



## 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.

#### Interest approach

##### To:FSI Team

Congratulations! You all have made impressive progress in your FSI Field Training and now your expertise is needed to determine the source of a foodborne illness outbreak in your hometown. There are detectives already on the scene interviewing involved individuals. Now, it is time for you to put all your training to work and solve the case. Good luck.

## Classroom Procedures

Teaching procedures	Content
<p>Lead discussion to briefly introduce today's activity.</p>	<p>Today we will be using everything we have learned from the whole Unit to solve the questions surrounding a foodborne illness outbreak.</p> <p>Your Case File needs to be in order to solve the clues for this case.</p>
<p>State expectations for today's lesson.</p>	<ol style="list-style-type: none"> <li>1. Students will answer questions about a simulated foodborne illness outbreak and solve the case by finding all six clues.</li> <li>2. Students will fill out the Outbreak Summary form.</li> </ol>
<p>Break the class in to their Investigative Teams. Hand out Investigation Activity 2.5 "Instructions for Solving the Case" and "Outbreak Summary" or use ppt template to help students organize their notes.</p> <p>The teacher will need to check each group's answer to the clues.</p> <ol style="list-style-type: none"> <li>1. If they are right, give them the next clue.</li> <li>2. If they are wrong, send the group representative back to the group to figure out the correct answer.</li> </ol> <p>Do not reveal more than one Clue Card at a time. If students are given clues out of order, answers will be revealed.</p>	<p>Instructions for Solving the Case</p> <ol style="list-style-type: none"> <li>1. Each group will begin by receiving Clue # 1. Everything you need to solve each clue is in your Case File.</li> <li>2. When each group believes they have solved the first clue, record it on your outbreak summary form and send a representative to report to the teacher. The teacher will confirm if you have solved the clue correctly. If the clue is correct, your group will receive Clue # 2. Repeat process for remaining clues.</li> <li>3. Each student should fill out an Outbreak Summary form and store it in their completed case file at the end of the activity, but the teacher only needs to see one copy.</li> <li>4. There are six clues in total, so work quickly. The case must be solved in this period.</li> </ol>

<p>Handout Clue Card # 1.</p> <p><b>The answer to Clue Card # 1 is <i>Salmonella</i></b></p>	<p><b>Clue Card # 1:</b> 20 people have been admitted to the Emergency Room with symptoms that indicate it could be a foodborne illness. The most common symptoms reported are diarrhea, fever, and abdominal cramps. Most cases have lasted between four and seven days.</p> <p>Use your Sign &amp; Symptoms notes from Lesson 1.5 in your Case File to identify this disease.</p>
<p>When Clue Card # 1 is returned and the group has shown the correct answer hand out Clue Card # 2.</p> <p><b>The answer to Clue Card # 2 is Fresh Tomatoes</b></p>	<p><b>Clue Card # 2:</b> Now that we have isolated the microorganism responsible, <i>Salmonella</i>, we can begin to figure out the contaminated food that caused this outbreak. From our investigations during FSI Training we know that <i>Salmonella</i> has an incubation of 12 to 72 hours. Several FSI investigators have been interviewing patients and their families to help determine the contaminated food. The following lists are what people consumed prior to being ill. Use these notes to determine the contaminated food.</p>
<p>When Clue Card # 2 is returned and the group has shown the correct answer hand out Clue Card # 3.</p> <p><b>The answer to Clue Card # 3 is the Farmers' Market or local retail store.</b></p>	<p><b>Clue Card # 3:</b> Once you have figured out that the contaminated food was fresh tomatoes, the FSI investigator went back to the hospital to interview the patients again. This time he asked patients where they purchased the tomatoes that they had eaten within the past week. Use these notes to determine where the contaminated food most likely originated.</p>
<p>When Clue Card # 3 is returned and the group has shown the correct answer hand out Clue Card # 4.</p> <p><b>The answer to Clue Card # 4 is Muddy River Farm.</b></p>	<p><b>Clue Card # 4:</b> Now that you know the contaminated tomatoes came from a local grower that sells at the farmers' market and the local retail store, we need to figure out which grower it is. Both managers have provided you with a list of local growers and information about where and what they sell. You will need to review this list and determine the grower most likely responsible for the outbreak.</p> <p>Note: There are three varieties of tomatoes shown. Cherry and plum are not involved in this outbreak.</p>

