Food Safety from Farm to Fork

An Interdisciplinary Educational Unit for Grades 5-7
Americans enjoy the safest food supply in the world, yet the most common intestinal ailments in the United States are caused by foodborne illnesses. How can this be?

**Food Handling Is The Key!**

This unit provides fifth through seventh graders a better understanding of food safety through real-life examples and enjoyable activities. They learn that everyone has a responsibility in minimizing foodborne illnesses—farmers, transporters, restaurants, grocery stores... and the consumer! Through reading, games, puzzles, math problems and science investigations, participants identify the roles each one of us plays to ensure the food we enjoy is safe to eat.

Food gathering and preparation have changed over time. Americans have gone from growing and preparing their own food to enjoying convenience foods grown by a fewer number of farmers and prepared by someone other than themselves. Thus food safety practices are important in every stage of food production, preparation, and consumption. Here are a few examples of food safety practices from each area.

**The Farm**

Good Agricultural Practices have been developed jointly by the agricultural industry and government. These provide guidelines that reinforce already stringent laws governing food safety on U.S. farms.

**The Food Handlers**

Grocery stores, transportation companies, storage facilities and restaurants have food safety rules and require employees to abide by them. Stringent regulations imposed by national, state and local governments, based on sound science, ultimately benefit the consumer.

**The Consumer**

This educational guide is part of a consumer food safety education program. The consumer, the person who eats the food, is responsible for making sure that the food is prepared and stored properly. This is crucial since most foodborne illness outbreaks are associated with improper handling at the restaurant or home.

So take a look through the guide. See how you can use it to teach your students about foodborne illnesses and reduce the number of foodborne illness incidents. At the same time your class will practice reading and writing, investigate and experiment, apply math to real situations, and practice thinking critically about a topic that impacts all of us daily—food safety!

**Nutrition!**

Throughout the lessons, discuss the importance of eating right. The human body has natural defense mechanisms that work best when we eat right, get plenty of exercise, drink lots of water and get enough sleep!

**Links to Content Standards for California Public Schools**

Students learn and retain information best when they can relate what they learn in the classroom to their personal lives. This multidisciplinary, thematic unit on food safety includes lessons that teach or reinforce many educational Content Standards for California Public Schools. Each activity includes a listing of the specific content standards addressed. Refer to the California Department of Education Website (www.cde.ca.gov) for descriptions of the educational standards.

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Description

Students will learn the basic science of food safety and the importance of safe food practices while playing a board game, performing “fact or opinion” and “cause and effect” activities, and then writing an essay on what they learned.

Activity

1. Explain that students will learn about the science of food safety.
2. Discuss the differences between “facts” and “opinions.” Select students to read dictionary definitions of these two terms.
3. Have students number a piece of paper from 1-6. Instruct them to listen to the statements that you read to them. They are to write an “F” next to the number if they think the statement is a fact, and an “O” if the statement is an opinion. Read the statements below, one at a time, and have the students record their answers. Discuss the answers.

Fact or Opinion?

1. People should only eat cooked foods since, according to a media report, all bacteria in food are harmful.
2. Microorganisms can live almost anywhere, even in food.
3. To maintain your health, it is important to eat five or more servings of fruits and vegetables per day.
4. A single bacterium is too small to see without a microscope.
5. Scientific research has shown that the mishandling of food by the person who prepares or eats it accounts for most foodborne illnesses.
6. People should not eat fresh foods since your aunt says they can carry bacteria like E. Coli and Salmonella.

In preparation for the game, orally read What’s All the Talk About Food Safety?

5. Create groups of three to four students. Explain Playing it Safe and then have the students play the game.

Directions:
a. Shuffle the playing cards and place them face down on the board.
b. Place the sponge markers on “Start.”
c. The first player draws a card from the top of the stack, reads it aloud, and then moves the number of spaces directed. All students should listen to the fact stated on the card, making a mental note that the statement is indeed a “fact.” If a person must move “back” but is already on “Start,” then the player should remain on “Start.”
d. The next player takes a turn. Continue until one player crosses the finish line. Reuse the cards, if necessary.

