

Lesson A3-2

Identifying Food-Borne Illnesses and Their Prevention

Unit A. Food Science

Problem Area 3. Food Microbiology

Lesson 2. Identifying Food-Borne Illnesses and Their Prevention

- **Illinois State Goal and Learning Standard.** This lesson is correlated with the following State Goal and Learning Standard:

State Goal: 12 Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

Learning Standard: B Know and apply concepts that describe how living things interact with each other and with their environment.

- **Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

- 1 Describe the symptoms of food-borne illnesses.**
- 2 Describe the causes of food-borne illnesses.**
- 3 Describe prevention of food-borne illnesses.**

- **List of Resources.** The following resources may be useful in teaching this lesson:

West, Dorothy. *Nutrition, Food, and Fitness*. Tinley Park, IL: Goodheart-Willcox Publisher, 2006. (Chapter 20)

McGraw-Hill. *Food Science: The Biochemistry of Food and Nutrition*. New York, NY: Glencoe Publishing, 2006.



- Byrd-Bredbenner, Carol. *Adventures in Food and Nutrition!*. Tinley Park, IL: Goodheart-Willcox Publisher, 2007. (Chapter 8 and 9)
- National Council for Agricultural Education. *Food Science, Safety, and Nutrition Curriculum*. Madison, WI: National FFA Foundation, 1993. (Unit 4)
- Parker, R. *Introduction to Food Science*. Albany, NY: Delmar-Thomson Learning, 2003. (Chapter 25)
- Seperich, George J. *Food Science and Safety*. 2nd Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2004.

■ List of Equipment, Tools, Supplies, and Facilities

- ✓ Writing surface
- ✓ Overhead projector
- ✓ Transparencies from attached masters

■ Terms. The following terms are presented in this lesson (shown in bold italics):

- ▶ Cross contamination
- ▶ Food-borne illness

■ Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask the class if any of the students have suffered from food poisoning. Have them describe their experience. As a class, develop a list of possible reasons for this food poisoning. Allow this to lead into a discussion of the content of this lesson.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1: Describe the symptoms of food-borne illnesses.

Anticipated Problem: What are the symptoms of food-borne illnesses?

- I. A **food-borne illness** is an illness caused by foods that were improperly prepared or stored. Most people are familiar with, or have personally experienced, some form of a food-borne illness or food poisoning.
 - A. Symptoms of food-borne illnesses vary, depending on the type of pathogens that cause them. Common symptoms include diarrhea, vomiting, abdominal cramping, bloody stools, and headaches.

- B. Symptoms may start as early as 30 minutes after eating, or may take days to begin. Symptoms often last for a short period of time. If symptoms persist or are very severe immediate medical attention may be required.

Many techniques can be used to assist students in mastering this material. Students need text material to aid in describing the symptoms of food-borne illnesses. Unit 4 in the Food Science curriculum is recommended. Use VM–A to aid in discussion on this topic.

Objective 2: Describe the causes of food-borne illnesses.

Anticipated Problem: What are the causes of food-borne illnesses?

- II. Microorganisms cause food-borne illnesses. The two most common means of contamination with these microorganisms are failure to keep foods at the proper temperature (either hot or cold) and cross contamination. **Cross contamination** occurs when clean foods come into contact with equipment that has been used to process foods that contain microorganisms. Specific microorganisms are responsible for different food-borne illnesses.
- A. Salmonellosis is caused by the *Salmonella* bacteria. Raw meat is usually the source of these bacteria. Symptoms include abdominal pain, diarrhea, nausea, and vomiting. The onset of symptoms occurs in eight to 12 hours after consuming contaminated foods.
- B. E. coli is caused by the *Escherichia coli* bacteria. The usual source of these bacteria is meat, especially undercooked or raw ground meat. Symptoms include severe abdominal pain, diarrhea, bloody stools, and vomiting. Onset of symptoms varies and can last for up to eight days.
- C. *Staphylococcus aureus* causes Staphylococcal food poisoning. These bacteria usually develop when food is left at room temperature for too long. Symptoms include diarrhea, vomiting, nausea, abdominal pain, and cramps. This illness can sometimes be fatal. Onset of symptoms occurs 30 minutes to eight hours after consuming contaminated foods.
- D. *Clostridium perfringens* cause perfringens food poisoning. Not keeping food hot enough is the usual cause for this illness. Symptoms include abdominal pain, diarrhea, nausea, and vomiting. Onset of symptoms occurs eight to 12 hours after eating contaminated foods.
- E. *Campylobacter jejuni* is the cause of Campylobacteriosis. Bacteria on animals can contaminate meat or milk, which, when eaten, causes this illness. Symptoms include diarrhea, abdominal cramping, and fever, and begin two to five days after contaminated food is consumed.
- F. *Clostridium botulinum* causes botulism. This food-borne illness is usually found in canned meat, luncheon meats, and fish. Symptoms include double vision, inability to swallow, speech difficulty, paralysis of respiratory system, and in severe cases,

death. Onset of symptoms occurs four to 36 hours after contaminated food is consumed.

- G. Listeria is caused by *Listeria monocytogenes*. Microorganisms found in soil, water, and vegetation cause this illness. Symptoms include blood poisoning, meningitis, encephalitis, and abscesses.

Many techniques can be used to assist students in mastering this material. Students need text material to aid in describing the causes of food-borne illnesses. Unit 4 in the Food Science curriculum is recommended. Use VM-B to aid in discussion on this topic.

Objective 3: Describe prevention of food-borne illnesses.

Anticipated Problem: How do we prevent food-borne illnesses?

