

Processing and Manufacturing • Lesson 9

The Pizza Puzzle

Class periods: one to four 30-min. class periods

Supplement section: Processing and Manufacturing PA PAS for FCS: 9.3.3 A, 9.3.3 B, 9.3.6 B, 9.3.9 B, 9.3.12 B

National Education Standards: FCS 8.2.1, 8.2.3, 8.2.5, 8.2.6, 9.2.1, 9.2.3, 9.2.5, 9.2.6; LA 2, 3, 035, 132, 278; SC 5.

LESSON SUMMARY

Students will learn about the different pieces of the pizza puzzle. The different pieces come from many places. Raw materials like milk, wheat, meat, and vegetables are changed into ingredients used in making the pizza. Students will learn what some of the changes are and how these new ingredients are assembled into a pizza.

Objectives

The students will be able to:

- List the parts of a pizza: crust, sauce, cheese, and toppings.
- Identify the ingredients in a ready-to-eat pizza.
- Describe one of the transformations that occur in the raw materials (wheat) to make pizza ingredients.
- List the safety procedures followed at the manufacturing plant while “manufacturing” (making) a pizza in a foods lab.
- Identify at least four members of the food safety team after viewing the video “The Mona Lisa Pizza Parlor Puzzle.”

Materials Provided

- Video: “The Mona Lisa Pizza Parlor Puzzle”

Overheads:

1. Ingredients in a pizza and where they come from
2. Safety points: Food safety in the purchasing and manufacturing the ingredients for a pizza

Worksheets:

1. Food Safety: From Farm to Table Newspaper Activity, Manufactured Foods
2. “The Mona Lisa Pizza Parlor Puzzle” video questions

Teacher information sheets:

1. The Kernel of Wheat ...
2. “The Mona Lisa Pizza Parlor Puzzle” video questions answer key
3. Evaluation for Pizza Lab
4. Evaluation of NIE newspaper activity
5. Glossary of Bolded Terms

Suggested Presentation Aids

- Show pizza pictures, box pizza, or fresh pizza and have students brainstorm about what are the ingredients that make up a pizza and where the different ingredients originate.
- Pizza lab: Provided by instructor: Planning sheet, ingredients for making a pizza (pizza dough, sauce, cheese, toppings).
Provided by students: Evaluation for inspection of pizza lab (activity for day one).

LESSON PLAN

Class Period 1

Introduction

Pizza is an edible puzzle. It has different pieces that come from many places.

Lesson Sequence

- Pizza can be divided into different parts, which include 1. Crust, 2. Sauce, 3. Cheese, and 4. Toppings.
- Show the pictures, box pizza, or fresh pizza to the class. Brainstorm: what ingredients come to mind when you think of pizza? (Flour/dough, yeast, cheese, sausage, pepperoni, mushrooms, ground beef, chopped vegetables, spices, etc.)
- In which part of the pizza are the different ingredients placed?
- (Overhead 1). Where do the pizza ingredients come from? Or What are these ingredients made from? (Flour/wheat, yeast/microscopic single cell organism, cheese/milk, sausage/pork, pepperoni/pork, mushrooms and chopped vegetables/grown, ground beef/beef steer)
- What happened to the wheat, milk, beef, pork, and vegetables to make the ingredients for the pizza?
- Let's look at wheat (Teacher information sheet 1) as an example of what happens to one pizza component, from raw material to the final ingredient. Wheat is used mainly for flour. Each grain has three basic parts: bran, endosperm, and germ. The three parts are separated during the milling process to produce flour. The **bran** is the outside covering of the grain and consists of several layers. It protects the grain kernel until it is milled. The **endo-sperm** is the white, inner part of the grain and is the source of white flour. The **germ**, from which the new plant sprouts, is at the end of the kernel. The germ is usually eliminated from

the wheat grain because the fat content limits the keeping quality of the flour. The bran and germ may be separated from the endosperm during the milling process, leaving the white endosperm to be used as flour.