Remind students that a “cause” is something that makes something else happen. What happens is the “effect.” Have groups do the Cause and Effect activity located on the game board. Students should agree on the answers and discuss as a class.

7. Have each student write a three paragraph essay that covers the following information. Once written, have students edit for proper grammar, spelling, and punctuation, including capitalization.
   a. What is food safety and why is it important to use safe food practices?
   b. Define “foodborne illness” and provide specific examples of foodborne illnesses.
   c. Describe several things a person could do to prevent foodborne illnesses.

Time

One 50-minute session

Materials

For teams of 3-4:
- Four 1/2” pieces of sponge; four colors
- What’s All The Talk About Food Safety Student Page (page 4)
- Playing It Safe! Game Board (page 5)
- Playing It Safe! Game Cards (page 6)

Content Standards for California Public Schools Links

English Language Arts

Grade 5
- Reading 2.5
- Writing 1.0, 1.2
- Written and Oral English Language Conventions 1.0, 1.4

Grade 6
- Reading 2.2
- Writing 1.0, 1.2
- Written and Oral English Language Conventions 1.0, 1.4

Grade 7
- Reading 2.3
- Writing 1.0, 1.2
- Written and Oral English Language Conventions 1.0, 1.6

Health Education

Grade 5
- Nutrition and Physical Activity 1.3.N

Grade 7
- Nutrition and Physical Activity 1.3.N, 1.4.N

CAUSE & EFFECT ACTIVITY

ANSWER KEY

<table>
<thead>
<tr>
<th>No.</th>
<th>Cause</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not refrigerated</td>
<td>turned sour</td>
</tr>
<tr>
<td>2</td>
<td>washed hands</td>
<td>healthful salad</td>
</tr>
<tr>
<td>3</td>
<td>warm summer temperatures</td>
<td>more foodborne illnesses</td>
</tr>
<tr>
<td>4</td>
<td>added rennet (bacteria)</td>
<td>made cheese</td>
</tr>
<tr>
<td>5</td>
<td>core in bin</td>
<td>decomposed to compost</td>
</tr>
</tbody>
</table>
What’s All the Talk About Food Safety?

Did you ever have an upset stomach or something that people call the 24-hour flu? If your symptoms lasted less than a day, chances are your brief illness was caused by a foodborne illness. You will learn about ways you can minimize the number of foodborne incidents you have in your lifetime.

What is a foodborne Illness?

A foodborne illness is a disease that is carried to animals or humans by food. Foodborne illnesses are caused by microorganisms such as bacteria. Not all bacteria cause disease in humans. Those that do are called pathogens. They grow rapidly when conditions are right—dark, damp places where temperatures range between 40°F and 140°F. Any type of food can be a source of a foodborne illness; however, high protein foods are responsible for most of them. Examples include milk and milk products, eggs, meats, poultry, fish, seafood, and soy protein food such as tofu.

What is food safety?

Food safety is the practice of making sure that people have the healthful food they need for an active, healthy lifestyle. Some foods, particularly fresh fruits and vegetables, are not cooked before we eat them. These foods must be handled correctly to make sure they are safe to eat. The Centers for Disease Control reports the majority of foodborne illnesses associated with fresh fruits and vegetables are due to improper food handling at the foodservice or consumer level. They are contaminated with pathogens and then not cooked or stored properly. Since you handle food, you can do your part to keep your food safe.

Who is responsible?

All people have a personal responsibility to keep food safe. Farmers are the first people responsible for producing healthful food. They must know how to plant, cultivate, irrigate, harvest, and store the food so that the final product is safe for the consumer. Farmers are responsible for making sure that the people involved in their operations follow the guidelines established by the United States Department of Agriculture (USDA). In the 1990s, the agricultural industry adopted some guidelines called GAPs—Good Agricultural Practices—that keep food safe at the farm level. People who pack, process and transport food must make sure that food is kept at proper temperatures, and handled and washed appropriately. Storage facilities must be kept clean. Grocers and those who prepare and serve food at restaurants are responsible for using proper food safety procedures. You, the at-home consumer, must do your part too! It requires teamwork.

