



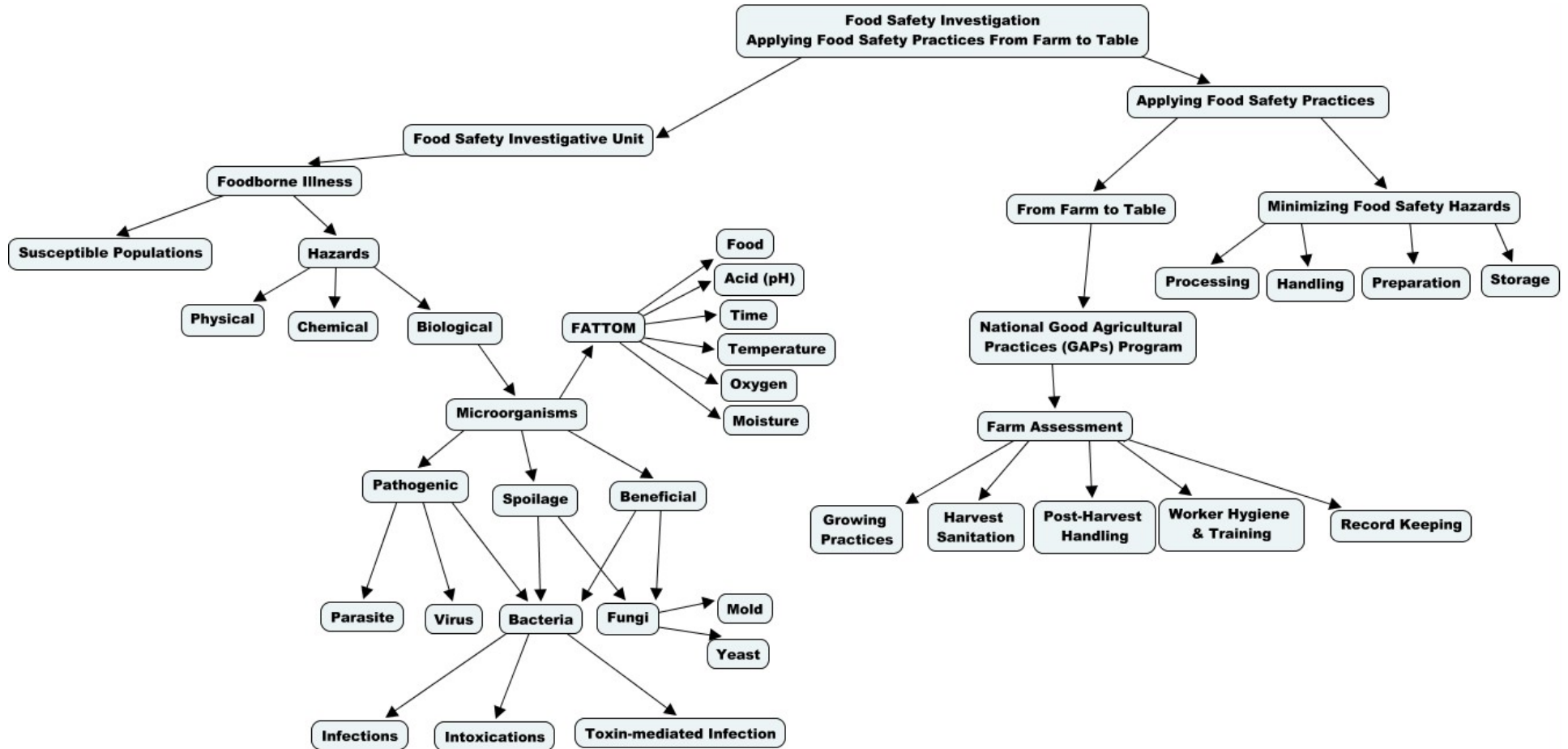
Unit Overview

Title	Food Safety Investigation (FSI) – Applying Food Safety Practices from Farm to Table
Target Audience	Introductory Agriculture, Biology, Health, and Food Science Students Grades 9 through 12.
Prerequisite Knowledge and Skills	<ol style="list-style-type: none"> 1. State several types of microorganisms including bacteria, viruses and parasites. 2. Identify types of foods including fruits, vegetables, meat, dairy, and grains. 3. Collect information from credible sources and provide proper citations. 4. View materials using a microscope.
Motivating Question	How are food safety issues relevant to students’ lives as consumers and potential future producers? How can students reduce microbial risks during food handling and prevent foodborne illness?
Unit Questions	<ol style="list-style-type: none"> 1. Why is food safety important? 2. What are the three categories of food safety hazards? 3. What is foodborne illness? 4. What segments of the population are most susceptible to foodborne illness? 5. What conditions increase microbial growth in food? 6. How do agricultural commodities move from farm to table? 7. What are some ways that food producers and consumers can minimize food safety hazards?

