Scrub the desk or cover with wax paper for cleanliness and easy clean-up. Secure wax paper to desk with tape.
7. Fill large bowls or pitchers with warm water (105 to 115 degrees).

Activity

This activity takes about 2½ hours from start until the bread is baked, cooled, and ready to take home. After about 1 hour there will be a 1½ hour time period for regular classroom activity while the bread is rising, baking, and cooling. To aid instruction it might be helpful to write the steps out on a chalkboard as you do them.

1. Pass out the bread kits, one per three children. Have the children put them on the table or desk.
2. Have the children write their name on the outside bottom of their bread pan with permanent marker.
3. Have the children measure out ½ cup all-purpose white flour and put it in the large plastic bag. To this add the yeast and approximately half the sugar. Have one child from each group bring the bag up to the bowl of warm water and measure ½ cup water into the bag; the adult supervisor can take a pitcher of water to each group to measure. For successful results, measure water and flour accurately.
4. Force the air out of the bag and close the top of the bag. Hold the top of the bag with one hand while mixing ingredients with the other. Caution students that the bag can break if mishandled. Mix until completely blended. Let rest 15 minutes.

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5. The children can now add to the dough the remaining sugar, the whole wheat flour, oil, salt, and 1 cup of the remaining all-purpose flour, and 3/4 cup warm water (105 to 115 degrees).
 6. Have the children thoroughly mix the dough in the plastic bag until the dough pulls away from the bag - about 5 minutes.
 7. Have the children lightly flour their hands and table or desk. Turn the plastic bag inside out and remove the dough. Save the bag for later use.
 8. Using a bowl scraper or knife the adult helper should divide the dough into 3 equal parts.
 9. Children should now knead the dough (fold, push, turn; fold, push, turn) for 5 minutes. Not all the remaining flour should be needed; use enough to keep dough from sticking to the hands and desks. Avoid using too much flour in the kneading process or else the finished product will be dry and low in volume.
 10. Cover the kneaded dough with the plastic bag and let rest 10 minutes.
 11. While the dough is resting, the children may oil their pans (bottom and sides using the film of oil left in the bottom of the oil cups). For the remaining time, the teacher may share other wheat related material/information such as: demonstrating home wheat mills, examining bran, flour (endosperm) and germ, and wheat heads or kernels; discussing and showing home bread machines; or sharing a story that involves wheat or talking about career opportunities in food, grain, and baking sciences.
 12. After 10 minutes have the children shape the dough for the pans. Have them press the dough out flat with fingertips into a 4x6 inch rectangle. Beginning at a short end roll the rectangle up tightly like a sleeping bag. With fingertips, pinch the edge to the rest of the dough, forming a seam. Fold over the two ends and pinch. Place dough, seam side down, in pan.
 13. If baking at the school, ask kitchen personnel to preheat the ovens.
 14. Cover loaves with plastic bags and let rise until doubled, about 45 to 60 minutes. Bake in a preheated 350 to 375 degree convection oven 15 to 18 minutes or in a 400 degree conventional oven for 30 to 35 minutes.
 15. Clean up and continue with scheduled classroom activities.
 16. Remove from pans; cool on wire racks 15 to 20 minutes. If bread is not taken out of the pans it will become soggy. Be sure to place each loaf next to its pan as it cools so the loaves will not get mixed up.
 17. Distribute loaves and plastic bags to take home.

*Items Needed to Make a Bread in the Bag Kit

1. Two gallon, heavy-duty Ziplock type freezer bags, one per three students.
2. Quart size Ziplock type plastic bags with 2 cups of all-purpose flour, one per three students.
3. Quart size plastic bags with 2 cups of whole wheat flour, one per three students. NOTE: To measure flour accurately, first stir the flour, then spoon it into a measuring cup intended for dry ingredients and level with a knife.
4. Two teaspoons of salt in a disposable container, such as a sandwich bag, small paper/plastic cup, or check with your school food service personnel or restaurant supplier.
5. One package active dry yeast or fast-rise yeast (2 1/4 teaspoons), one per three students.
6. Two tablespoons sugar in small disposable cup or bag, one per three students.
7. One tablespoon of vegetable oil in small disposable cup, etc., one per three students.
8. Disposable mini loaf pan, 3x5 inches, one per student.
9. One gallon plastic bag, one per student, for transporting the bread home.

Recipe for Easy Wheat Bread

Mix in a heavy-duty closed plastic bag:

½ cup all-purpose flour

1 package active dry yeast or fast-rise yeast

1 tablespoon sugar

½ cup warm water (105 - 115 degrees)

Have children check temperature with a thermometer.

Close top of bag and work with fingertips until completely blended. Let rest 15 minutes.

Open bag and add:

1 tablespoon sugar

2 cups whole wheat flour

1 tablespoon vegetable oil

2 teaspoons salt

1 cup all-purpose flour

¾ cup warm water (105 - 115 degrees)

Mix well. Slowly add enough of the remaining all-purpose flour until a soft dough ball forms. Turn dough out into a lightly floured surface, divide into thirds and let each child knead a dough piece 5 to 6 minutes. Knead in just enough flour to make a soft dough. It should be a little sticky. If too much flour is added the final product will be dry and low volume. Cover with a plastic bag. Let rest 10 minutes.

Press the dough out flat with fingertips into a 4x6 inch rectangle. Beginning at a short end, roll the rectangle up tightly like a sleeping bag. With fingertips, pinch the edge to the rest of the dough, forming a seam. Fold over the two ends and pinch. Place dough, seam-side down, in pan.

Cover with plastic bag and let rise until doubled, about 45 to 60 minutes. Bake in a preheated 350 to 375 degree convection oven 15 to 18 minutes or in a 400 degree conventional oven for 30 to 35 minutes.

Remove from pans; cool on wire rack.

One mini loaf provides:

Calories:	654
Protein:	20.4 g
Carbohydrates:	131 g
Fat:	6.98 g
Dietary Fiber	12.6 g

One mini loaf contains eight 1-ounce servings.