Beneficial Microbes

Microbes live almost everywhere! In fact, you are covered with microbes inside and out! Your mouth contains more than 600 kinds! Your large intestine contains Escherichia coli, a bacterium. Lactobacillus acidophilus turns milk into yogurt. Saccharomyces cerevisae, also known as yeast, makes bread rise. Bacillus thuringensis (Bt), a natural pesticide, is found in the soil and is used by farmers and home gardeners. Rhizobia are bacteria that live in the nodules of some plant roots, such as beans and alfalfa, and convert nitrogen into a form plants can use. Without microbes to decompose things, the world would be covered with waste. In fact, Earth as we know it would not exist!

Bacteria Out of Control!

Under certain conditions, a bacterium can double in population every 10 to 30 minutes—usually in warm, damp and dark places. People can get sick when they eat foods that have been contaminated by harmful bacteria. Salmonella and E. Coli are common bacteria that cause foodborne illnesses. Seems funny that one form of E. Coli is inside our gut, but if we eat another form, it can make us sick. That’s strange but true! Since pathogens can live almost anywhere, it is important to clean, separate, chill, and cook your food properly... and then eat it in a timely manner.
Cause and Effect

Read each of the following statements. Underline the “cause” and circle the “effect.”

1. The milk was not refrigerated, so it turned sour.
2. Miguel washed his hands before making a tasty, healthful salad.
3. There are more foodborne illnesses in the summer because bacteria multiply quicker in warmer temperatures.
4. Grandma made cheese after adding rennet to milk.
5. Sandra threw her apple core into the outdoor bin so it would decompose and become compost.
### Playing it Safe: Game Cards

#### Instructions:
Copy and cut one set of game cards for each group.

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<tr>
<th>Task</th>
<th>Move 1</th>
<th>Move 2</th>
<th>Move 3</th>
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<tr>
<td>You washed your hands for 20 seconds with warm water and soap before helping make dinner.</td>
<td>Move 3</td>
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<tr>
<td>You pet your dog and let him lick your hand. Then you helped mom cut up lettuce for the salad without washing your hands.</td>
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<td>Go back 2 spaces</td>
<td>Move 3</td>
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<td>You used a clean paper towel to wipe off the kitchen counter and then disposed of it properly.</td>
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OPERATION KITCHEN IMPOSSIBLE

Description
In this lesson, students become the head chef in a virtual kitchen. They will use mathematical knowledge, problem-solving skills and food safety guidelines to prepare a safe and nutritious meal.

Activity
Part 1: Introducing Food Safety
1) Brain Dump! Ask students, “What can we do to keep food safe?” Give students 30 seconds to capture their ideas on a personal sheet of paper. Capture thoughts on a common share sheet.
2) Instruct one student to read Chef Al’s recipe card (pg. 8) out loud.
3) Divide students into four collaborative working groups. Assign each group one of the four safety tips below. Each group is to develop and present a 30-second song, rap, or poem sharing important information about their safety tip. Divide a large class into eight groups and feature each tip twice.
4) After each presentation, have the class identify an anchoring movement to recall the important concept presented. For example, students may make a motion with their hand like they are opening the refrigerator door to represent the First In, First Out (FIFO) principle.

Part 2: Applying What We Know
1) Lead students in a review of safety tips and anchoring movements.
2) Have students work individually or with a learning partner to complete the scenario-based problems on the Operation Kitchen Impossible handout (page 8). Students should use a separate sheet of paper to solve problems and record answers.
3) Don’t forget it! Have one student read problem 10 of the handout about farmers and ranchers’ commitment to food safety. Challenge each student to share with the class one personal commitment to food safety.

Safety Tips
Buy it Cold—Keep it Cold!
Take food straight to the fridge after buying. Choose packages tightly wrapped without tears or holes. Freeze fresh meat if you can’t use it within two days. Defrost meat in the refrigerator or using the microwave—don’t leave it out!

Heat it Up Before You Eat it Up!
Foods must reach a certain temperature to be considered safe. Keep these in mind: poultry 165°, ground beef 160°, beef roasts and steaks 145°, pork 160°, leftovers 165°.