<p>When Clue Card # 5 is returned and the group has shown the correct answer hand out Clue Card # 5.</p> <p><b>The answer to Clue Card # 5 is A: Contaminated water from a contaminated well.</b></p>	<p><b>Clue Card # 5</b> Thank you for such a successful investigation so far, but our work is not done! Again the FSI investigators have narrowed the possible sources of infection of the <i>Salmonella</i> to three possibilities. Only one can be the true source of contamination. Use the fact sheet in your Case File and the resource Food Safety Begins on the Farm: A Grower’s Guide to figure out which is the true source of contamination.</p> <ul style="list-style-type: none"> <li>a. Near the Muddy River Farm there is a free-range chicken producer who allows his chickens to run free. It has been suggested that this farm is the source of the <i>Salmonella</i>. The Muddy River Farms uses well water to wash its tomatoes, but the well is not capped.</li> <li>b. One of the managers of Muddy River Farms is a certified Master Composter. He is beginning to install a composting program on the farm and it has been suggested his compost is the source of the <i>Salmonella</i>.</li> <li>c. The tomatoes were grown in a field that had manure applied in the fall before spring planting (at least 6 months prior to harvest). It has been suggested that the <i>Salmonella</i> lay dormant in the soil through that time and is now infecting the new crop of tomatoes.</li> </ul>
<p>When Clue Card # 5 is returned and the group has shown the correct answer hand out Clue Card # 6.</p>	<p><b>Clue Card # 6:</b> Congratulations on a Job Well Done! Thank you for solving the mystery of the foodborne illness outbreak. Using your experience with this case and your expertise with preventing microbial contamination please compose a note to the manager of Muddy River Farms to give him some suggestions on how to prevent this from happening again.</p>

<p>Once the group has received the last clue, remind them that each member of the group must file a complete copy of the Outbreak Summary (including the paragraph from Clue Card # 6) in their Case File.</p> <p>HINT: Final summaries should include things like wild animal exclusion, water testing, and properly capping wells.</p>	<p>The suggestions on Clue Card # 6 should be one full paragraph with detailed information about the GAPs procedures you think should be implemented. You may use your Case File or any other resources. Be sure to include GAPs dealing with clean hands, clean soils, clean surfaces, and clean water.</p>
<p>Make an announcement reminding students that their completed Case File with all its components and the reflection assignment are due: _____</p>	
<p>Reflections for future use.</p>	





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## FSI Investigators Called to Action

### Investigation Activity 2.5

Name: \_\_\_\_\_ Date: \_\_\_\_\_

#### Instructions for Solving the Case

Each group will begin by receiving Clue 1. Everything you need to solve each clue is in your Case File.

When you believe you have solved the first clue, record it on your outbreak summary form and send a representative to report to the teacher. The teacher will confirm if you have solved the clue correctly. If you have, your group will receive Clue 2. This process will be repeated for the remaining clues.

Each student should fill out an Outbreak Summary form and store it in your completed case file at the end of the activity, but you only need to show the teacher one copy.

There are six clues in total so work quickly. You only have this period to solve the case.

Good Luck!



## FSI Investigators Called to Action

### Investigation Activity 2.5

#### Clue Card # 1

## Daily Times

*Mia Macakrisis – Staff reporter*

PINE VALLEY, NY—Earlier this week, the first reported incidence of foodborne illness occurred at Pine Valley Regional Hospital. Quincy Johnson, of Plant City, CA, reported symptoms including diarrhea, fever, and abdominal cramping. More than 20 additional people have reported similar incidents all across the country. Mary Palmer of Tri-Valley, FL, experienced minimal diarrhea, but severe arthritic symptoms after eating at Norton County Eatery. Elizabeth White of Lake Butler, NY, reported diarrhea, but also had a typhoid-like fever, which caused her hospitalization. The CDC and the FDA feel that these unidentified illnesses are related and they are working with members of the FSI investigation unit to traceback information to solve this case. With over 20 cases all across the country, this illness could become an epidemic and it is vital that the FSI team determine where the contamination occurred. More news to come as more interviews are conducted and more clues are uncovered. Twenty people have been admitted to the Emergency Room with symptoms that indicate it could be a foodborne illness. The most common symptoms reported are diarrhea, fever and abdominal cramping. Most cases have lasted between four and seven days.