<p>Rationale for the Unit</p>	<p>In any classroom, chances are that at least some of the students are thinking about food at any given time. As these students sit daydreaming about their next meal there are many things they are probably <u>not</u> thinking about. Most students never think about where their food comes from or if the people handling their food are using safe handling and preparation practices to keep the food they eat safe. Yet foodborne illness is something students should be considering because it affects an estimated 76 million people (roughly one quarter of the entire US population) each year!</p> <p>Since 1999, the National Good Agricultural Practices (GAPs) Program based at Cornell University has worked to develop comprehensive education and extension programs for growers, farm workers, and packers to help implement good agricultural practices on the farm and reduce microbial risks in fresh fruits and vegetables.</p> <p>As consumers, food service industry employees, and potential producers, students need to be aware of how they impact the safety of the foods they handle and consume. By understanding broad food safety concepts and learning how to implement practices that reduce the risk of contamination of foods, students will be able to protect themselves and others from foodborne illness as food moves from farm to table.</p>
<p>Unit Goals</p>	<p>Students will be able to immediately apply what they have learned in this unit to their own lives while simultaneously building the foundation for further study in all areas of food science and food safety.</p> <p>By completing the lessons and activities in this unit, it is intended that students will:</p> <ol style="list-style-type: none"> 1. Develop an awareness of food safety issues 2. Distinguish between the three types of food safety hazards associated with food contamination 3. Identify common foodborne illnesses, their causes, and the people who are most susceptible to illness 4. Apply safe food handling practices 5. Be able to define GAPs and how to find resources related to reducing microbial risks to fresh fruits and vegetables 6. Generate an interest in the wide variety of careers relating to the production of safe food

Unit Concept Map

Food Safety Investigation (FSI)



How to Use this Unit

<p>Creating the FSI Unit</p>	<p>Recent media attention and the rising popularity of investigative themed television shows have highlighted the use of forensic science to solve complex investigations with improved accuracy. This has sparked a rising interest, especially among youth, to focus on this approach of inquiry and problem solving.</p> <p>This unit on food safety has adopted this approach and uses the investigative framework to appeal to and engage students in the material. While working through the unit, teachers are encouraged to emphasize and call attention to the investigative theme.</p>
<p>Building the Case File</p>	<p>The investigator (student) gathers evidence and information regarding a case. It is collected and organized into a “Case File”. As a part of this unit, students will receive their own Case File that they will assemble and maintain as an exercise in record keeping.</p> <p>Throughout the Unit, students will collect “evidence” in the form of case notes, lesson investigation activities, and homework assignments. This evidence will help students build their case for implementing food safety practices to minimize risks during food handling and preparation.</p> <p>At the completion of the unit, each student’s Case File will serve as a portfolio of their work that, along with a written reflection, will be collected and graded as the cumulative unit assessment.</p> <p>For more detailed information on the preparation of, use, and organization of the Case File please see Appendix B.</p>
<p>Assigning Student Investigative Teams</p>	<p>A team of people with different expertise is often needed to conduct an investigation. As the students work through many of the lessons’ investigation activities they will be working as a team of three to four people, depending on class size. These teams, referred to as Investigative Teams, should be maintained throughout the unit to provide consistency to the investigation activities. Remember that each student will work on his or her own Case File even if problems are solved in the Investigative Teams.</p>

