FSI FOOD SAFETY INVESTIGATION

Lesson 1.1

Building a Case to Prevent Foodborne Illness

Estimated time: One 50 min period

Instructional overview

Lesson 1.1 serves as an introduction to the unit by developing the theme and defining the key terms food safety, hazard, and foodborne illness. Students will discuss the significance of food safety as a part of their lives as consumers and members of the workforce. Students will be introduced to the main assignment for the unit, the Case File (See Appendix B for detailed information).

Instructional objectives

1. Distinguish between three types of food safety hazards associated with food contamination.
2. Explain the relationship between food safety hazards and foodborne illness.
3. Identify some common microorganisms that cause foodborne illnesses and recognize symptoms common of each.
4. Begin to prepare a Case File for the unit.

Assessment

On Homework Assignment 1.1 students will demonstrate that they are able to collect information from credible sources and provide proper citation. Student responses, which will summarize an article from a newspaper, magazine, or other current literature, should demonstrate that they are able to explain the relationships between food safety hazards and foodborne illnesses with at least 70% accuracy on the Grading Rubric.

Relevant learning standards – NSES-F, NHES-1, NHES-3

Equipment, supplies, and materials

1. Glo Germ™ kit.
2. Apples for each student, a container with a mix of beans and pebbles, Mr. Clean™ lemon scented, Lemonade in clear bottle.
3. PowerPoint presentation – PPT 1.1.
4. Prepared Case File – one per student.
5. Case File Checklist – one per student or use ppt template.
6. FSI Unit Debriefing Notes – one per student or use ppt template.
7. Case Notes 1.1 – one per student or use ppt template.
8. FDA Alert - one per student or use ppt template.
9. Homework Assignment 1.1 – “Eye Witness Account” – one per student or use ppt template.

References and background information

1. Dr. Carl Winter, Still Stayin Alive Music CD: http://foodtunes.com/
2. Foodborne Illnesses Table: Bacterial Agents. http://www.ama-assn.org/ama1/pub/upload/mm/36/2004_food_table_bact.pdf
3. Foodborne Illnesses Table: Parasitic Agents. http://www.ama-assn.org/ama1/pub/upload/mm/36/2004_food_table_para.pdf
4. Foodborne Illnesses Table: Viral Agents. http://www.ama-assn.org/ama1/pub/upload/mm/36/2004_food_table_vira.pdf
5. FDA Alert: http://www.fda.gov/bbs/topics/NEWS/2003/NEW00993.html
6. GAPsNET www.gaps.cornell.edu

Interest approach

Prepare a jar containing dry beans with pebbles mixed into the beans. The more the beans and the pebbles look alike, the better. Purchase one bottle of lemonade and one bottle of Mr. Clean™ or some other cleaning solution that is roughly the same color. Brush one apple with Glo Germ™ Powder. Prepare beans, lemonade, and apples before students enter the classroom. As students enter the room, play a selection from *Still Stayin Alive* CD by Dr. Carl Winter and hand out unbrushed apples to students. Keep the rest of the props on the desk. Use props to demonstrate the three types of food hazards following the teaching procedures below to initiate classroom discussion. The music is optional but will engage students with its foodborne illness specific lyrics.

Classroom procedures

Teaching procedures	Content
Lead student discussions Show beans and pebbles = physical Show lemonade and Mr. Clean™ = chemical Use black light and Glo Germ™ apple = biological Use PPT 1.1 to lead class discussion on potential food safety hazards. Record student ideas on the board. Encourage student brainstorming for additional examples of hazards.	• How many of you eat? • How many of you believe that your food is safe to eat? • What makes food safe or unsafe? • Can you think of anything that might be on or in your food that would make it unsafe to eat? • Can you categorize these hazards in any way? By the way they look or where they come from or how they might cause injury or whom they might injure? What is the hazard in the beans? Beans grow in a field with rocks, stones, and sticks. What happens if they get in the product at harvest? What could be the hazard in the lemonade? What would happen if a lemon scented cleaning agent accidentally spilled into the bottling line? What could be the hazard on the apple? What if one of the people that picked these apples did not wash their hands after using the bathroom?