- During the flour milling process, sanitation procedures must be followed to produce a safe product. Equipment needs to be clean and well maintained. Workers need to follow sanitary hygiene procedures. Storage of the wheat and flour needs to be free of pests, rodents, and insects.
- When flour is mixed with water, a substance called **gluten** is formed. Gluten is an elastic substance that forms a mesh-like structure in the dough that can surround the gas given off from the leavening agent, yeast. The gluten will stretch as the gas expands until the heat of the oven coagulates the gluten.
- **Yeast** is a microorganism that causes fermentation in flour to form carbon dioxide. The carbon dioxide gas can expand the gluten structure and cause the dough to rise.

Closure class period 1

- Activity: Divide a sheet of paper into four rows down and four columns across. In the newspaper, find pictures of the ingredients needed to make pizza, paste in the first column, and in the second column write down steps that were taken to make each ingredient safe. In the third column, paste pictures of different types of manufactured pizza products (frozen, boxed, pre-made pizza shells, etc.), and in the fourth column, write down steps to maintain safe food products.

Class Period 2

- The safety of making pizza is examined in the video, "The Mona Lisa Pizza Parlor Puzzle" (25 minutes). After the video is over, discuss the main points using Worksheet 2 and Teacher information/answer sheet 2.

- What does a pizza maker have to do first? He or she has to order the ingredients from a person or company that manufactures or sells the ingredients. The ingredients need to be stored in a sanitary place, either in a cool, dry place for non-perishables or in the refrigerator or freezer for perishable foods.
- Trucks transport the ingredients from the vendor to the manufacturing plant, where they are made into a pizza ready to be sold or used by the consumers (i.e., ready-to-eat pizza).
- (Overhead 2). Safety points for purchasing and manufacturing the ingredients for a pizza. Discuss each point with the class.

Closure class period 2

- What safety procedures do you need to consider when making a pizza?
Wash hands and personal hygiene; proper storage temperatures for perishable ingredients; clean storage areas for ingredients; sanitize cutting and preparation surfaces—avoid cross contamination; wash packages before opening; wash vegetables before cutting; clean ovens and serving equipment; cook pizza to proper temperatures; and refrigerate any unused ingredients.

Class Period 3

- Plan a pizza lab.
 1. Students will list all the ingredients in the pizza puzzle.
 2. Explain all the safety procedures needed to prepare each ingredient for the pizza. (Wash hands, wash equipment, clean cutting and preparation surfaces between different ingredients, wash packages before opening, wash vegetables, and cook meats to proper temperatures.)

Closure class period 3

- List all the safety procedures needed to manufacture the pizza in the foods lab. (All of the above safety points as well as cook pizza to proper temperature, use clean serving techniques, and clean all dishes, equipment, serving utensils, and preparation surfaces with hot, soapy water.)
- Plan kitchen duties so that each student has a turn as a food/kitchen inspector.

Class Period 4

1. Prepare, eat, and evaluate the pizza.
2. Use the evaluation sheet for inspection of the manufacturing of the pizza.
3. Each group will share with the class positive and negative food safety procedures during the pizza lab.

Closure class period 4

- Evaluate the pizza lab using Teacher information sheet 3.

Suggested Learning Activities

- Divide students into four to six groups. Ask each group to give a report on how each member of the Food Safety Team (farmer, manufacturer, retailer, consumer, and government official) is involved in making sure that ingredient is safe. Have students share their reports with the class.
- Have students look through newspapers and magazines to find articles on food marketing, government regulation, and food manufacturing. Have students report to the class and discuss the point of view of the group they represent.
- Manufactured foods. In the newspaper, find a picture of manufactured foods containing meat, fruit, vegetables, and/or grains. Paste the pictures into the first column on the paper. In the second column, write down steps that were taken to make each food safe. (Worksheet 1)

Evaluation

- Newspaper activity Worksheet 1: evaluate activity on foods chosen and safety procedures for manufacturing each food (Teacher information sheet 4).
- Have students evaluate the pizza lab for procedure, organization, cleanup, and food product and determine if **safety procedures** were followed.
- Inspectors give report of evaluation of safety procedures during pizza preparation.
- Quiz #9.
- Examination #3 at the end of the Processing and Manufacturing unit.