<p>Lesson Modules and Plans</p>	<p>The lessons for this unit are organized into two modules:</p> <p>Module 1: Food Safety Investigation (FSI) focuses on food safety hazards and food microbiology.</p> <p>Module 2: Applying Food Safety Practices from Farm to Table focuses on how food moves from farm to table and methods used to prevent the introduction and spread of organisms that cause foodborne illness throughout the food system.</p> <p>Within this unit plan there is an overview of both modules and the lessons within each. This overview will help teachers quickly review the student tasks and assemble the needed materials for each lesson.</p> <p>Detailed lesson plans have been provided in the “T-Format” lesson plan style. The body of the lesson is broken into two columns. Teachers will find the procedures they should follow in the left hand column under “Teaching Procedures”, and the information students need to know in the right hand column under “Content”.</p> <p>An interest approach has also been provided for each lesson to grab students’ attention and help them focus in on the class before them. These interest approaches also should leave students feeling there is more they would like to know, and help set the stage for completing the lesson objectives. Many of the interest approaches provided can be used as a script, however teachers may choose to use or modify the interest approaches to suit their style of teaching and the needs of their students.</p> <p>The last row in each of the lesson plans has been reserved for “Reflection for future use”. Teachers may use this area to make notes on what went well during the lesson and how to improve the lesson for the future.</p>
<p>Assessment</p>	<p>Please see Appendix E or individual lessons for grading rubrics for homework assignments and investigation activities.</p>
<p>Equipment, Supplies, and Materials</p>	<p>PowerPoint slides are provided for each lesson and may be printed for handouts or copied onto acetate for use with overhead projectors.</p> <p>A few of the lessons will require the teacher to prepare materials in advance. These lessons have a “Advance Preparation” note on the cover sheet with detailed directions on what and how to prepare these materials.</p> <p>A comprehensive list of equipment, supplies, and materials is provided at the end of the Unit Overview. This list also provides a list of possible vendors as well as approximate cost of some of the materials.</p>
<p>Appendices</p>	<p>Appendix A—Content Standards Appendix B—Building the Case File Appendix C—Glossary Appendix D—Food Preparation Appendix E—Lesson Grading Rubrics</p>

Module 1 – Food Safety Investigation (FSI)

Lesson 1.1	Instructional overview
Building a Case to Prevent Foodborne Illness	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).
Estimated time:	Instructional objectives
One 50 min period	<ol style="list-style-type: none">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
	<ol style="list-style-type: none">1. Glo Germ™ kit2. Apples for each student, a container with a mix of beans and pebbles, Mr. Clean™ lemon scented, Lemonade in clear bottle3. PowerPoint presentation – PPT 1.14. Prepared Case File – one per student5. Case File Checklist – one per student or use ppt template6. FSI Unit Debriefing Notes – one per student or use ppt template7. Case Notes 1.1 – one per student or use ppt template8. FDA Alert – one per student or use ppt template9. 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

Lesson 1.2

Suspect Profiling

Estimated time:

One 50 min period

Instructional overview

Lesson 1.2 will introduce students to criminal profiling techniques. Students will use these techniques to investigate the characteristics of five types of microorganisms commonly associated with food: bacteria, viruses, parasites, yeasts, and molds.

Instructional objectives

1. Identify five types of microorganisms and record definitions in the Case Notes.
2. Determine the characteristics of bacteria, viruses, parasites, yeasts, and molds associated with foods.
3. Record observations of five microorganisms using the prepared microscope slides and reference materials provided.

Assessment

Students will view materials using a microscope to illustrate and identify important cell structures, and describe 2-3 defining characteristics of five microorganisms as part of their Case File development. Students will score at least 70% according to the Grading Rubric.

Relevant learning standards - NSES-C

Equipment, supplies, and materials

1. PowerPoint presentation – PPT 1.2
2. Case Notes 1.2 – one per student or use ppt template
3. Investigation Activity 1.2 – one per student or use ppt template
4. Microscopes
5. Prepared Slides and reference booklet of bacteria, parasites, yeasts, and molds

References and background information

1. Food Science and Safety: George J. Seperich.
2. <http://www.microbe.org>
3. Swiss Criminal Profiling Scientific Research
www.criminalprofiling.ch/introduction.html
4. Laboratory Fundamentals of Microbiology, 6th edition: Alcamo.
5. <http://www.denniskunkel.com/index.php>
6. <http://www.3dscience.com/index.php>
7. <http://www.asm.org/microbe/>
8. GAPsNET www.gaps.cornell.edu

Lesson 1.3

The Good Samaritans - Beneficial Microorganisms

Estimated time:

One 50 min period

Instructional overview

Lesson 1.3 will show students the importance of beneficial microorganisms in food production and increase awareness of how important some microorganisms are in our daily lives. Making root beer requires beneficial microorganisms and is just one example of how microorganisms are both directly and indirectly involved in the production of many of the foods we eat and enjoy.