- III. Having a food-borne illness is not only an unpleasant experience, it can be life-threatening. Every effort should be made to prevent these illnesses. There are three solutions to accomplishing this task.
- A. Proper food storage is the first solution for preventing food-borne illnesses. This includes properly refrigerating and freezing foods that require it. Foods stored at room temperature must also be sealed correctly.
- B. Proper sanitation is the second solution for preventing food-borne illnesses. There is nothing that can replace a clean food preparation environment. Proper sanitation also applies to the people who prepare the foods.
- C. Proper cooking temperature is the third solution for preventing food-borne illnesses. This is especially important for meats. Beef should be cooked to 140°F, pork to 150°F, and poultry to 165°F.

Many techniques can be used to assist students in mastering this material. Students need text material to aid in describing prevention of food-borne illnesses. Unit 4 in the Food Science curriculum is recommended. Use VM-C and VM-D to aid in discussion on this topic.

- **Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the review/summary.
- **Application.** The *Food Science and Safety* text is an excellent way of applying the materials in this lesson.

■ **Evaluation.** A test has been included to help evaluate the student comprehension of the objectives covered in this lesson.

■ **Answers to Sample Test:**

Part One: Matching

1. a
2. c
3. b
4. d
5. e
6. f

Part Two: Completion

1. Cooking
2. sanitation
3. Microorganisms

Part Three: Short Answer

Proper storage, proper sanitation, and proper cooking temperature

Identifying Food-Borne Illnesses and Their Prevention

► Part One: Matching

Instructions: Match the term with the correct response. Write the letter of the term by the definition.

- | | |
|------------------------|----------------------------------|
| a. Botulism | d. Food-borne illness |
| b. Campylobacteriosis | e. Listeria |
| c. Cross contamination | f. Staphylococcal food poisoning |

- ____ 1. A food-borne illness usually found in canned meat, luncheon meats, and fish
- ____ 2. Occurs when clean foods come into contact with equipment that has been used to process foods that contain microorganisms
- ____ 3. Disease caused by bacteria on animals contaminating meat or milk to cause this illness
- ____ 4. An illness caused by foods that were improperly prepared or stored
- ____ 5. A food-borne illness caused by microorganisms found in soil, water, and vegetation
- ____ 6. A food-borne illness caused by food left at room temperature for too long

► Part Two: Completion

Instructions: Provide the word or words to complete the following statements.

1. _____ foods to the proper temperature is important to prevent food-borne illnesses.
2. Proper _____ includes keeping both the food preparation area and the food preparers clean.



3. _____ cause food-borne illnesses.

► **Part Three: Short Answer**

Instructions: Provide information to answer the following statement.

Describe three solutions to preventing food-borne illnesses.

SYMPTOMS OF FOOD-BORNE ILLNESSES

- ◆ Food-borne illness—an illness caused by foods that were improperly prepared or stored.
- ◆ Symptoms of food-borne illnesses vary, depending on the type of pathogens that cause them.
- ◆ Common Symptoms
 - Diarrhea
 - Vomiting
 - Abdominal cramping
 - Bloody stools
 - Headaches
- ◆ Symptoms may start as early as 30 minutes after eating, or may take days to begin.
- ◆ Symptoms often last for a short period of time.
- ◆ If symptoms persist or are very severe immediate medical attention may be required.



CAUSES OF FOOD-BORNE ILLNESSES

Food-borne Illness	Pathogen	Source	Symptoms
Salmonellosis	<i>Salmonella</i> bacteria	Raw meats	Abdominal pain, diarrhea, nausea, vomiting (Onset in 8 to 12 hours)
E. coli	<i>Escherichia coli</i>	Meat, especially undercooked or raw ground meat	Severe abdominal pain, diarrhea, bloody stools, vomiting (Onset varies, lasts up to 8 days)
Staphylococcal food poisoning	<i>Staphylococcus aureus</i>	Food left too long at room temperature	Diarrhea, vomiting, nausea, abdominal pain, cramps, sometimes fatal (Onset in 30 min. to 8 hours)
Perfringens food poisoning	<i>Clostridium perfringens</i>	Not keeping food hot enough. This bacteria lives between 120°F and 130°F.	Abdominal pain, diarrhea, nausea, vomiting (Onset in 8 to 12 hours)
Campylobacteriosis	<i>Campylobacter jejuni</i>	Bacteria on animals that can infect meat or milk	Diarrhea, abdominal cramping, fever (Onset in 2 to 5 days)
Botulism	<i>Clostridium botulinum</i>	Canned meat, luncheon meats, fish	Double vision, inability to swallow, speech difficulty, paralysis of respiratory system, death (Onset in 4 to 36 hours)
Listeria	<i>Listeria monocytogenes</i>	Found in soil, water, vegetation; adaptable to wide ranges of temperatures	Blood poisoning, meningitis, encephalitis, abscesses



PREVENTION OF FOOD-BORNE ILLNESSES

Three solutions for preventing food-borne illnesses:

- ◆ Proper food storage
- ◆ Proper sanitation
- ◆ Proper cooking temperature



GOOD PERSONAL HABITS FOR SAFE FOOD HANDLING

- ◆ Wash your hands before beginning food preparation.
- ◆ Wear clean food-handling gloves.
- ◆ Wear a hat and/or a hairnet (and a beard net, if appropriate).
- ◆ Never pick up items from the floor when handling food.
- ◆ Never handle unclean items while working with food.
- ◆ Wear clean and appropriate clothing.
- ◆ Keep the work area clean and sanitary.
- ◆ Use good judgment to prevent food contamination.