Use your notes from lesson 1.5 Bad Bug Book in your Case File to identify this disease.



## FSI Investigators Called to Action

### Investigation Activity 2.5

#### Clue Card # 2

Now that we have isolated the microorganism responsible, *Salmonella*, we can begin to figure out the contaminated food that caused this outbreak. From our investigations during FSI Training we know that *Salmonella* has an incubation of 12 to 72 hours. Several FSI investigators have been interviewing patients and their families to help determine the contaminated food. The following lists are what people consumed prior to becoming ill. Use these notes to determine the contaminated food.

#### Detective's Notes

Patient	Dinner	Lunch	Breakfast	Snacks
<b>A. Brown</b>	Spaghetti and Meatballs, Garlic Bread, Garden Salad <ul style="list-style-type: none"> <li>• Romaine Lettuce</li> <li>• Baby Carrots</li> <li>• Shredded Cheddar</li> <li>• Tomatoes</li> </ul>	Pasta Alfredo at a local Restaurant, Caesar Salad <ul style="list-style-type: none"> <li>• Shredded Cheddar</li> <li>• Croutons</li> <li>• Dressing</li> </ul> French Onion Soup	Bagel, Cream Cheese, Fresh Squeezed Orange Juice	Fresh Fruit Salad <ul style="list-style-type: none"> <li>• Melon</li> <li>• Grapes</li> <li>• Cherries</li> <li>• Apples</li> </ul> Energy Bar
<b>R. Fitzpatrick</b>	Steak and Mashed Potatoes, Steamed Broccoli	Bacon Cheeseburger (on my new grill) <ul style="list-style-type: none"> <li>• Lettuce</li> <li>• Tomato</li> <li>• Onion</li> <li>• Pickles</li> </ul> French Fries	Farmer's Omelet <ul style="list-style-type: none"> <li>• Green Peppers</li> <li>• Tomato</li> <li>• Onion</li> <li>• Sausage</li> <li>• Cheddar</li> </ul> White Toast with Butter	Nachos from that new restaurant downtown, loaded with all the toppings

<b>R. Green</b>	Salad that I picked up from the Deli on my way home from work <ul style="list-style-type: none"> <li>• Romaine and Iceberg Lettuce</li> <li>• Spinach</li> <li>• Carrots</li> <li>• Radish</li> <li>• Sprouts</li> </ul>	Ham and Swiss on Rye <ul style="list-style-type: none"> <li>• Tomato</li> <li>• Lettuce</li> <li>• Onion</li> </ul> Baby Carrots (Brought from home)	No Breakfast	Orange, Apple
<b>B. Moore</b>	I was too sick to eat last night	Ham and Cheddar on Wheat (from Downtown Deli) <ul style="list-style-type: none"> <li>• Mayo</li> <li>• Onion</li> <li>• Banana Peppers</li> <li>• Dijon Mustard</li> </ul>	Cereal with Milk, Orange	Chips and Fresh Salsa my wife made
<b>Q. Johnson</b>	Marinated Chicken on the grill, Tomato and Mozzarella Pasta Salad (Homemade by my mother in law), Baked Beans	Leftover Hamburger Helper my wife made last night	Donuts and Coffee	Chips and Dip
<b>C. Arnold</b>	Barbecued Chicken Garden Salad <ul style="list-style-type: none"> <li>• Carrots</li> <li>• Peppers</li> <li>• Salami</li> <li>• Cheese</li> <li>• Lettuce (3 varieties)</li> <li>• Spinach</li> </ul>	Orange, Tuna Dill Wrap <ul style="list-style-type: none"> <li>• Lettuce</li> <li>• Dressing</li> </ul>	Strawberry Yogurt and Granola	Tomatoes with Salt
<b>L. Walters</b>	I was too sick to eat last night. I don't generally eat dinner anyway.	I can't remember. Maybe I didn't eat lunch, but maybe I did... I had a garden salad the day before yesterday.	Shredded Wheat Cereal with Milk (probably, I'm not sure).	I don't think I had any snacks, but sometimes I get cookies from the vending machine.

