

Lesson C11–1

Exploring Food Science and Its Benefits

Unit C. Basic Principles of Agricultural/Horticultural Science

Problem Area II. Understanding Food Science Technology

Lesson I. Exploring Food Science and Its Benefits

New Mexico Content Standard:

Pathway Strand: Food Products and Processing Systems

Standard: II: Apply principles of food science to the food industry.

Benchmark: II-A: Apply food science principles to enhance product development.

Performance Standard: 1. Conduct research. 2. Apply the use of chemistry. 3. Comply and apply USDA/FDA standards. 4. Use product development (e.g., consumer opinion, taste testing). 5. Conduct nutritional analysis (e.g., biochemistry). 6. Compare and contrast the nutritive values of food groups. 7. Identify and compare various food constituents.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Define food science.
2. Describe why food science is important and how it improves quality of life.
3. Describe how the study of food science makes people better consumers.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Osborne, Edward W. *Biological Science Applications in Agriculture*. Danville, Illinois: Interstate Publishers, Inc., 1994. (Textbook, Chapter 23)

Seperich, George J., *Food Science and Safety*. Danville, Illinois: Interstate Publishers, Inc., 1998. (Textbook, Chapter 1)

Other Resources. The following resources will be useful to students and teachers:

Cooper, Elmer E., *AgriScience Fundamentals and Applications*. Albany, New York: Delmar Publishers, 1997. (Textbook, Unit 34)

Food Science, Safety, and Nutrition. Alexandria, Virginia: National Council for Agriculture Education, 1993. (Curriculum Binder)

Morgan, Elizabeth M., et al. *AgriScience Explorations*, Second Edition. Danville, Illinois: Interstate Publishers, Inc., 2000. (Textbook, Chapter 16)

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters

Terms. The following terms are presented in this lesson (shown in bold italics):

Deterioration
Domestication
Food-borne illness
Food Science
Microbes
Preservation
Process

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students to name some of their favorite foods. Compile a list of the most commonly named foods. Determine which of the foods have gone through some type of processing. Briefly discuss the role food science plays in the availability of our favorite foods. Point out that without food science, the selection of foods we have available would be much lower. Move on to the objectives of the lesson.

Summary of Content and Teaching Strategies

Objective 1: Define food science.

Anticipated Problem: What is food science?

- I. **Food science** is the study of the substances we eat, their makeup, and the processes used to alter them.
 - A. In food science, there are two reasons substances are altered:
 1. To make them more suitable in taste or nutritional value.
 2. To make them available longer for consumption. This deals with the amount of time a food product can be stored before it is eaten. As an example, canned fruits last longer than fresh fruit.
 - B. A **process** is a course, method, or series of operations used in producing a food product. When a food is processed, it is altered in some form from its original condition.

Many techniques can be used to help students master this objective. Students need text materials to assist them to understand food science and achieve mastery learning. Chapter 1 in the recommended reference will be helpful. Use TMC11–1A to help students understand food science and why foods are processed. Have students read the What is Food Science section in the chapter.

Objective 2: Describe why food science is important and how it improves quality of life.

Anticipated Problem: Why is it important to study food science? How does food science improve the quality of life.

- II. Food science is used to discover new ways to process existing foods and to discover new types of foods.
 - A. Food scientists research new processing methods for foods. These methods deal with slowing the breakdown of foods so that they last longer.
 1. **Deterioration** is a natural process that results in the breakdown of a food into different components. For example, an orange that sits on a counter for an extended period will begin to become discolored. This is a form of deterioration.
 2. **Preservation** is the use of a process that allows a food to be extended beyond its natural life. Typical methods of food preservation are listed below. They will be discussed in depth in Lesson C11–2.
 - a. Heating—the most effective method.
 - b. Refrigerating and freezing—the most commonly used method.
 - c. Drying—local elevators typically dry grain to extend its useful life.
 - d. Fermentation—this method is commonly used in the yogurt-making process
 - e. Irradiation—exposing food to radiation.

- f. Food additives—adding chemicals to a food to extend its useful life.
- B. Food scientists are constantly researching new uses for existing foods. They also work to discover plants and animals in food source.
 - 1. Food scientists routinely experiment with new uses for existing foods. An example of this is the use of soybeans in the processing of hamburgers. Adding soybean meal to hamburgers means that less meat is used in the final product. This allows the meat to be used in other products. At that same time, soybeans which are readily available, are put to good use.
 - 2. Food scientists also work to discover plants and animals as food sources. This involves using existing plants or animals as a food source or working with other scientists to discover new types of plants and animals that can be used as food sources.
 - a. **Domestication** is a process by which a wild plant or animal is altered to become a reliable food source. An example includes the production of catfish in a controlled environment. Aquaculture, which is farming in water allows for fish species to be domesticated.
 - b. Food scientists work with other scientists to discover new types of plants and animals that can be used as sources of foods. Food scientists have worked with plant scientists to develop a new type of tomato that can be stored longer. Food scientists have also worked with animal scientists to develop new cattle breeds that provide leaner meats.