The glossary in Appendix C contains all definitions presented in the Unit.	**Hazards** are physical, chemical or biological agents that are reasonably likely to cause illness or injury in the absence of control. Examples: Physical – foreign objects: metal, glass, hard plastic, pebbles, pits, shells, etc. Chemical – toxic chemicals, natural toxins, food allergens, etc. Biological – microorganisms such as bacteria, viruses, parasites, and certain fungi (molds). If any of these hazards get into or on foods it is called contamination. **Contamination is** when physical, chemical, or biological hazards are introduced in or on foods.
Lead class discussion into foodborne illness. Use student experiences if possible. Write student responses on the board.	What hazards cause foodborne illness? What is foodborne illness? Has anyone ever had or known someone who has had a verified "foodborne illness" or "food poisoning"? What happened to them? Do you know what caused the illness? Can we develop our own definition for foodborne illness from this information? Compare class definition with actual definitions. **Foodborne illness** An illness or disease transmitted to people through food products that result from ingesting foods that contain pathogens (including bacteria, viruses and parasites) and/or their toxins and toxic chemicals. What is a pathogen? **Pathogen** Any microorganism that is infectious or toxic and causes illness or disease. Pathogens include bacteria, viruses, parasites, and some fungi. Some pathogens produce toxins which are poisonous substances produced by bacteria and fungi.

Focus discussion on the biological hazards and lead discussion of both good and bad microorganisms.	Are all microorganisms pathogenic? NO. Microorganisms can be found in the air, water, and soil. Some microorganisms are beneficial. In food production, beneficial microorganisms are used to create desirable products such as yogurt and sauerkraut. Other microorganisms cause food to spoil (spoilage microorganisms) and some cause human illness and even death (pathogenic microorganisms). **Microorganism** An organism so small that it cannot be seen without the aid of a microscope. Another word for microorganism is microbe.
Lead discussion to briefly introduce some common foodborne illnesses and their causes. Students might know of others. Record their answers on the board. Students need to understand this is not a complete list of foodborne illnesses and more details will be presented over the course of the unit. There are over 2500 different species of *Salmonella*. Approximately 200 are pathogenic to humans.	There are more than 250 known foodborne diseases. Here are three common foodborne illnesses, the causing microorganisms, the symptoms, and foods likely to be contaminated. Example of a **bacterium**: Name of illness: Salmonellosis Microorganism: *Salmonella* species (*spp*). Chief symptoms: Nausea, vomiting, abdominal cramps, diarrhea, fever, and headache. Sometimes chronic consequences such as arthritic symptoms may occur 3-4 weeks after onset of first symptoms. *Salmonella typhimurium* and *Salmonella enteriditis* are the most common serotypes in the U.S. Food: Contaminated foods are often of animal origin such as beef, poultry, milk, or eggs but all foods including produce such as alfalfa sprouts, melons and tomatoes may become contaminated. Example of a **virus**: Name of illness: Hepatitis A Microorganism: Hepatitis A virus Chief symptoms: Diarrhea, dark urine, jaundice, and flu-like symptoms, i.e., fever, headache, nausea, and abdominal pain. Food: Shellfish harvested from contaminated waters, contaminated drinking water, raw produce, uncooked foods and cooked foods that are not reheated after being handled by an infected food worker.

