



Processing Our Foods

Middle School Food and Agricultural Literacy Curriculum

Precepts

- H. Social Growth
 - H1. Acknowledge that differences exist among people

National Standards

- FPP.01.01.02.c. – Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.
- FPP.03.01.02.a. – Explain the application of chemistry and physics to food science.
- FPP.04.03.03.b. – Explain the processes of food preservation methods.
- NL-ENG.K-12.5 – Communication Strategies
- NL-ENG.K-12.6 – Applying Knowledge
- NL-ENG.K-12.12 – Applying Language Skills
- NS.5-8.2 – Physical Science
- NS.5-8.5 – Science and Technology

Student Learning Objectives

- As a result of this **unit** the student will...
- Examine processes involved in food science
- As a result of this **lesson** the student will...
- Identify key characteristics of five methods of processing food.

Content Outline

Objective 1. Identify five methods of processing food.

- I. **Methods of processing food:** foods are processed to extend their shelf life, prevent foods from spoiling, keep foods safe, and to change the products into different forms for consumption.
 - A. **Pasteurization**
 - 1. A form of heat processing.
 - 2. **Microorganism:** small living thing, like bacteria.

Time

Instruction time for this lesson: 60 minutes.

Resources

Allen, P., Bruening, T., Hoover, T., Hunter, W., Marrison, D., & Preis, B. (1993). *Food Science, Safety, and Nutrition*. Madison, WI: National Council for Agricultural Education. — National FFA Organization. (2003). *LifeKnowledge Precepts and Signs of Success*. — Parker, R.O. (1999). Food dehydration and concentration. Retrieved August 21, 2009, from AgEdNet.com. www.agednet.com — Seperich, G. J. (2004). *Food Science and Safety*. Upper Saddle River, NJ: Prentice Hall Interstate.

Tools, Equipment, and Supplies

Products of your choice that have been pasteurized, dehydrated, frozen, fermented, and canned – one of each (examples include: beef jerky, canned soup, milk, frozen vegetables, pickles, or instant mashed potatoes)
Music player and soft music of your choice
Overhead projector/transparencies
MS.FS.2.1.TM.A – one per teacher
MS.FS.2.1.AS.A – one per student
MS.FS.2.1.ASSESS.A – one per student
MS.FS.2.1.ASSESS.B – one teacher copy per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Dehydration
Freezing
Fermentation
Pasteurization
Canning
Microorganism

- 3. Destroys pathogenic **microorganisms** in food, but does not destroy **microorganisms** that cause spoilage; kills **microorganisms** that carry diseases and make people sick, but does not kill **microorganisms** that make the food go bad.
- 4. Dairy products like milk are examples of foods that are pasteurized.

B. **Dehydration**

- 1. The process of removing water from foods.
- 2. Methods include: sun drying for sun-dried tomatoes, freeze drying for instant coffee, or by using air with a dehydrator for beef jerky.



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3. Moisture can be added back into foods that are freeze dried, like instant coffee or mashed potatoes, but moisture cannot be added back into dehydrated foods like beef jerky.

C. Freezing

1. Frozen foods are stored at 0°F, **Freezing** keeps foods safe from **microorganisms**, and when done properly, maintains the color, quality, taste, and texture of foods.
2. Frozen foods have a long shelf-life and can remain frozen and safe to eat for months at a time.
3. If foods are not packaged and frozen properly, they can become freezer burned, where they become very dry and lose flavor, become discolored, and are not desirable for consumption.

D. Fermentation

1. Protects foods against **microorganisms**.
2. Uses **microorganisms** like yeast, mold, and some bacteria to preserve and change the state of the food.
3. Fermented foods include: pickles, olives, sausage, bread, and cheese.

E. Canning

1. A form of heat processing.
2. Has the longest shelf-life of any heat processed food – can stay preserved for years as long as the package is not damaged.
3. Jars are filled with heated food products, or heated after they are filled.
4. Canner's brine: liquid added to the jar that can be either sugar- or salt-based and helps with preservation. For example, salt-based brine in a can of tuna, or sugar- based brine in a can of peaches.

Interest Approach

Distribute **MS.FS.2.1.AS.A** as students enter the classroom.

Place a food product or packages of foods representing each of the five methods of food processing that will be presented in the lesson at the front of the room. Ask students to look at the products and determine what the products have in common and make a list. Then, ask the students to make another list identifying what is different about the products. Ask students to share and discuss the products together as a class.