References

- NIE Newspaper Supplement
- <http://www.smallgrains.org/whfacts/kernel.htm> to find Teacher information sheet 1.
- Fight Bac Workshop, July 13-15, 1998. “The Mona Lisa Pizza Parlor Puzzle” video. The NIE Supplement and the Food System. Pennsylvania State University, College of Agricultural Sciences.
Contact J. Lynne Brown, Associate Professor, Food Science, Penn State University at email: f9a@psu.edu for more information on securing this video

Overhead 1

Ingredients in a Pizza and Where They Come From

Flour: wheat

Yeast: microorganism

Tomato Sauce: tomatoes

Cheese: milk

Pepperoni: pigs

Ground Beef: beef

**Vegetables, such as green peppers,
onions, mushrooms, or broccoli grown
in gardens or in farmers' fields**

Overhead 2

SAFETY POINTS: FOOD SAFETY IN PURCHASING AND MANUFACTURING THE INGREDIENTS FOR A PIZZA

Trucks transport the ingredients to the manufacturing plant or to pizza makers where they are made into a form ready to be sold or used by the consumers. Here are some of the safety steps food manufacturers use:

- They inspect incoming ingredients for bacteria content and temperature when they are unloaded.
- They clean and sanitize equipment and buildings regularly.
- They control temperatures throughout all stages of the manufacturing.
- They make sure workers follow good hygiene practices.
- They make sure the pizzas are microbiologically safe before they ship them to grocery stores, restaurants, food outlets, etc.

NIE Newspaper Supplement

Worksheet 1

Name _____

Class/Period _____

Date _____

**Foods Safety: From Farm to Table Newspaper Activity,
Manufactured Foods**

In the newspaper, find a picture of manufactured foods containing meat, fruit, vegetable, and/or grains. Paste the pictures into the first column on this sheet. In the second column, write down steps that were taken to make each food safe.

Manufactured Foods

Steps taken

Meat

Fruit

Vegetables

Grains

The NIE Newspaper Supplement: Fight Bac Workshop, July 13-15, 1998.

Worksheet 2

The Mona Lisa Pizza Parlor Puzzle Video Questions

1. What was the problem at the Mona Lisa Pizzeria?
2. What people are involved in providing the ingredients for the pizza?
3. What people are involved in making sure the pizza is safe?
4. The students visited four types of people. Who were they?
5. What did the students find out about the cause of the problem with the pizza?
6. How safe do you think your food is?

Fight Bac Workshop, July 13-15, 1998. NIE Food Supplement and the Food System

Teacher Information Sheet 1

The Kernel of Wheat

The wheat kernel, sometimes called the wheat berry, 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. The kernel of wheat is a storehouse of nutrients essential to the human diet.

Endosperm

..about 83 percent of the kernel weight. It is the source of white flour. The endosperm contains the greatest share of the protein in the whole kernel, carbohydrates, iron as well as many B-complex vitamins, such as riboflavin, niacin, and thiamine.

Bran

..about 14 1/2 percent of the kernel weight. Bran is included in whole wheat flour and is also available separately. Of the nutrients in whole wheat, the bran contains a small amount of protein, larger quantities of the B-complex vitamins listed above, trace minerals, and indigestible cellulose material also called dietary fiber.

Germ

..about 2 1/2 percent of the kernel weight. The germ is the embryo or sprouting section of the seed, usually separated because of the fat that limits the keeping quality of flour. Of the nutrients in whole wheat, the germ contains minimal quantities of protein, but a greater share of B-complex vitamins and trace minerals. Wheat germ can be purchased separately and is included in whole wheat flour.