FIFO!
When storing meat, label each package with the date and item. Practice the FIFO system, First In (the fridge), First Out!

Separate—Don’t Cross-Contaminate!
Keep raw meat, poultry and seafood away from other foods to prevent the spread of bacteria. Use separate cutting boards for meat and other foods. Always wash your hands and food preparation areas with soap and water before and after use.

ANSWER KEY
1) a. ¼ hour; b. 1 ½ hours; c. ¾ hour
2) 20°
3) 159°
4) 142.5 pounds beef
5) 25.5 gallons milk
6) 6 bags
7) x = 2 cups
8) 48 ft.²
9) 6 oz. solution
10) Answers will vary by student.

Content Standards for California Public Schools
Mathematics
Grade 5
Number Sense 1.2, 2.2, 2.4, 2.5
Algebra and Functions 1.1, 1.2
Statistics, Data Analysis, and Probability 1.1
Grade 6
Number Sense 1.3, 2.1
Algebra and Functions 1.1, 2.2, 2.3
Statistics, Data Analysis, and Probability 1.1
Grade 7
Number Sense 1.2, 1.3
Algebra and Functions 1.2, 1.4, 1.5
Measurement and Geometry 1.1, 2.1

Health Education
Grade 5
Nutrition and Physical Activity 1.5.N
Personal and Community Health 1.1.P
Grade 7
Nutrition and Physical Activity 1.3.N, 1.4.N, 7.2.N

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HELP! My name is Chef Al Fredo and I have been taken by hungry kidnappers who want my secret recipes! Tonight my restaurant, “HEY! PASTA BOWL TO ME!” will be full of guests, and I need you to stand in as head chef. I trust you will create safe and delicious food! Did you know that foodborne illness is often due to bacterial contamination linked to how the food is handled? Next to each light bulb in my kitchen I have important safety reminders. Read them first and then get cooking!

– Chef Al

Warming up!
1. Cooking food for the appropriate length of time is important in food safety! Chef Al left these times in code, by writing them as decimals. Convert the following cooking times from decimals to fractions.
   A) 0.25 hours   B) 1.5 hours   C) 0.75 hours

Use the graph on the right to answer questions 2 and 3.
2. What is the difference in recommended internal temperature between poultry and beef steaks?
3. What is the average internal temperature for all foods listed?

Now you’re cooking!
4. Chef Al warned you not to leave too much food out or it will spoil. He uses 95 lbs. of beef for 200 people, but tonight you are expecting 300 people. How many pounds of beef should you put in the fridge to thaw?
5. Dairy products need to be refrigerated so they don’t go bad. Calculate how many gallons of milk you will need to make Chef Al’s famous Alfredo sauce. He uses 17 gallons to serve 200 people, but you are expecting 300.
6. You pull out frozen pizza dough from the freezer that Chef Al has carefully labeled with the contents, date and amount of dough. You need 15 lbs. of dough to thaw for dinner. If each bag weighs 2½ lbs, how many bags do you need to take out of the freezer?

On fire!
7. Chef Al left his pasta recipe in a secret code. For the amount of flour, Chef Al wrote 2(3x+4) = 20. Solve for the variable to determine how many cups of flour are needed.
8. Make sure you don’t cross-contaminate! You must clean the counter in the kitchen before you begin preparing food. The counter is 4 ft. wide and 12 ft. long. What is the area of the counter?
9. The antibacterial cleaning bottle says that you need ½ ounce of solution for every 4 square feet of surface area. Using your answer from problem 8, how many ounces of antibacterial solution do you need to make sure your counter is clean?
10. American farmers and ranchers are committed to continued research in the area of food safety. What is your food safety commitment? Take a moment to write down three specific actions you will take to commit to food safety in your home.
Mighty Microbes

Who Done It?

Description
Students, acting as epidemiologists, look at the facts of an outbreak and determine the source and cause of an illness that makes many picnickers sick. Interpreting data tables, classifying, and reading are incorporated into this investigative epidemiological mystery.

Activity
1. Explain to the students that they will become epidemiologists and determine the cause of an illness that affected many people in a community. Have someone read the dictionary definition for “epidemiology” and discuss its meaning. Also, discuss that actual epidemiology cases are much more complex than the hypothetical case they are about to analyze.