	Example of a **parasite**: Name of illness: Giardiasis Microorganism: *Giardia lamblia* Chief symptoms: Diarrhea, stomach cramps, gas. Food: Contaminated drinking water, uncooked foods, or food contaminated by an ill food handler after cooking. Can you name other foodborne illnesses?
Use student input to develop a definition of **food safety**. Discuss the complex food system and the many people that are involved in keeping food safe.	How do we prevent foodborne illness and other food safety hazards? By implementing detailed food safety practices in all sectors of the food system. What do you think food safety means? **Food safety** is the general term used for the practices and safe guards that are used to protect our food from biological, chemical, and physical hazards that may cause illness or injury. Who is responsible for implementing food safety techniques? There are many people responsible for food safety in all sectors of the food system. The safety of food is dependent upon EVERYONE working in the food industry from farm to table.
Handout Case Files including Case Notes or use ppt template reflecting today's gathered information. Students should put their names on all handouts and their Case File so they can be identified from others in the class. Explain that the Case File will serve as the unit assessment rather than an exam. Handout or use the ppt template of the Case File Checklist and FSI Unit Debriefing for students to read through and put in their Case Files. Review the Case Briefing with students. Ask them to underline details that they think will be important for solving this case.	Begin to prepare a Case File for the unit assignment. As food safety investigators you will learn about the complex food system, to identify food hazards, to prevent contamination, and to collect pertinent facts during an investigation. You will develop a Case File with all the relevant information and notes about the investigation. At the end of the FSI Unit your Case File will be graded instead of having a unit exam. It is very important that you complete all of your Case Notes and keep them neat and orderly in the Case File. Failure to do so will compromise your ability to pass the FSI Unit. Good record keeping is critical and must include all the gathered information.

Hand out or use PPT 1.1 to introduce the FDA Alert on green onions. Ask students what information is needed to solve an investigation like this.	Examples of student questions: • What type of microorganism caused the outbreak? • Where were the green onions grown? • How many states were affected? • What is complicating the investigation? • Who is at risk? Over the coming weeks you will learn ways to solve this and similar cases. You will also discover how implementing food safety practices can help minimize the risk of spreading and contracting foodborne diseases.
Handout Homework Assignment 1.1 or use ppt template to help students organize their notes. Write the Due Date on the board. Go over the three parts of the assignment. (See Homework Assignment 1.1).	Please write the due date in the space provided on your handout now. A grading scale has been provided for you.
Context with future instruction.	In the next lesson, we will begin our investigation into foodborne illness outbreaks and discuss many suspects.
Reflections for future use.	

FSI FOOD SAFETY INVESTIGATION

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Case Notes 1.1

Name: _____ **Date:** _____

Potential food safety hazards:

Physical	
Chemical	
Biological	

Foodborne illness: _____

_____

_____

Pathogens: _____

_____

_____

Toxins: _____

_____

_____

Microorganisms: _____

_____

_____

Pathogenic Microorganisms	Common Foodborne Illness	Chief Symptoms	Food
Bacteria			
Virus			
Parasite			

Food safety: _____

_____

_____

_____

_____

_____

Name one thing you can do to prevent foodborne illness? _____

_____

_____

_____

_____

_____

Reflection: How do food safety and foodborne illness affect me? _____

_____

_____

_____

_____

FSI Case File Checklist

The FSI Investigator (student) will gather evidence and information regarding the cases in this FSI Investigation Unit and then organize them into a "Case File". In each lesson, evidence will be collected in the form of homework assignments, case notes, and investigation activities. Instead of a typical exam at the end of this unit, the Case File will be graded. Grades will be determined on how well the students have collected and maintained the evidence in their Case File.

Students are responsible for including all of the items listed below in their Case File. Students should use the Checklist and check off items as they put them in the Case File. Note: students are responsible for finding or talking to the teacher about any lost or misplaced evidence.

Lesson	Title	Evidence Reviewed	Evidence included in final Case File
1.1	Case Notes 1.1		
1.1	Case File Checklist		
1.1	FSI Unit Debriefing Notes		
1.1	Homework Assignment 1.1		
1.2	Case Notes 1.2		
1.2	Investigation Activity 1.2		
1.3	Case Notes 1.3		
1.3	Investigation Activity 1.3		
1.4	Case Notes 1.4		
1.4	Investigation Activity 1.4.		
1.5	Case Notes 1.5		
1.5	Investigation Activity 1.5 All sheets.		
2.1	Case Notes 2.1		
2.1	Assignment 2.1		
2.2	Investigation Activity 2.2		
2.3	Farm Assessment Action Plans		
2.3	Assignment 2.3		
2.4	Case Notes 2.4		
2.4	Investigation Activity 2.4		
2.5	Investigation Activity 2.5		
2.5	Summary 2.5		

FSI Unit Debriefing Notes

Debriefing or reporting on an investigation or task is an important part of an investigator's work. As FSI investigators you will be required to reflect on what went well and what areas you think need to be improved in this unit.