Instructional objective

1. Identify uses of bacteria, yeasts, and molds in the food industry.
2. Examine recipe ingredients and identify those where beneficial microorganisms are involved in production.
3. Follow a recipe to make root beer.

Assessment

Students will complete Investigation Activity 1.3. They will be informally assessed on group participation and their ability to complete the lesson activity within one class period. Students will complete the Investigation Activity handout to score at least 70% on the Grading Rubric.

Relevant learning standards - NSES-C, NSES-F, NSES-G, NHES-1

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 1.3
2. Case Notes 1.3 – one per student or use ppt template
3. Investigation Activity 1.3 Root beer – one per student or use ppt template

*Note: it takes six days before the root beer can be consumed.

Two liters of root beer requires:

- 7 cups of distilled or purified water
- 1½ cups of white sugar
- ¼ teaspoon of active dry yeast
- 1 teaspoon of root beer extract
- One 2 liter plastic bottle
- Glass bowl for microwave use or a non-aluminum pan for use on a stove
- Funnel
- Measuring cup or ladle
- Refrigerator
- Plastic cups

References and background information

1. Food Science and Safety: G. Seperich.
2. Food Science and You: K. Mehas and S. Rodgers.
3. <http://www.root-beer.org/index.php>
4. GAPsNET www.gaps.cornell.edu

Lesson 1.4

When Good Food Goes Bad

Estimated time:
One 50 min period

**REQUIRES
ADVANCED
PREPARATION**

Instructional overview

Lesson 1.4 will teach students to identify the causes of food spoilage as microbial factors, natural food enzymes, and other factors. Students will focus on investigating conditions that allow microbial growth and cause microbial spoilage. Students will learn the acronym FATTOM and they will describe these six conditions as well as actions that can be taken to modify these conditions to reduce or prevent microbial growth and reproduction.

Instructional objectives

1. Identifying three causes of food spoilage: microbial factors, natural food enzymes, and other factors.
2. Defining the acronym FATTOM and describe the factors affecting microbial growth.
3. Examining samples of four different foods and determine the factors that caused the changes.

Assessment

In this lesson students will be assessed on the completion of their Case Notes 1.4. Students will complete Investigation Activity 1.4 and be informally assessed on group participation. Students will complete the Investigation Activity 1.4 handout to score at least 70% on the Grading Rubric.

Relevant learning standards - NSES-C, NSES-F**Equipment, supplies, and materials**

1. PowerPoint Presentation – PPT 1.4
2. Case Notes 1.4 – one per student or use ppt template
3. Investigation Activity 1.4 – one per student or use ppt template
4. pH test kit and laminated color keys
5. Food thermometers

Advanced preparation—Food samples:

1. Bread/moldy bread = moisture
2. Milk/soured milk = time and temperature
3. Cabbage/Sauerkraut = lack of oxygen
4. Cucumber/Pickles = acid
5. Whole Cantaloupe/cut up Cantaloupe = time and food

Preparation of food samples

*Note the time and date when you manipulated the samples and share this information with the students.

1. A: Put one fresh piece of bread in a Petri dish right before class begins.
B: Prepare the moldy bread three days in advance by misting it with water and leaving it in a Petri dish.
2. A: Pour a fresh glass of milk right before class begins.
B: Leave a glass of milk at room temperature over night or add a tablespoon of vinegar right before class begins.
3. A: Slice up a head of cabbage right before class begins.
B: Pour Sauerkraut in a bowl right before class begins.
4. A: Place whole cucumber on table right before class begins.
B: Pour pickles from container into bowl right before class begins.
5. A: Place whole cantaloupe on table right before class begins.
B: Cut up cantaloupe and place in a Petri dish two days before class, leave at room temperature. Be sure that whole cantaloupe (sample 5A) stays in room temperature the same amount of time.

References and background information

1. Food Science and Safety: George J. Seperich.
2. Food Science and You: Kay Mehas and Sharon Rodgers.
3. Food Safety, Bacteria Spoilage: USDA Food Safety and Inspection Service
http://www.fsis.usda.gov/help/FAQs_Food_Spoilage/index.asp
4. Introduction to Food Science: Rock Parker.
5. GAPsNET www.gaps.cornell.edu

Lesson 1.5

The Usual Suspects

Estimated time:

Two 50 min periods

Instructional overview

Using information from peer presentations, students will identify the ten most common foodborne pathogens and recognize the differences among each type of illness.