2. As a class read the foodborne illness outbreak scenario on page 10.

3. Discuss the terms “outbreak” and “dichotomous,” as well as any others the students may find difficult. Create a class vocabulary list if necessary.

Have student duos complete the activity as described on the student worksheet.

NOTE: Have newspaper articles handy for students to use as a guideline for writing their news article as described on page 10.

ANSWER KEY

The unhealthy microbes in the fruit juice were most likely transmitted by an ill worker who had a foodborne illness himself. His improper handling of the cups and juice, along with warm temperatures, spread the disease to the juice. The dichotomous path used to reach this conclusion is: 1a, 2a, 3a, 4a, 5a.

Time
Two 50-minute sessions

Materials
For each student:
• What Caused the Illness? student page
• What Caused the Foodborne Illness? Dichotomous Key
• Samples of newspaper articles

Content Standards for California Public Schools Links

English Language Arts

Grade 5
Reading 1.0, 2.0, 2.1, 2.1, 2.2
Writing 1.0, 1.2, 1.3
Written and Oral English Language Conventions 1.0, 1.4

Grade 6
Reading 2.0, 2.1, 2.1, 2.2, 2.5
Writing 1.0, 1.1, 1.2, 2.2
Written and Oral English Language Conventions 1.0, 1.4

Grade 7
Reading 2.0, 2.3
Writing 1.0, 1.1, 1.2
Written and Oral English Language Conventions 1.0, 1.4

Science

Grade 5
Investigation and Experimentation 6, 6a, 6i

Grade 7
Investigation and Experimentation 7, 7c, 7e

Health Education

Grade 5
Nutrition and Physical Activity 1.5.N

Grade 7
Nutrition and Physical Activity 1.3.N, 1.4.N

Local Health Department Conducting Investigation!
**What Caused the Illness?**

Name ______________________________

**Scenario**

The local hospital has treated numerous people for dehydration due to uncontrollable vomiting followed by diarrhea. The county health department is conducting an investigation to determine the causative agent. It was determined that all the patients ate at a community get-together on May 16 and that the illnesses were caused by a foodborne pathogen, a disease-causing microorganism obtained from something the people ate or drank. Look at the data chart above. Each of the 20 people in the chart were hospitalized. Determine what food was responsible for the food poisoning.

**PATIENT DATA CHART:**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Hot Chocolate</th>
<th>Fruit Juice</th>
<th>Bottled Water</th>
<th>Granola Bar</th>
<th>Popcorn</th>
<th>Cut Vegetables</th>
<th>Veggie Dip</th>
<th>Watermelon</th>
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</thead>
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<td>T</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
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<td>-</td>
</tr>
</tbody>
</table>

+ = that person ate item  - = that person did not eat item

1. From the data above, what food do you suspect caused the illness?

2. In one complete sentence, describe your reasoning.

3. Discuss your reasoning with the lead epidemiologist (your teacher) and then obtain the dichotomous key to continue your investigation.

4. Using the dichotomous key, determine the actual source of the illness. Complete the following statement. "Through scientific investigation, my team has determined that the people at the get-together on May 16 became ill because:

5. Suppose you are a reporter for the local newspaper. Write a three to five paragraph article that describes what happened, why it happened, and how the foodborne illness could have been avoided. Before writing your story, examine a newspaper article to see how it is set up. Make sure your article has:

   • a headline
   • authors listed
   • facts of what happened
   • facts about foodborne illnesses in general
   • how this incidence could have been avoided
   • quotes from experts or witnesses (pretend you interviewed patients, event planners, food handlers, epidemiologists, etc.)
   • been proofed for spelling, capitalization, proper punctuation, sentence structure, and flow of story
What Caused the Foodborne Illness? Dichotomous Key

Instructions: Read number 1. Determine which statement, a or b, best reflects the incident and information. Proceed as directed, until the illness is traced back to its source. This is called a “trace-back,” something that epidemiologists do on a regular basis.

