The Science in Food Handling & Storage

Media Type: Video
Duration: 53 minutes

Goal: For students to gain in depth knowledge of food microbiology, safe handling practices and proper storage techniques so they are able to apply them to their lives.

Description: This presentation explores the basis and purpose of various food handling and storage practices in the industry, as well as in home kitchens. Food spoilage, food intoxications and infections, along with food pathogens, food microorganisms and food additives are also discussed. The application and importance of proper storage methods, such as freezing, vacuum packaging and dehydrating, are introduced and explained.

Objectives:
1. To investigate food microbiology.
2. To explain the difference between food intoxication and food infection.
3. To examine the conditions of microbial growth.
4. To analyze sanitary food handling practices.
5. To discuss harmful and helpful food microorganisms.
6. To describe the use of food additives and their role in the food industry.
7. To identify agencies involved in regulating food additives.
8. To illustrate the steps of proper food freezing and storage.
9. To discuss the advantages and disadvantages of freezing food.

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Horizontal Alignment

Core-Subject Area	Foundation Concept	Basic Understanding
Science	***Scientific Thinking and Investigating***	• Field and laboratory investigations • Critical thinking and scientific problem solving • Real-world investigations and applications • Analytical skills • Hypothesis development • Researching and proving theories • Collecting data • Conducting experiments • Technology-based research • Evaluating conclusions • Compare/contrast findings • Classification/organization skills
	Scientific Laws and Principles	• Cycles, structures and processes • Principles of biology, chemistry, anatomy, physiology or psychology • Human development • Horticulture • Patterns of behavior • Physical or kinesthetic activity • Periodic table • Food safety and sanitation • Temperature control • Equation development and solution • Physical and chemical reactions • Laws of physics

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Lesson Plan

Class 1: Begin the class by handing out the *Science in Food Handling & Storage Worksheet* and the *Science in Food Handling & Storage Vocabulary Handout*. Show *The Science in Food Handling & Storage (Part 1).* Have students complete the *Is Your Cutting Board Clean? Activity*. After, introduce the *Food Spoilage Project*. Distribute the *Food Spoilage Microorganism Profile Project* for students to begin as homework.

Video 8 min.

Class 2: Show *The Science in Food Handling & Storage (Part 2).* Remind students to use the *Worksheet* and *Vocabulary Handout*. Have students complete the *Safety First Activity*.

Video 4 min.

Class 3: Show *The Science in Food Handling and Storage (Part 3).* Remind the students to use the *Worksheet* and *Vocabulary Handout* as reference materials. Have students complete the part one of the *Freezer Burn Storage Activity*.

Video 4 min.

Class 4: Show *The Science in Food Handling & Storage (Part 4)* and *The Science in Food Handling & Storage (Part 5).* Remind the students to use the *Worksheet* and *Vocabulary Handout*. Introduce the *Food Safety Awareness Project,* and allow students to begin. Instruct them to finish it for homework.

Video 9 min.

Class 5: Show *The Science in Food Handling & Storage (Part 6)* and *The Science in Food Handling & Storage (Part 7).* Remind the students to use the *Worksheet* and *Vocabulary Handout*. Introduce the *Food Additive Search Activity,* and allow students to begin. Distribute the *Food Storage Guidelines Project.*

Video 12 min.

Class 6: Distribute the *Types of Food Additives Student Handout.* Have students complete the *Food Additive Search Activity*. Show *The Science in Food Handling & Storage (Part 8).* Remind students to use the *Worksheet* and *Vocabulary Handout.* Have students complete part two of the *Freezer Burn Storage Activity.*

Video 6 min.

Class 7: Show *The Science in Food Handling & Storage (Part 9).* Remind students to use the *Worksheet* and *Vocabulary Handout*. Instruct students to begin the *Career Investigation Project*. It should be finished for homework.

Video 10 min.