After assembling your Case File, please choose two in-class activities or homework assignments on which to reflect. If possible, try to choose one from each module. For each activity/assignment write a 1-2 page response that includes the following:

- Explain why you chose to reflect on this activity/assignment.
- Evaluate the purpose and meaning of the activity/assignment, including what you have learned.
- Reflect on what you did well as an individual or in the group.
- Discuss ways to improve either your actions or the activity/assignment in the future.

Your FSI Unit Debriefing will be due when you hand in your Case File at the completion of the FSI Unit. Remember, instead of a typical exam, your Case File will be the final grade you receive for this unit.

Your completed Case File will be graded on the following criteria:

- Required evidence: is all the evidence included in your Case File?
- Organization of the Case File: was your Case File carefully maintained throughout the FSI Unit and put in correct order?
- Growth/Development during the Unit: does the work you turned in with your Case File reflect your critical thinking and problem solving abilities?
- Debriefing (Reflection): does your debriefing discuss all of the criteria listed above?
- Grammar and Spelling: did you edit your Case File to correct spelling and grammar errors?

Directions: Read the following details regarding the foodborne illness outbreak at the center of our investigation. Underline any details you think may be important for solving this case. The FDA alert can be found at http://www.fda.gov/bbs/topics/NEWS/2003/NEW00993.html

FDA Statement

FOR IMMEDIATE RELEASE
Statement
December 9, 2003
Media Inquiries: 301-436-2335
Consumer Inquiries: 888-INFO-FDA

FDA Update on Recent Hepatitis A Outbreaks Associated With Green Onions from Mexico

The Food and Drug Administration is reaffirming that several recent Hepatitis A virus outbreaks have been associated with eating raw or undercooked green onions (scallions). Investigations by state and local health departments, the Centers for Disease Control and FDA have determined that the outbreaks were caused by green onions traced to Mexico for the three outbreaks with completed traceback investigations. It is important to remember that Hepatitis A Virus is transmitted by fecal-oral route. Produce can become contaminated when a person who has Hepatitis A or whose hands are contaminated with Hepatitis A virus comes into contact with the product or by exposure of the product to water contaminated with Hepatitis A virus.

Hepatitis A outbreaks associated with raw or undercooked green onions served in restaurants occurred in Tennessee, North Carolina and Georgia in September and in Pennsylvania in late October through early November. The source of the green onions in the outbreaks has been traced to Mexico for the Tennessee, Georgia and Pennsylvania outbreaks. The source of the onions in the North Carolina outbreak is still being determined. The exact source of the contamination has not been established in any of these outbreaks. FDA is continuing to investigate in both the U.S. and Mexico and has been in consultation with Mexican authorities to obtain their assistance in assessing the situation.

A team of investigators from FDA and CDC spent the first week of December in Mexico working with Mexican officials to visit the four firms and associated facilities identified in the FDA traceback investigations. Preliminary findings from the FDA team include the following points: The onions would have been harvested in July or early August for the Tennessee and Georgia outbreaks and September for the Pennsylvania outbreak.

- At the point of the inspections in December 2003, none of the farms or packing sheds inspected were harvesting or handling green onions, or had field workers or packing shed workers present.
- No one firm's onions are common to all of the outbreaks under investigation.
- FDA, CDC and the states to date have found no evidence of contamination of implicated green onions occurring at firms operating in the U.S., but investigations relating to the source of green onions in the North Carolina outbreak are continuing.