1. The fruit juice was made from frozen fruit juice concentrate, which was pasteurized at the plant. Pasteurization is when something is heated to a temperature high enough to kill microorganisms. The can had a batch number of 10394-PR on its end. A bacterial count was determined from a frozen concentrate with the same batch number. Look at the chart above.
   a. If the bacterial count was 0 in 3 milliliters of juice, the illness was not likely caused by the concentrate itself. Go to 2.
   b. If the bacterial count was 1 per 3 milliliters of juice or greater, the illness was likely caused by the bacteria in the concentrate before preparation. Illness came from fruit juice concentrate.

2. Water used to dilute the juice concentrate came from the tap and is tested by the city’s Public Works Department on a regular basis. Here are the data for a 3-week period.
   a. If the bacterial level of the water was 0 or less, the water was not the cause. Go to 3.
   b. If the bacterial level of the water was 1 or higher, bacteria from the water could be the culprit.

<table>
<thead>
<tr>
<th>Test Performed</th>
<th>May 10</th>
<th>May 17</th>
<th>May 24</th>
<th>Max. Allowable Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Count</td>
<td>None detected</td>
<td>None detected</td>
<td>None detected</td>
<td>None detected</td>
</tr>
<tr>
<td>Copper (ppm)**</td>
<td>40</td>
<td>30</td>
<td>40</td>
<td>170</td>
</tr>
<tr>
<td>Nitrates (mg/l)*</td>
<td>22</td>
<td>19</td>
<td>21</td>
<td>45</td>
</tr>
<tr>
<td>Calcium (ppm)**</td>
<td>48.2</td>
<td>41.7</td>
<td>48.1</td>
<td>300</td>
</tr>
<tr>
<td>Lead (ppb)***</td>
<td>None detected</td>
<td>None detected</td>
<td>None detected</td>
<td>None detected</td>
</tr>
<tr>
<td>Fluoride (ppb)***</td>
<td>110</td>
<td>98</td>
<td>110</td>
<td>2000</td>
</tr>
</tbody>
</table>

   * mg/l = milligrams per liter  ** ppm = parts per million  *** ppb = parts per billion

3. Ice was added to the juice. The ice came from ice cubes made of city water and were made fresh with clean ice cube trays.
   a. The ice was probably not the source of illness. Go to 4.
   b. The ice could have been the problem.

4. The prepared juice was at the park for the entire event on May 16 from 2 p.m. until 5 p.m. Use the following information gathered from the event manager to make an appropriate choice.
   a. If the bacterial count was 0 per 3 ml juice, the illness was not likely caused by the concentrate itself. Go to 5.
   b. If the bacterial count was 0 per 3 ml juice, the illness was likely caused by the bacteria in the concentrate before preparation. Illness came from fruit juice concentrate.

5. A quick survey of the overall health of the workers indicated that one of the workers at the fruit juice station had a severe stomachache and was feverish the night before the event.
   a. A sick worker could have spread a foodborne illness to the guests at the event.
   b. A sick worker could not have spread a foodborne illness to the guests. Go to 6.

6. Most bacteria grow best between the temperatures of 40°F and 140°F. View the chart below and the description in 4 and determine whether the outside temperature could have aided in bacterial contamination.
   a. Outdoor temperatures could have caused contamination.
   b. Most likely outdoor temperatures did not contribute to the illness. Go to 7.

7. How the juice was dispensed or stored could be the problem.
   a. The juice could have sat in the cup for longer than two hours, as much time as it takes for harmful bacteria to reach a population that could cause illness. Juice that was not kept cool enough was most likely the problem.
   b. The illness was caused by something other than handling. Further investigation needs to occur before a probable cause can be determined at this time.
Description
Students, acting as scientists, will explore bacteria and fungi. They will design an experiment that will promote or minimize the bacterial and fungal growth on a piece of white bread.