Instructional objectives

1. Explain the difference between an infection, intoxication and toxin-mediated infection.
2. Identify the ten most common or dangerous foodborne pathogens.
3. Work in the Investigative Teams to research one of the ten most common pathogens and present findings to the class in the form of a news report.
4. Access available information that consumers might use to learn about foodborne illness.

Assessment

Students will be assessed in two different ways in this lesson. Students will assess the presentations by other groups according to the grading rubric provided. Teachers also will assess each student based on the rubric provided. Students will be evaluated based on their class participation, quality of their group's presentation, and attentiveness to other presentations. Teachers may choose to incorporate student assigned grades as a part of the overall grade for the assignment. Student groups must earn at least three points according to the group presentation scoring criteria.

Relevant learning standards - NSES-C

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 1.5
2. Disease Fact Sheets from “the Bad Bug Book” (Set of 10)
3. Case Notes 1.5 – one per student or use ppt template
4. Investigation Activity 1.5 – one per student or use ppt template
 - “Investigation of a Foodborne Illness” form – several per student
 - “Peer Review” form – one per student

References and background information

1. Marler Clark law firm focusing on foodborne illness trials.
<http://www.marlerclark.com/videoclips.htm>
2. U.S. Food and Drug Administration Bad Bug Book:
<http://vm.cfsan.fda.gov/~mow/intro.html>
3. Food Safety and Inspection Service Web Glossary:
<http://www.gsis.usda.gov/help/index.asp>
4. Department of Health, Center for Disease Control:
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/>
5. GAPsNET www.gaps.cornell.edu

Module 2 —

Applying Food Safety Practices from Farm to Table

Lesson 2.1

Avenues for Contamination

Estimated time:

Two 50 min periods

Instructional overview

Lesson 2.1 serves as an introduction to the second module of *Food Safety Investigation: Applying Food Safety Practices from Farm to Table*. This module applies information from module one and examines farm management and food safety practices. In this lesson, students will explore how different types of food move from farm to table. Students will determine how different physical, chemical, and biological hazards can contaminate food within each highlighted sector of the food system including produce, meat, milk, and grain.

Instructional objectives

1. Identify several paths food could take as it moves from farm to table.
2. Determine points at which physical, chemical, and biological hazards could contaminate food.

Assessment

Teachers should assess students on their understanding of the food system, as students work on their assignments to determine how food moves from farm to table as well as the hazards that exist and present their ideas through the JIGSAW activity. Student experiences with farming and the food system will vary, thus some groups will require more guidance than others.

Relevant learning standards – NSES-A, NSES-C, NHES-1

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 2.1
2. Case Notes 2.1 “Avenues for Contamination” – one per student or use ppt template
3. Supplemental Career Introduction Activity 2.1 “Windows of Opportunity” – one per student or use ppt template

References and background information

1. “Jigsaw Classroom: Jigsaw in 10 Easy Steps” Social Psychology Network, 2006. Internet Access at <http://www.jigsaw.org/steps.htm>
2. GAPsNET www.gaps.cornell.edu

Lesson 2.2

FSI Traceback

Estimated time:

Two 50 min periods

Instructional Overview

Lesson 2.2 highlights the importance of traceback in the production of fresh produce through the review of a real foodborne illness outbreak. Students will read the case and answer the questions to see why traceback is critical in an investigation.

Instructional objectives

1. Identify methods used in developing a traceback system.
2. Read and analyze a foodborne illness outbreak report.
3. Answer questions about the report and create a diagram of product movement.
4. Determine ways contamination risks could have been reduced.

Assessment

Students answer the questions related to the foodborne illness outbreak report, scoring at least 70% on the grading rubric.

Relevant learning standards - NSECS-F, NHECS-1

Equipment, supplies, and materials

1. Glo Germ™ powder
2. Minimum of two bags of lettuce
3. PowerPoint Presentation – PPT 2.2
4. Investigation Activity 2.2 – one per student or use ppt template
5. Reduce Microbial Risks with Good Agricultural Practices, pamphlet
6. *Food Safety Begins on the Farm: A Grower's Guide*, booklet
7. 11"x17" blank paper – one per group

References and background information

1. Investigation of Pre-washed Mixed Bagged Salad following an Outbreak of *Escherichia coli* O157:H7 in San Diego and Orange County
<http://www.dhs.ca.gov/ps/fdb/local/PDF/PO%20Report%20Web%20Version%202.PDF>
2. Guide to Traceback of Fresh Fruits and Vegetables Implicated in Epidemiological Investigations. U.S. Food and Drug Administration. June 2006 Internet Access at
http://www.fda.gov/ora/Inspect_ref/igs/epigde/epigde.html
3. GAPsNET www.gaps.cornell.edu