<b>M. Palmer</b>	Tomato sandwich with mayo, Potato Chips	Garden Salad with Italian Dressing, Orange	Scrambled Eggs on Toast, Coffee	Brownie that someone brought into the office
<b>E. White</b>	Grilled Chicken Sandwich my husband made <ul style="list-style-type: none"> <li>• Honey Mustard</li> <li>• Lettuce</li> <li>• Tomato</li> </ul> Baked Potato	Beef Burrito and a Taco from a fast food restaurant	Instant Oatmeal and fresh fruit	2 Apples
<b>T. Hardisty</b>	Hamburger <ul style="list-style-type: none"> <li>• "...with all the toppings I could find in the fridge."</li> </ul> Garden Salad <ul style="list-style-type: none"> <li>• "I don't know what was in it. I just ate it."</li> </ul> French Fries	Turkey and Provolone on white bread <ul style="list-style-type: none"> <li>• Lettuce</li> <li>• Tomato</li> <li>• Mayo</li> </ul>	Eggs over-easy, Hash Browns, Sausage	Tomatoes with Italian Dressing



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#### Clue Card # 3

Once you have figured out that the contaminated food was fresh tomatoes, the FSI investigator went back to the hospital to interview the patients again. This time he asked patients where they purchased the tomatoes that they had eaten within the past week. Use these notes to determine where the contaminated food most likely originated.

#### Detective's Notes

Patient	Where did you get the tomatoes you have eaten over the past week?
<b>A. Brown</b>	"I bought some at the farmer's market and some were from the farmer down the road. He's always giving me fresh fruit and vegetables."
<b>R. Fitzpatrick</b>	"I got some from the retail store downtown."
<b>R. Green</b>	"I got them from the local retail store. I love shopping there. Everything is always so fresh!"
<b>B. Moore</b>	"I don't know. My wife does all our grocery shopping and she isn't here right now."
<b>Q. Johnson</b>	"My mother made the salad with tomatoes in it. She usually likes to eat locally grown food, but I don't know where she got those tomatoes."
<b>C. Arnold</b>	"Fresh from the garden just like I like them."
<b>L. Walters</b>	"I don't know, maybe from the retail store or my friend who has a garden or maybe the farmer's market."
<b>M. Palmer</b>	"It was one of the big juicy tomatoes that was really fresh and had just been picked. That's all I know."
<b>E. White</b>	"I don't know. I think my husband got them from a friend who grows tomatoes. I know he didn't get them at the local co-op because we have not been there for weeks."
<b>T. Hardisty</b>	"Maybe they came from the farmer's market. We went shopping there last Saturday, but then there were other tomatoes that maybe came from my mother. She got them at the store and then she said she wasn't going to eat them before they went bad so she gave them to us, because she knows I really love tomatoes."



## FSI Investigators Called to Action

### Investigation Activity 2.5

#### Clue Card # 4

Now that you know the contaminated tomatoes came from a local grower that sells at the farmers' market and the local retail store, we need to figure out which grower it is. Both managers have provided you with a list of local growers, and information about where and what they sell. You will need to review this list and determine the grower most likely responsible for the outbreak.

Note: There are three varieties of tomatoes shown. Cherry and plum are not involved in this outbreak.

#### Local Fresh Produce Growers in Your County

Farm Name	Farmer's Market	Local retail store	Produce Sold
Fresh Food Farms	Yes	No	tomatoes, lettuce, onions
U-Pick or We-Pick Farms	No	Yes	blueberries, apples, pumpkins, pears, tomatoes, peppers
Valley Fresh Produce	Yes	Yes	onions, beans
Clean Water Market	Yes	Yes	lettuce, peppers, broccoli, eggplant, romaine lettuce, onions, pumpkins, cabbage, sprouts
Hill Top Growers	No	No	cabbage, lettuce
Your Town Fresh Produce	Yes	No	eggplant, cabbage, peppers, sprouts, broccoli, cherry tomatoes, romaine lettuce
My Orchards	Yes	Yes	apples, pears
Four Corners Farms	No	Yes	cabbage, tomatoes
Main Street Produce	No	Yes	lettuce, eggplant, tomato, apples