Activity
1. Prior to this activity, students should understand what bacteria are and that most are beneficial. Those which cause illness are called pathogens. Review if necessary.
2. Show the students the supplies for an experiment they will design. The goal is to either promote or minimize bacterial/fungal growth on a piece of white bread over a two-week period.
3. Have the students design and complete their experiments, record observations every other day and, after two weeks, write a formal lab report using the guidelines provided.
4. Discuss what is needed for bacteria to grow and what might minimize their growth. Relate this to food preservation and safety.
5. Divide students into teams of three. Assign each group one method of food preservation — drying, freezing, canning, fermenting, smoking, salting, pasteurizing. Using books and on-line sources, they are to:
   - Research their assigned form of food preservation
   - Learn about its history
   - Create a list of examples
   - Find out how it is done today
   - Create a poster with pictures and words that describes their food preservation process.

Materials
- White bread without preservatives, two pieces per team
- Re-sealable plastic bags
- Thermometer
- Dark closet or shoebox with lid
- Hand lenses or microscopes
- Water
- Eye droppers
- Refrigerator access

Content Standards for California Public Schools Links

English Language Arts
Grade 5
Reading 2.0, 2.1
Writing 1.3, 1.4
Listening and Speaking 1.0, 1.5, 2.0, 2.2

Grade 6
Reading 2.0, 2.2
Writing 1.4
Listening and Speaking 1.0, 1.4, 1.6, 2.2

Grade 7
Reading 2.0, 2.1, 2.2
Listening and Speaking 2.0, 2.3a, 2.3b, 2.3c

Science
Grade 5
Investigation and Experimentation 6, 6b, 6c, 6h

Grade 6
Ecology 5
Investigation and Experimentation 7, 7a, 7b, 7d, 7h

Grade 7
Investigation and Experimentation 7, 7a, 7c, 7e

Health Education
Grade 5
Nutrition and Physical Activity 1.5.N

Grade 7
Nutrition and Physical Activity 1.3.N, 1.4.N

SAFETY NOTE:
The plastic bags which contain bread must be kept sealed and disposed of properly. Do not allow students to open the bags under any circumstances! Harmful microorganisms could be in the bag.
Introduction
Bacteria and fungi are all around us. They are responsible for many things. Most importantly, they decompose dead plants and animals and convert them into soil and nutrients that other living things can use. They are a part of all ecosystems. Some bacteria and fungi, however, can be harmful. These are called pathogens. It is important for people to understand how to minimize the amount of pathogens so that the food they eat can be nutritious and safe.

You and your partner are to design an experiment that will encourage or discourage bacteria and fungi from growing on a piece of bread. Before you place it in the plastic bag, you may expose it to a doorknob, backpack, notebook, or even moisture or heat. Or, you may expose it to nothing other than the container it was in. You decide! Design your experiment, have your teacher approve your procedure, and then perform your experiment.

Remember, scientists always create hypotheses, list their procedures, record their observations, and write conclusions. So, as a scientist, you will complete all of these steps on a separate sheet of paper. Here is how your completed write-up should look.

Think About It!
Do bacteria and fungi prefer light or dark places?
What about moisture?
What about heat?

Title: The name of the experiment
Purpose: What you are trying to learn
Hypothesis: Your guess as to what will happen
Materials: The materials you used
Procedure: The detailed steps you performed
Observations: Charts and sketches clarifying what you observed
Results: A summary of your observations
Conclusion: What your experiment proved or disproved

SAFETY NOTE:
Once you place your bread in the plastic bag and seal it, you may not open it under any circumstances. Some bacteria and fungi can be harmful. When finished with the experiment, give your bread, still in the sealed bag, to your teacher for proper disposal. You don’t want to get a disease from a pathogen!
How Safe Is Your Kitchen?

Description
Restaurants and school kitchens are inspected each year by state health inspectors. They check to make sure that safe food preparation guidelines are in practice. Inspectors check equipment, storage facilities, and preparation areas. Food safety should also be practiced at home. Choose a meal. Evaluate your kitchen during its preparation and clean-up by using the form below. Discuss your findings with your family.

Kitchen Inspection Evaluation
Inspector: (your name) ________________________________
Date: __________________________ Time ___________________________
Meal Inspected (circle one): Breakfast Lunch Dinner Snack

Clean
Food preparer washed hands with warm, soapy water before handling food. Yes No
Counter tops were cleaned before use. Yes No
Cutting board was cleaned after preparing each food item and before going on to the next food item.