Many techniques can be used to help students master this objective. Use TM: C11–1B to help reinforce the benefits derived from food science. Discuss the typical methods of food preservation. Mention that they will be discussed more in the next lesson. Students need text materials to help understand the benefits of food science. Chapter 1 in the recommended reference will be helpful. Have students read the Why The Study of Food Science is Important section of this chapter. Chapter 23 in Biological Science applications in Agriculture will also be helpful.

Objective 3: Describe how the study of food science makes people better consumers.

Anticipated Problem: How will an understanding of food science make people better consumers?

- III. Studying food science allows consumers to understand the basic principles of different foods. Having knowledge of these principles enables consumers to buy, store, and prepare safe meals.
 - A. Buying—an understanding of food science helps consumers to recognize the quality of food products in stores.
 - B. Storing—Once a food product is purchased it must be stored correctly to extend its life as long as possible and to keep it safe. Having an understanding of food science enables consumers to wisely store their food products.
 - C. Preparing—understanding food science principles helps consumers to properly prepare food products. **Food-borne illness** is an illness that results from consuming improperly

prepared or stored foods. Most food-borne illnesses are the result of improper food preparation. Most commonly, organisms in the food are not killed because the food product was undercooked. The tiny organisms that grow in and on foods are known as **microbes**.

A number of techniques can be used to help students master this objective. Use TM: C11–1C to reinforce how an understanding of food science helps in buying, storing, and preparing safe foods. Students need text materials to help them understand how the study of food science makes them better consumers. Chapter 1 in the recommended reference will be helpful. Have students read the Better Consumers section of the chapter. The Curing Process section in Chapter 23 of Biological Science Applications in Agriculture will also be helpful.

Review/Summary. Concentrate the review and summary around the lesson's student learning objectives. Call on the class to explain the content associated with each objective. Use the Reviewing section and the questions at the end of the chapter in the recommended reference to review and summarize the lesson content.

Application. Application can involve the Applying The Concepts Section at the end of the chapter in the recommended reference. The experiments in Chapter 23 of *Biological Science Applications in Agriculture* will also be useful.

Evaluation. Evaluation should mainly involve student achievement of the lesson's student objectives. Various techniques can be used, such as student performance on the application activities. A sample written test is also attached.

Answers to Sample Test:

Part One: Matching

1=d, 2=b, 3=g, 4=a, 5=e, 6=c, 7=f

Part Two: Completion

1=Food scientists
2=animal
3=buy, store, prepare
4=food-borne

Part Three: Short Answer

1. Heating—the most effective method.
Refrigerating and freezing—the most commonly used method.
Drying—local elevators typically dry grain to extend its useful life.
Fermentation—this method is commonly used in the yogurt making process
Irradiation—this involves exposing food to radiation.
Food additives—this involves adding chemicals to a food to extend its useful life.

2.
 1. To make them more suitable in regards to taste or nutritional value.
 2. To make available longer for consumption.
3.
 1. New process methods
 2. New uses for existing foods
 3. New plants and animals become food sources

Test

Lesson C11–1: Exploring Food Science and Its Benefits

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | |
|-----------------------|------------------|
| a. food-borne illness | e. preservation |
| b. deterioration | f. domestication |
| c. process | g. food science |
| d. microbes | |

- _____ 1. The tiny organisms that grow in and on foods.
- _____ 2. A natural process that results in the breakdown of a food into different components.
- _____ 3. The study of the substances we eat, their makeup, and the processes used to alter them.
- _____ 4. An illness that results from consuming improperly prepared or stored foods.
- _____ 5. The use of a process that allows a food to keep its usefulness beyond its natural life.
- _____ 6. A course, method, or series of operations used in producing a food product.
- _____ 7. A process by which a wild plant or animal is altered to become a reliable food source.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____ research new process methods for foods.
2. Food scientists have also worked with _____ scientists to develop new cattle breeds that provide leaner meat.
3. Having the knowledge of basic principles of different foods enables consumers to _____, _____, and _____ safe meals.
4. Most _____ - _____ illnesses are caused as a result of improper preparation.

FOOD SCIENCE—the study of the substances we eat, their makeup, and the processes used to alter them.

Foods are altered for two reasons:

- **To make them more suitable in taste or nutritional value.**
- **To make them available longer for consumption.**

Process—a course, method, or series of operations used in producing a food product.

The Benefits of Food Science

A. New Process Methods Are Developed

- **Less Food Deterioration**
- **Better Preservation Techniques**

B. New Uses For Existing Foods Are Developed

C. New Plants and Animals Are Developed and Become Food Sources

How Food Science Helps People Become Better Consumers

- A. Buying—Recognizing Quality Food Products**
- B. Storing—Recognizing Correct and Safe Storage Methods**
- C. Preparing—Decreasing the Occurrence of Food-Borne Illnesses**