

Kernel Counting

Grade Level: 4-5

Approximate Length of Activity: 30-40 minutes

Objectives

Teacher

1. Integrate the agricultural concept of food processing into math
2. Have students solve different types of math problems and work with a graph to gain an understanding of how processing adds value to agricultural products.

Students

1. Define how processing adds value to agricultural products and list the steps in commercial processing of agricultural products.
2. Solve a variety of math problems involving addition, subtraction, multiplication, and division.
3. Complete a graph.

Michigan Content Standards: (Math) N.FL.04.08; N.FL.04.10; N.FL.04.11; N.MR.04.14; D.RE.04.01; N.FL.05.04; N.FL.05.05

Introduction

Nearly all agricultural products must be processed in some manner before they can be used. Since processing makes the product more valuable to consumers, the term “value-added processing” is often used. Each step in the processing adds value to the final form of the product. Pork into sausage, wheat into food, wool into sweaters, or timber into construction lumber are all types of processing. Depending upon the final product, processing can be done in a few steps, or it may take many.

For example, to process wheat into foods, the wheat must first be made into flour. The place where wheat is made into flour is a mill and the people who process the wheat are millers. At the mill, the wheat is put through a cleaning process to remove foreign matter (weed seeds, corn seeds, bean seeds). Rollers then process over the wheat kernels to break them into pieces. This is repeated many times to make a soft powdery substance we know as flour. Next, a miller adds a special ingredient to the flour to whiten it, along with B-vitamins and iron for nutrients. The flour is shipped in bags to the bakery or grocery store. Bakers like to use Michigan wheat flour to make food items such as cakes, cookies, biscuits, pancakes, pretzels, and ice cream cones.

Presently, U.S. agriculture is a multi-billion dollar industry. Engineers have designed machines that process agricultural products quickly, efficiently, and in large quantities. Commercial agricultural processing is much different than processing a small quantity of a product at home, since the machines do much of the work. The agricultural industry is able to supply, low-cost, quality products because of high technology.

Glossary

- Bran -- the outer layer of a wheat kernel included in whole wheat flour for additional fiber.
- Endosperm -- the white, inner part of a wheat kernel 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 dough to rise and stretch.
- Mill -- to grind grain into flour or meal.
- Yeast -- a leavening agent that causes dough to rise and beverages to ferment.
- Gross profit -- total income before expenses are subtracted.
- Net profit -- the final profit after all expenses have been subtracted.

Materials Needed

- "Kernel Counting" worksheet
- "Where Does Your Food Dollar Go?" worksheet

Activity Outline

1. Use the "Kernel Counting" worksheet to have the students identify the parts of the wheat kernel; then complete the math problems about wheat production and flour milling.
2. Discuss the problems and answer any questions the students have.
3. Use the "Where Does Your Food Dollar Go?" worksheet to discuss with the class each of the food dollar components for processing food. Explain to the students that the price they pay to purchase an item at the grocery store is more than what the farmer receives for the product. For every dollar spent, part of it goes to the farmer and the rest is distributed to other costs. The amount the farmer receives varies from one product to another over time. On average, farmers receive 19 cents of the retail food dollar. The price the farmer receives for his product plays only a small role in the total price the consumer pays for food in the grocery store. An ear of corn, a bushel of wheat, or a live steer are all of little use to you in their "natural" states. The process of bringing food from the farm to your table includes many steps. Each step toward a finished product adds value and cost right up to the time you purchase it. Have the students look at the chart on their worksheets to see what a dollar spent on food paid for in 2004. Discuss the meaning of each component and have the students give examples of each.
4. Have the students label each piece of the dollar with the cost of each component.

Discussion Questions

1. Why do you think the agricultural industry is able to supply low-cost, quality products?
2. What are some of the components covered in the cost of food?
3. Which components cost the most? The least? Explain the reasons for the differences.
4. Why do you think consumers are willing to pay more for processed items such as sausage, foods made of wheat, sweaters, etc., than they are for raw commodities?

Related Activities

1. Have student's research the career opportunities needed to make and sell a loaf of bread.
2. Visit a local bakery or doughnut shop to see how bread is processed.
3. Michigan Farm Bureau has an educational magazine geared for kids entitled "Pizza Ag Mag"; it contains activities such as, historical facts, games, and hands on activities. Contact Michigan Farm Bureau the Promotion and Education department at 1-800-292-2680 ext. 3202 to obtain copies for your classroom.
4. The lesson "Foods Amazing Journey" located in the social studies section of this curriculum guide.

Acknowledgment

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Kernel Counting

Identify the endosperm, bran, and germ of this wheat kernel. Then complete the math problems related to wheat.

1. An acre is about the size of a football field. Joe raised 37 bushels of wheat per acre 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. What is her gross income on the sale? _____
3. John sold 1,500 bushels of wheat for \$3,900. His expenses 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. What is John's net profit? _____
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 flour is 76 percent of the original weight of the wheat. How many pounds of flour can be milled from one ton (2,000 pounds) of wheat? _____
6. One ton of wheat cost \$87, and one ton of flour costs \$210. How much did the value of wheat increase by processing it into flour? _____
7. A large bakery can produce 18-dozen hamburger buns per minute. How many buns can it produce per hour? _____



Kernel Counting

Identify the endosperm, bran, and germ of this wheat kernel. Then complete the math problems related to wheat.

1. An acre is about the size of a football field. Joe raised 37 bushels of wheat per acre in his 75-acre field. How many total bushels of wheat did he produce? **2,775 bushels**
(37 bushels per acre x 75 acres)
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. What is her gross income on the sale? **\$4,860**
(1,800 bushels x \$2.70 per bushel)
3. John sold 1,500 bushels of wheat for \$3,900. His expenses 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. What is John's net profit? **\$30**
($\$3,900 - \{\$1,634 + 1,032 + 688 + 516\}$)
4. One bushel of wheat can produce 70 loaves of bread. How many bushels are needed to produce 5,740 loaves? **82 bushels**
($5,740 / 70$)
5. After milling, the weight of flour is 76 percent of the original weight of the wheat. How many pounds of flour can be milled from one ton (2,000 pounds) of wheat? **1,520 pounds of flour**
($2,000 \times .76$)
6. One ton of wheat cost \$87, and one ton of flour costs \$210. How much did the value of wheat increase by processing it into flour? **\$123**
($\$210 - 87$)
7. A large bakery can produce 18-dozen hamburger buns per minute. How many buns can it produce per hour? **12,960 hamburger buns**
($18 \times 12 \times 60$)

Where Does Your Food Dollar Go?

Each dollar you spend on food is divided in many ways. Each person and process involved in getting the food to you receives a share of each food dollar. Using the numbers on the chart below, label each part of the diagram with the monetary amount and category.

One dollar spent on food in 1997 paid for:

- Farm value.....21¢
- Off farm labor 38.5¢
- Packaging..... 8¢
- Energy.....3.5¢
- Transportation..... 4¢
- Profit.....4.5¢
- Interest, taxes, and other costs..... 20.5¢

					

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