Welcome to class, everyone! We have a lot to do so let's get started! As we can see, there are five different food products in front of us that we are going to think about. When I say THINK, we are going to use our comparison handouts to list the similarities and differences between the food products. You will have two minutes to think about and create the lists of as many similarities and differences as you can think of. Be prepared to share when time is up. What questions are there? THINK!

Walk around the room to check on student progress with the activity. Give students a 30- second warning before time is up. When time is up, select a volunteer to be the class scribe, who will create a class list on the board.

Time's up! That means we should be ready to share some thoughts. I would like to invite a volunteer to the front of the room to be our scribe and make a class list up here at the board.

Select a student based on volunteers who are interested in participating.

Thank you. Let's begin. What are some things that the products have in common?

Allow several students to share their responses. Depending on the products on display, possible responses may include: they are all in a package, they are all preserved, they have been processed, they are not farm fresh, etc.

Awesome! Now let's hear about the differences between the products.

Allow several students to share their responses. Depending on the products on display, possible responses may include: some are fruits, vegetables, or meats, some require heating or cooking, others don't, etc.

Great job thinking about these products! All of the responses are correct! There are many similarities between these products, and yet the products are very different. But the one major quality they all have in common is that they have been processed in some way. Today we are going to be intent listeners as we learn about five different ways foods are processed. Processing helps foods taste good, makes them stay fresh on the shelf or in your refrigerator, and in some cases provide us with extra nutrients.



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Summary of Content and Teaching Strategies

Objective 1. Identify five methods of processing food.

Present the content for the lesson using the Choral Response e-Moment®. Using the products that are placed at the front of the room, emphasize each product as you talk about the corresponding method of preservation. The preservation methods will be the key terms emphasized for the choral response. The review portion of the lesson will contain the activity. Students will record the key terms from the Choral Response e-Moment activity on the guided notes handout, **MS.FS.2.1.AS.B**, which should be distributed to students at the start of the lesson.

Foods are processed to extend their shelf-life, prevent foods from spoiling, keep foods safe, and to change the products into different forms for consumption. We are going to learn about five different methods for processing foods. For today's lesson, I am going to need your help. Several times during the lesson, I am going to ask you to repeat very important information, and this process is going to help you remember this highly important content. As you repeat this information, speak loud and clear. You will know it's your turn to repeat something when I point to the class. For example, I'll say, "food processing."

Point to the class so they can practice saying "food processing."

OK, great! Remember to use the guided notes handout to fill in the key terms that we are repeating. Let's begin.

Walk over to the pasteurized food product. Hold the item up for the class as you explain **pasteurization**. If you feel comfortable, pass the product around for students to have a closer look.

Pasteurization.

Point to the class and have them repeat "**pasteurization**."

Awesome! **Pasteurization** is a form of heat processing, meaning the product is heated to very hot temperatures. The purpose of **pasteurization** is to eliminate **microorganisms**.

Food Science: Processing Safety

Point to the class to indicate they should repeat "**Microorganisms**."

Microorganisms are small living things, like bacteria. **Pasteurization** destroys or kills the **microorganisms** in food that make people sick, but they do not eliminate the **microorganisms** that cause food to spoil. So, when you have a product like milk, you can drink tons of milk and not get sick, but milk will eventually turn sour and go bad. What questions are there?

Walk over to the dehydrated product. Hold the item up for the class as you explain **dehydration**. If you feel comfortable, pass the product around for students to have a closer look.

The next form of processing that happens to many food products is **dehydration**.

Point to the class to indicate that they should repeat "**dehydration**."

Great job! This is the process of removing water from foods. We can dehydrate products though sun drying for sun-dried tomatoes, freeze drying for instant coffee, or by using air with a dehydrator for beef jerky. Moisture can be added back into foods that are freeze dried, like instant coffee or mashed potatoes, but moisture cannot be added back into dehydrated foods like beef jerky. What questions do you have? Super! Let's check out this next item.

Walk over to the frozen product. Hold the item up for the class as you explain **freezing**. If you feel comfortable, pass the product around for students to have a closer look.

This product has been frozen. **Freezing**.

Point to the class so they can repeat.

Freezing means that foods are stored at 0°F, keeping foods safe from **microorganisms**, and when done properly, maintains the color, quality, taste, and texture of foods. Frozen foods have a long shelf-life and can remain frozen and safe to eat for months at a time. If foods are not packaged and frozen properly, they can become freezer burned, where they become very dry and lose flavor, become discolored, and are not desirable for consumption. What questions are there? Great!