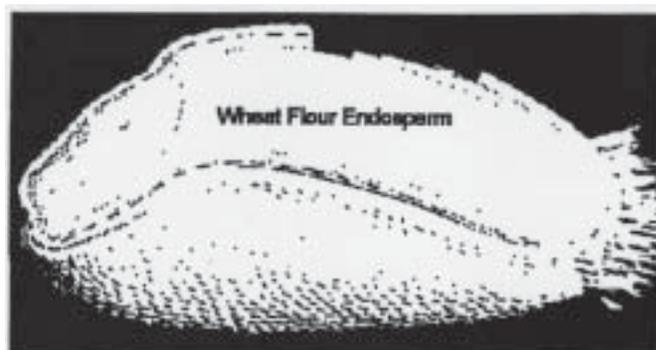
NUTRIENT COMPARISON OF SELECTED WHEAT FOODS

*100 Grams Edible Portion

Product	Calories	Protein grams	Fat grams	Carbo- hydrate grams
White Bread	267	8.28	3.92	48.82
Whole Wheat Bread	245	9.62	4.36	45.41
Cookie, Chocolate Chip	463	5.00	26.81	64.08
Doughnut	419	5.10	23.07	48.97
English Muffin	237	7.91	1.94	45.94
Crackers, Cheese	538	9.13	32.68	51.95
Pasta, dry	(368)	12.80	1.60	75.10

*100 gram equal 3.5 ounces
 Parentheses () denote calculated values

USDA Human Nutrition Service



Teacher information sheet 2

Answer Key

The Mona Lisa Pizza Parlor Puzzle Video Questions

1. What was the problem at the Mona Lisa Pizzeria?

17 people got sick after eating pizza; the health department is investigating the incident.

2. What people are involved in providing the ingredients for the pizza?

Genetic engineers who breed the tomato plants used, farmers including ranchers, growers, dairymen, food scientists, food manufactures, shippers and truckers, ingredient manufacturers, and government inspectors who check to see that regulations are being met

3. What people are involved in making sure the pizza is safe?

Farmers, shippers, food processors, retail units, government inspectors and consumers-the students

4. The students visited four types of people. Who were they? Who seemed to have the most interesting job?

Food scientist, genetic engineer, food processor, and farmer

Students' opinions

5. What did the students find out about the cause of the problem with the pizza?

No real cause was presented, just a lot of possibilities

6. How safe do you think your food is?

Students' opinions

Fight Bac Workshop, July 13-15, 1998. NIE Food Supplement and the Food System

Teacher information sheet 3

Name _____

Class/Period _____

Date _____

Evaluation for Pizza Lab

Evaluate each step of the pizza lab using the following rating scale. One is lowest and ten is the highest score. If an evaluation step is not used in your recipe, leave it blank.

Procedure	Score									
Proper storage temperature for perishable ingredients	1	2	3	4	5	6	7	8	9	10
Clean storage area for ingredients	1	2	3	4	5	6	7	8	9	10
Wash hands and personal hygiene	1	2	3	4	5	6	7	8	9	10
Clean and sanitize work area, ovens, and equipment	1	2	3	4	5	6	7	8	9	10
Wash packages before opening	1	2	3	4	5	6	7	8	9	10
Organize work area	1	2	3	4	5	6	7	8	9	10
Follow pizza directions completely	1	2	3	4	5	6	7	8	9	10
Measure ingredients accurately	1	2	3	4	5	6	7	8	9	10
Wash vegetables before cutting	1	2	3	4	5	6	7	8	9	10
Cook ground beef topping to 160° F	1	2	3	4	5	6	7	8	9	10
Assemble pizza ingredients on pizza	1	2	3	4	5	6	7	8	9	10
Bake pizza to proper temperature: 400-450° F for approx. 15 min.	1	2	3	4	5	6	7	8	9	10
Clean up: wash all equipment with hot, soapy water	1	2	3	4	5	6	7	8	9	10
Clean up any spills on the floor	1	2	3	4	5	6	7	8	9	10
Use a commercial cleaner on preparation surfaces to sanitize	1	2	3	4	5	6	7	8	9	10
Refrigerate or freeze any leftover pizza	1	2	3	4	5	6	7	8	9	10

Teacher information sheet 4

Name _____

Class/Period _____

Date _____

Evaluation of NIE Newspaper Activity

Grade the NIE activity on the following criteria using the 0-4 rating scale. Four is the highest rate and zero is the lowest rate. Write comments in the boxes under the rating for each criterion.

Criteria	4	3	2	1	0
Content: Information is correct, complete, and useful					
Neatness: Clean, organized, and not sloppy					
Spelling: All words spelled correctly					
Handed in on time: Handed in on due date. A point is deducted for each day late.					
Time Management: Time used wisely and working on project at allotted time.					