Separate to Prevent Contamination
Raw meat, seafood, poultry and other foods were kept separate from each other in the refrigerator. Yes No
A separate cutting board was used for meat Yes No or the cutting board was washed before a different food item was prepared on it.

Cook to Proper Temperatures
Meat was cooked completely, and hot food was completely heated. Yes No

Chill: Refrigerate Promptly
Leftover food was placed in the refrigerator within two hours of preparation. Yes No
Food meant to be cold was served cold. Yes No

Knives and cooking utensils were washed immediately after they came in contact with raw meat or eggs. Yes No
Cooked meat was placed on a clean dish. Yes No
Raw egg shells were thrown away and any areas where raw eggs were used were washed with soapy water. Yes No

Total number of “Yes” answers: ___ X 10 = ______
Total number of “No” answers: ___ X 0 = ______
Total Score: ________________________________

If your score was:
90-110: You are “A” safe cook
70-89: You need to “B” a little more aware of food safety procedures.
50-69: You need to “C” the food safety rules and use them!
below 50: Sorry, your kitchen has been “D”-stroyed by microorganisms!

WHAT’S YOUR GRADE?

Wash Up and Sing! Wash your hands thoroughly with warm, soapy water prior to preparing food. While washing, sing “Happy Birthday” to yourself. This will ensure you have washed your hands long enough to adequately remove dirt, grime and germs.

Be Careful Crossing the Meat! Wash hands, utensils, plates and cutting boards immediately after they have been in contact with raw meat, poultry, seafood or eggs and before they come in contact with any other food, especially fresh produce.

Microwave it! Microwave sponges and dishcloths on high for one minute to remove any harmful bacteria.

When in Doubt, Throw it Out! If you think something may be old or spoiled, throw it out! Follow the old adage: It’s better to be safe than sorry—or home with a bad stomachache!
OTHER ACTIVITIES

1. Create flyers which encourage handwashing, proper food preparation and storage. Post in restrooms, lunchrooms and in areas where lunchboxes are stored.
2. Submit student-written editorials to your local newspaper on what the public can do to reduce foodborne illnesses.
3. Create a student-made refrigerator magnet that encourages proper food handling and storage.
4. Check your local public health department website and review inspection reports of your favorite local restaurants.

RESOURCES

Food Safety Music
Carl Winter, Ph.D. has combined his passion for music with his expertise in food toxicology to teach students and adults about food safety. Three CDs are available on a donation basis. Appropriate for all ages.
Carl Winter, Ph.D.
Food Science and Technology Department
University of California
One Shields Avenue
Davis, CA 95616-8598
Phone: (530) 752-2647
Fax: (530) 752-4759
E-mail: ekwinter@ucdavis.edu
Website: foodsafe.ucdavis.edu

Science and Our Food Supply—Investigating Food Safety From Farm to Table
Kit includes interactive video, comprehensive reference guide, career guide, and varied activities that can be incorporated into all curricula. Separate guides for middle school and high school science teachers.
National Science Teacher's Association
Website: www.nsta.org/pdf/lda.aspx

Your Game Plan for Food Safety: A Fight BAC!
Food Safety Education Program for 4th, 5th and 6th Grade Classrooms
This comprehensive program includes video, posters, experiments, activities, home survey, take-home BAC-Catchers, and a teacher's activity and experiment guide.
It is available free from the Fight BAC! website. Grades K–3 and 9–12 curricula also available.
Fight BAC!
Website: www.fightbac.org

LITERATURE


WEBSITES

Alliance for Food and Farming: www.foodandfarming.info
California Department of Education: www.cde.ca.gov
California Foundation for Agriculture in the Classroom: www.LearnAboutAg.org
Centers for Disease Control: www.cdc.gov
Fight BAC!: www.fightbac.org
Food Detectives Fight BAC!: www.fooddetectives.com
Food Safety Information and Inspection Service: www.fsis.usda.gov/food_safety_education
FoodSafe: foodsafe.ucdavis.edu
Gateway to Government Food Safety Information: www.foodsafety.gov
MicrobeWorld: www.microbeworld.org