Lesson 2.3

Food Safety
Begins on the
Farm

Estimated time:

Two 50 min periods

Instructional overview

In Lesson 2.3 students will be given a transcript of an interview with Bill Tinsaft, a farmer who has requested the expertise of the FSI Team to help him define Good Agricultural Practices (GAPs) and implement them on his farm. Working in groups, students will assess the current farm practices and recommend actions to be taken to improve the GAPs on his farm. Students will summarize the farm assessment and compose a letter to Bill Tinsaft explaining the farm assessment and their findings.

Instructional objectives:

1. Define Good Agricultural Practices (GAPs).
2. Conduct a farm assessment working in groups to determine the strengths and weaknesses of a farm operation.
3. Write a summary letter to Bill Tinsaft regarding the completed farm assessment.

Assessment

The grading rubric for this assignment is attached to the lesson.

Relevant learning standards – NSES-A, NSES-C, NHES 1-5

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 2.3
2. Transcript of interview – one copy per group or use ppt template
3. Farm Assessment Worksheets – one copy per group or use ppt template:
 - Clean Hands
 - Clean Soil
 - Clean Water
 - Clean Surfaces
4. Farm Assessment Action Plans – one copy per group or use ppt template:
 - Clean Hands
 - Clean Soil
 - Clean Water
 - Clean Surfaces
5. *Reduce Microbial Contamination with Good Agricultural Practices* – one copy per group
6. *Food Safety Begins on the Farm: A Grower's Guide* – one copy per group
7. Assignment 2.3 “Farm Assessment Summary Assignment” – one per student or use ppt template

References and background information

1. “Costs of Adopting Good Agricultural Practices (GAPs) to Ensure Food Safety in Fresh Strawberries” by Mollie Woods and Suzanne Thornsby. 2005. Agricultural Economics Report no. 624, Michigan State University, East Lansing, MI.
(Provided as PDF on CD).
2. *Food Safety Begins on the Farm: A Grower’s Guide*. The National GAPs Program.
3. *Food Safety Begins on the Farm: A Grower’s Self-Assessment of Food Safety Risks*. The National GAPs Program.
<http://www.gaps.cornell.edu/farmassessmentws.html>
4. GAPs resources online access at
<http://www.gaps.cornell.edu/pptindex.html>
5. GAPsNET www.gaps.cornell.edu

Lesson 2.4

Stop the spread

Estimated time:

Two 50 min periods

Instructional overview

Lesson 2.4 will help students demonstrate their ability to prepare foods using proper food safety practices, useful in both the home and food service industry. Students will learn the Fight BAC! 4 Cs of safe food handling and prepare salsa using these principles.

Instructional objective

1. Demonstrate how to minimize food safety hazards through proper handling, preparation, and storage techniques.
2. Define the 4 Cs of safe food handling.
3. Prepare fresh salsa from a recipe.

Assessment

Students will complete Investigation Activity 2.4, where they will be assessed on group participation as well as their individual completion of the lesson activity. To prepare a product that is safe to consume, students must follow proper food handling and preparation techniques. Students will complete the Investigation Activity handout to score at least 70% on the grading rubric.

Relevant learning standards - NSECS-F, NSECS-1, NSECS-5, NSECS-7

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 2.4
2. Case Notes 2.4 – one per student or use ppt template
3. Investigation Activity 2.4 – one per student or use ppt template
4. Glo Germ™ liquid and/or powder
5. Black light
6. 1 Tomato per student
7. Pre-prepared ingredients for fresh salsa recipe
(See Investigation Activity 2.4).
*Note: One batch requires 3 tomatoes. Adjust recipe to accommodate class size, see Investigation Activity 2.4
8. Food preparation gloves – one pair per student
9. Plastic knives – one per student
10. Cutting mats – one per group
11. Bleach sanitizing solution – one spray bottle per group
12. See Appendix D for additional food preparation information

Advance preparation

1. Prepare all ingredients for the fresh salsa recipe ahead of time and have them ready to go in the stock pot. Students will add the tomatoes.
2. Brush a tomato with Glo Germ™ powder OR brush a knife with Glo Germ™ powder OR brush a cutting mat with Glo Germ™ powder OR ***Some variation of the above as long as foods containing Glo Germ™ are not mixed in with what is going to be consumed.**

Alternate preparation so that students do not handle Glo Germ™ “contaminated” items

Set up a food preparation area in the front of the classroom. Brush tomato, knife, or cutting mat with Glo Germ™ powder. Turn off lights and use black light while you prepare salsa items. Students will be able to watch cross contamination occur, but there will be no risk of students getting Glo Germ™ on themselves or in the group salsa. Lead discussion of why proper food handling is crucial to food safety. Turn on lights and allow students to go to their own food preparation areas that do not contain any items with Glo Germ™ powder.