Muddy River Farms	Yes	Yes	Lettuce, peppers, broccoli, eggplant, romaine lettuce, onions, tomatoes, pumpkins, cabbage, sprouts
Genuine Fresh Produce	Yes	Yes	Romaine lettuce, spinach, iceberg lettuce, carrots, plum tomatoes, sprouts, eggplant, cabbage



## FSI Investigators Called to Action

### Investigation Activity 2.5

#### Clue Card # 5

Thank you for such a successful investigation so far, but our work is not done! Again the FSI investigators have narrowed the possible sources of *Salmonella* contamination to three possibilities. Only one can be the true source of contamination. Use the fact sheet in your Case File and the resource *Food Safety Begins on the Farm: A Grower's Guide* to figure out which is the true source of contamination.

- a. Near the Muddy River Farm there is a free-range chicken producer who allows his chickens to run free. It has been suggested that this farm is the source of the *Salmonella*. The Muddy River Farm uses well water to wash its tomatoes, but the well is not capped.
- b. One of the managers of Muddy River Farms is a certified Master Composter. He is beginning to install a composting program on the farm and it has been suggested his compost is the source of *Salmonella*.
- c. The tomatoes were grown on a field that had manure applied in the fall before spring planting (at least 6 months prior to harvest). It has been suggested that the *Salmonella* lay dormant in the soil through that time and is now infecting the new crop of tomatoes.



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## **FSI Investigators Called to Action**

### **Investigation Activity 2.5**

#### **Clue Card # 6**

Congratulations on a job well done! Thank you for solving the mystery of the foodborne illness outbreak. Because you are so familiar with this case, please compose a note to the manager of Muddy River Farms to give him some suggestions on how to prevent this from happening again.



## FSI Investigators Called to Action

### Investigation Activity 2.5      Outbreak Summary

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Read and solve each clue, then have your instructor check your answer and get your next clue. There are six clues, so work quickly. Good Luck!

#### Clue # 1

Use the notes in your Case File to identify the disease based on the symptoms given to you on Clue Card # 1.

The foodborne illness outbreak is most likely \_\_\_\_\_.

#### Clue # 2

Use the Detective's Notes provided with your Clue Card # 2 to determine the contaminated food.

The food most likely responsible for the outbreak is \_\_\_\_\_.

#### Clue # 3

Your next task is to determine where the contaminated food was purchased. Use the detective's notes provided with your clue card to determine where the food was purchased. Hint: The food was purchased at two different places. Not all people will have accurate recollection of where they bought the food; you will have to sort through the information to find what the two most likely distributors are.

The contaminated foods were bought at \_\_\_\_\_ and \_\_\_\_\_.

#### Clue # 4

Use the list provided with your Clue Card to determine which grower sold the contaminated food.

The grower selling contaminated food is \_\_\_\_\_.

#### Clue # 5

Use the fact sheet in your Case File and the resource "Food Safety Begins on the Farm: Grower's Guide" to figure out which is the true source of contamination. Only one of the three possibilities listed on the clue card is possible.

**Hint:** Find the information specific to the harmful microorganism.

\_\_\_\_\_ is the source of the harmful microorganism on the farm.

**Clue # 6**

Now that you have solved the case, each of you will compose a memo to the farm manager to give him some suggestions on how to prevent this from happening again. This memo should be one full paragraph with detailed information about the GAPs procedures you recommend this farm to put in place. You may use your Case File or any other resource you need. Be sure to include GAPs dealing with employee hygiene, record keeping, and water use. Use the memo form on the next page and place it in your Case File when it is complete.



This lesson will be graded using the following Grading Rubric:

Assessment Criteria	Maximum Points	Points Scored
Clue 1 – 5 were answered correctly.	5	
Student participated in group.	5	
The memo included information about GAPs and was one paragraph in length.	10	
<b>TOTAL</b>	<b>/20 =</b>	<b>%</b>