- There are no reliable methods currently available to find Hepatitis A virus in samples collected in the field, so FDA did not collect environmental or green onion samples for Hepatitis A analysis.
- The investigation team identified issues of concern from interviews and observations at all four firms visited including items such as poor sanitation, inadequate hand washing facilities, questions about worker health and hygiene, the quality of water used in the fields, packing sheds, and the making of ice, any of which can have a role in the spread of infectious diseases such as Hepatitis A.
- FDA was pleased to see that some of the farms visited were making or had just completed improvements to their water systems and other physical facilities.
- As FDA investigates the sources of products implicated in foodborne outbreaks, FDA is always concerned with the monitoring of worker health, water quality, and sanitary conditions.
- FDA and the Mexican government are working together on an ongoing basis with regard to technical issues arising from the process of investigating all possible sources of implicated products in foodborne outbreaks. The FDA and Mexican health and agriculture authorities are engaged in a joint effort to ensure the safety of Mexican produce entering the United States and improving the health of citizens on both sides of the border.
- FDA is pleased to know, as Dr. Javier Trujillo, Undersecretary of Food Safety and Quality indicated, that the Government of Mexico is already well along in implementing a program of inspecting growers on a regular proactive basis by region so that problems can be prevented before they arise.

Hepatitis A is a liver disease that develops within 2-6 weeks after exposure. Hepatitis A is usually mild and characterized by jaundice (yellow discoloration of the skin), fatigue, abdominal pain, loss of appetite, nausea, diarrhea, and fever. It can occasionally be severe, especially in people with liver disease. Persons infected with Hepatitis A virus, in particular children, may have no symptoms or very mild symptoms.

Hepatitis A virus sequences from persons who became ill in the outbreaks in Tennessee, Georgia, North Carolina and Pennsylvania were identical or very similar to sequences observed among persons with Hepatitis A living along the United States-Mexico border and travelers returning from Mexico, consistent with a source in Mexico.

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Homework Assignment 1.1 **Assignment due:** _____

Name:_____ **Date:** _____

"Attack of the Killer Tomatoes!"

Even though the United States food production is one of the safest in the world, foodborne illnesses occur and are a serious problem for millions of people in the U.S. and around the world. It is good for people to be aware of the seriousness of foodborne illnesses so they can take precautions to protect themselves and others. However, newspaper headlines, TV shows, and news broadcasts can sometimes lead us to believe that a situation is far worse than it really is. Exciting and often emotionally charged topics can be dramatized or "sensationalized" by the media with little or no consideration of the scientific or medical facts. To tell the story in the time allotted, background information and complex scientific facts may be excluded. The audience is left to form opinions with only part of the critical information and this can lead to confusion or misunderstanding.

Part I – For this assignment you should search different newspapers, magazines or other current literature for an article on a food safety issue or foodborne illness outbreak. Fill in the information below and staple a copy of the article to this handout.

1. Article title: _____
2. Author(s):_____
3. Date the article was published: _____
4. Name of publication: _____
5. Type of publication (journal, magazine, newspaper, web site): _____

   _____
6. If you found it on the Internet, please write down the Internet Address below: _____

   _____

Part II – After you have read the article please answer the following (5 Ws):

What happened? _____

_____

_____

_____

_____

Who did this happen to? _____

_____

_____

_____

_____

Where did this occur?_____

_____

_____

_____

_____

When did this occur? _____

_____

_____

_____

_____

Why did this happen?_____

_____

_____

_____

_____

Part III – Critical Thinking Questions – On a Separate Piece of paper answer the following questions in 1-2 paragraphs. Be sure to staple your response along with a copy of your article to this handout!

How does this issue/event relate to food safety?

Do you think the article you found accurately portrays what actually happened?

How may the media have dramatized or otherwise sensationalized this issue or event?

This assignment will be graded using the following Grading Rubric:

Assessment Criteria	Maximum Points	Points Scored
The article relates to an actual foodborne illness.	**1**	
The literature or web site is scientifically credible.	**1**	
The summary explains the situation clearly (5 Ws).	**5**	
Student provided thoughtful responses to the critical thinking questions.	**3**	
TOTAL	**/10 =**	**%**