References and background information

1. Fight BAC! website: www.fightbac.org
2. Did you know? Your kitchen could be a source of illness. www.gaps.cornell.edu.
3. Fresh salsa recipe by Diana Rattray. Southern U.S. Cuisine <http://southernfood.about.com/od/salsarecipes/r/bl40212k.htm>
4. GAPs Hand washing magnets. www.gaps.cornell.edu
5. GAPsNET www.gaps.cornell.edu

Lesson 2.5

FSI Investigators
Called to Action

Estimated time:

One 50 min period

Instructional overview

Lesson 2.5 is the last lesson in the Unit. It will integrate all the lessons from the two modules into one activity. Students will work in their Investigative Teams to solve six clues in a foodborne illness outbreak investigation. At the end of the activity, students should have solved all six clues and recorded them on the Outbreak Summary.

Instructional objective

1. Students will answer questions about a simulated foodborne illness outbreak and solve the case by finding all six clues.
2. Students will fill out the Outbreak Summary form.

Assessment

By the end of the activity each student group will have completed the Outbreak Summary. For final grades, students will need to hand in their completed Case File.

Relevant learning standards – NSES-C, NSES-F

Equipment, supplies, and materials

1. PowerPoint Presentation – PPT 2.5.
2. Investigation Activity 2.5 “Instructions for Solving the Case” – one per student or use ppt template.
3. Investigation Activity 2.5 “Outbreak Summary” – one per student or use ppt template.
4. Clue Cards and Material for Clues 1 – 6.

References and background information

No new information is presented. All required information was presented in previous lessons.

Equipment, Supplies and Materials

LESSON	MATERIAL NEEDED	WEBSITE/SUPPLIER	COST
1.1	Glow Germ™ kit	http://www.hdd.net/cgi-bin/glogerm/hazel.cgi	\$83.95
	Dr. Carl Winter, Still Stayin Alive Music CD	http://foodtunes.com/	\$9.99
1.2	Microlife Microscope Slides 5 sets with booklet	http://www.deltaeducation.com Item #WW193-7574	\$59.95
	Microscopes		
1.3	7 cups of distilled or purified water		
	1½ cups of white sugar		
	¼ teaspoon of active dry yeast		
	1 teaspoon of root beer extract		
	One two liter plastic bottle		
	Glass bowl and microwave or non-aluminum pan and stove heater		
	Funnel		
	Cup or ladle		
	Refrigerator		
	Plastic cups		
	One can of soda containing citric acid		
1.4	Vial of litmus paper (100)	Science Material Supplier (i.e. Wards Biological)	
	pH test kit (1)	Carolina Biological Supply Company Item # 894722	
	Thermometers (5)	Tech Instrumentation, Inc. Item # 1246-02-1	\$6 each
	Samples of spoiled foods, please see Lesson 1.4		

2.4	Food preparation gloves		
	Cutting mats		
	Paring knives		
	Sanitizer spray bottles	Fisher Scientific Item # 5413505P	\$5 each
	Bleach		
	Salsa ingredients: Tomatoes Onion(s) Garlic Chili peppers Cilantro Lime juice Salt and pepper		
	Glo Germ™ kit	http://www.hdd.net/cgi-bin/glogerm/hazel.cgi	\$83.95

Additional Resources

GAPs Materials	<i>Food Safety Begins on the Farm: A Grower's Guide</i>	www.gaps.cornell.edu	\$2 each
	<i>Food Safety Begins on the Farm: A Grower's Self Assessment of Food Safety Risks</i>	www.gaps.cornell.edu	\$10 each
	<i>Food Safety Begins on the Farm: A Presentation CD</i>	www.gaps.cornell.edu	\$10 each
	<i>Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm</i> (Video)	www.gaps.cornell.edu	\$20 each

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