Class 8: Review the material from the past classes. Hand out *The Science in Food Handling & Storage Crossword* for the students to complete. Administer *the Science in Food Handling & Storage Assessment.* Ask students about their progress on the *Food Spoilage Project*, and remind them of its due date. Students should share their *Food Spoilage Microorganism Profile Projects* with the class.

Lesson Links

Center for Disease Control and Prevention
- http://www.cdc.gov

Food and Drug Administration
- http://www.fda.gov

FoodSafety.org
- http://www.foodsafety.org

Career & Technical Student Organizations

Family, Career & Community Leaders of America
- Culinary Arts

National FFA
- Food Science and Technology

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Career Connections

Using the *Career Connections Activity*, allow students to explore the various careers associated with this lesson. See the *Activity* for more details. *If student licenses have been purchased:* Students will select the interviews to watch based on your directions. *If only a teacher license is purchased:* Show students all the career interviews and instruct them to only complete the interview form for the required number of interviews.

- iCEV50048, Kendra Nightingale, Ph.D., Associate Professor, International Center for Food Industry Excellence, Texas tech University
- iCEV50079, Collette Schultz-Kaster, Vice President of Food Safety & Technician Services, American Meat Science Association
- iCEV50482, Barbara Masters, Administrator, USDA Food Safety & Inspection Service

Lab Activities

Is Your Cutting Board Clean?

Directions:

This activity requires Glo Germ®, a glass cutting board, a plastic cutting board, a wood cutting board, and a black light (UV light). In small groups, students will test the different types of cutting boards by putting Glo Germ® on each and washing the cutting boards with soap. Then, a black light should be used to see if there is left-over Glo Germ® on the cutting boards. This illustrates which cutting boards hold onto bacteria even after they are washed. After the activity is completed, lead a class discussion about which boards are most likely to foster bacteria growth.

Safety First

Directions:

The student will research and compile a list of Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP) for a local business, their home kitchen or the school cafeteria.

Freezer Burn Storage

Directions:

Working in groups, students will package pieces of meat in different storage containers and place the items in the freezer. After a few days, packages will be checked to compare which storage method best protects food from freezer burn. Storage methods to use are original packaging, a Ziploc® bag, foil and a plastic container. After students have completed the activity have groups compare results to see if any other variables might have affected the experiment.

Food Additive Search

Directions:

Students will examine the contents of a food product and research each of the contents to determine which are considered food additives. They should compile a poster which has a picture of the food and each of its ingredients

Projects

Food Storage Microorganism Profile

Directions:

Students should choose a food spoilage microorganism and develop a profile for the microorganism which includes at least the following: name of the microorganism; type of microorganism (bacteria, fungi, mold, etc.); short description of the microorganism; characteristics of how the microorganism causes food spoilage and methods of prevention which could be used to keep food from spoiling due to your chosen microorganism. Students should present their profile to the class and discuss the similarities and differences in the chosen spoilage microorganisms.

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Projects

Food Spoilage

Directions:

Students will test how quickly bread molds under different storage conditions. Each storage condition type should have one placed in the refrigerator and one out at room temperature. The storage conditions should consist of the following: no covering, plastic container, and Ziploc® bag. The student should monitor bread over time for mold growth and record findings in a report. *Note: Depending on where you live, it could take longer than a week for mold to grow. Research mold growth times for your area or discuss students' progress every few days to determine how long the project should last.

Food Safety Awareness

Directions:

The student will create a blog or Web page designed to inform the local community about food safety practices.

Career Investigation

Directions:

The student will research careers in food safety to compile a list of ten careers. Next, the student will choose two of the careers to write profiles about which include the median salary, required education, job skills, preferred experience, etc.

Food Storage Guidelines

Directions:

Divide the class into groups of three or four. As a group, students will research the storage requirements for fish, red meat and poultry. Groups must include the storage requirements for each type of meat and describe why they are important and what the consequences are for not following the requirements. After completing their research, groups should create a handbook which includes guidelines for proper storage techniques. Remind students to cite all sources used. Groups should present their handbook to the class.