Teacher information sheet 5

Glossary of Bolded Terms

Bran: Outside covering of the grain; consists of several layers.

Endosperm: The white, inner part of the grain. It is the source of white flour.

Germ: It is at the end of the kernel from which a new plant sprouts.

Yeast: A microscopic single-cell organism, which causes fermentation in flour to form carbon dioxide.

Gluten: An elastic substance that forms a mesh-like structure in the dough that can surround the gas given off from the leavening agent, yeast.

Quiz 9

Unit: Processing and Manufacturing
Lesson: The Pizza Puzzle

Name _____

Class/Period _____

Date _____

Matching: Match the vocabulary terms in column A with the definitions in column B. Write the letter of the definition in column B in the space next to the terms in column A.

A	B
_____ 1. Germ	A. Microscopic organism that causes fermentation in flour to form carbon dioxide.
_____ 2. Gluten	B. The end of the kernel from which a new plant sprouts.
_____ 3. Yeast	C. Elastic substance that forms a mesh-like structure in the dough that surrounds the gas given off from the yeast.
_____ 4. Endosperm	D. The white, inner part of the grain; the source of white flour.
_____ 5. Germ	E. Outside covering of the grain; consists of several layers.

Short answer: Write short answers to the following questions. Use complete sentences when answering questions.

1. List the four parts of a pizza. Choose two parts of the pizza and identify the origin of the ingredients.
 - a.
 - b.
 - c.
 - d.

2. List two safety and/or sanitation practices necessary during the flour milling process to ensure a safe food product.

3. What safety procedures do you need to consider when making a pizza? List three.

Quiz 9 Key

Unit: Processing and Manufacturing
Lesson: The Pizza Puzzle

Matching: Match the vocabulary terms in column A with the definitions in column B. Write the letter of the definition in column B in the space next to the terms in column A.

A	B
<u> E </u> 1. Germ	A. Microscopic organism that causes fermentation in flour to form carbon dioxide.
<u> C </u> 2. Gluten	B. The end of the kernel from which a new plant sprouts.
<u> A </u> 3. Yeast	C. Elastic substance that forms a mesh-like structure in the dough that surrounds the gas given off from the yeast.
<u> D </u> 4. Endosperm	D. The white, inner part of the grain; the source of white flour.
<u> B </u> 5. Germ	E. Outside covering of the grain; consists of several layers.

Short answer: Write short answers to the following questions. Use complete sentences when answering questions.

1. List the four parts of a pizza. Choose two parts of the pizza and identify the origin of the ingredients.
 - a. *Crust: flour (wheat), yeast, liquid, salt, sugar cane.*
 - b. *Sauce: tomatoes, garlic butter or other sauce.*
 - c. *Cheese: milk product: curd coagulation (mozzarella, Romano, cheddar, parmesan, etc.).*
 - d. *Toppings: farm-grown vegetables (green peppers, onions, broccoli, etc.) and fruits (pineapple, apples, bananas, etc.), mushrooms. Meat: beef and pork (sausage or ham). Poultry: chicken or turkey. Seafood: fish, clams, crab, lobster, anchovies.*

2. List two safety and/or sanitation practices necessary during the flour milling process to ensure a safe food product.
 - a. *Separation of grain into its parts: bran, endosperm, and germ. Clean equipment, employees, and storage facilities.*
 - b. *Well maintained equipment.*
 - c. *Storage facilities for wheat and flour needs to be free of pests, rodents, and insects.*

3. What safety procedures do you need to consider when making a pizza? List three.

<ol style="list-style-type: none"> a. <i>Wash hands and personal hygiene</i> b. <i>Maintain proper storage temperatures for perishable ingredients</i> c. <i>Clean storage areas for ingredients</i> d. <i>Sanitize cutting and preparation surfaces: avoid cross contamination</i> 	<ol style="list-style-type: none"> e. <i>Wash packages before opening</i> f. <i>Wash vegetables before cutting</i> g. <i>Clean ovens and serving equipment</i> h. <i>Refrigerate any unused ingredients</i> i. <i>Cook meat to proper temperature</i>
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