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Walk over to the fermented product. Hold the item up for the class as you explain **fermentation**. If you feel comfortable, pass the product around for students to have a closer look.

Fermentation.

Point to the class so they can repeat.

Fermentation also protects foods against **microorganisms**. And while the foods are protected against harmful **microorganisms**, **fermentation** sometimes uses good **microorganisms** like yeast, mold, and some bacteria to preserve and change the state of the food. Fermented foods include pickles (which are really cucumbers), olives, sausage, bread, and cheese. If you like blue cheese, for example, a special mold gives it the fabulous flavor and slight blue color. What questions are there? Nice job! One product left. Let's learn about it!

Walk over to the canned product. Hold the item up for the class as you explain **canning**. If you feel comfortable, pass the product around for students to have a closer look.

Ask the class,

"What kind of package is this product in?"

Answer: a can.

Right! **Canning**.

Point to the class so they can repeat.

Canning is also a form of heat processing. Canned products have the longest shelf-life of any heat processed food. They can stay preserved for years as long as the package is not damaged. Jars or cans are filled with heated food products, or they can be heated after they are filled. Canner's brine is the liquid added to the jar that can be either sugar- or salt-based or helps with preservation, like salt-based brine in a can of tuna, or sugar-based brine in a can of peaches. What questions are there? Excellent!

Review/Summary

Use the *Dickens e-Moment* to review the content, where students will be writing a short story with characters and story lines based on the content from the lesson.

We have just learned the different ways all five of these products were processed. We know that each product has similarities and differences as we discussed earlier. What are some other things that have similarities and differences? Take a moment to think about this and then we will share our thoughts.

Give students a few seconds to think about this question. Possible responses: clothes, classes in school, books, animals, people, etc.

Let's hear some of your thoughts. What are some things aside from food that have similarities and differences?

Students share.

Wow, I heard some really great responses. All of those things definitely have similarities and differences. For example, I heard people as a response. The same way people have differences in the way they dress, food products have different packages. What are some other ways people have similarities or differences, aside from the way they dress?

Possible responses: different ethnic or cultural backgrounds, difference religions, etc.

Excellent, that's true. So, going back to food, there are different variations of food products, like canned fruit versus fresh or frozen fruit. Can we think of something both foods and people have in common, despite the way they look or where they come from?

Possible response: they are important, helpful, have a purpose, same on the inside, etc.

Right! This means that one thing people and these food products have in common, is that beyond the package or the outer appearance, they are all the same on the inside. Food is food, and people are people, all the same. Great discussion, what questions do we have about that? Super.

Since an outline will be posted at the front of the room using the overhead projector, write the components of the story (personify, story line, write, or tell) on the board or on a flip chart so that the information is also present and students will remember the steps for writing their stories.

Remember those key words we repeated throughout the lesson?



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Let's take a look back at our products and quickly review. When I hold up each product, tell us how the product was processed.

Hold up each product and ask students to identify how each product was processed by calling out the answer.

Great! We are going to be creative writers and transform those products and processing methods into exciting characters in a short story. You have the freedom to write about any product or processing method of your choice. Before you begin writing your story, there are two things you must do. First, you must personify your product or processing method, which means it must be turned into a character that has the same qualities as humans. For example, you might turn **fermentation** into Frank the Fermenter, who has the secret power of transforming things into different forms.

The second step is to create a story using one of three types of conflict. These conflicts are human versus human, human versus nature, or human versus self. A problem should be solved or the characters must engage in a dialogue with one another. If characters are in a dialogue with one another, that means they are having a conversation about something. For example, the conflict in the story of Charlotte's Web is how to save the life of a pig named Wilbur.

Dialogue takes place among all the farm animals, including Wilbur and Charlotte, the spider. What questions are there so far? Great, then we are finally ready to write the story, and remember as you write or tell the stories they must include content from the lesson. An outline of the content we have learned today will be available at the front of the room for your reference as you write your stories, and you also have your guided notes as a reference.

Feel free to brainstorm with a neighbor if you need some ideas. You will have the remainder of the class period to work on your stories, which should be at least three paragraphs, and they will be collected for a grade. What questions are there? Awesome, you may begin!

Play soft music in the background as they write. Be sure to walk around the room and check for understanding. Assist the students if they need some help getting started. End the music and wrap up the class about five minutes before class is over to give students time to clean up. If they do not complete their stories in class, they can be finished for homework.

Application

Extended classroom Activity:

Make Beef Jerky or Dried Fruit – With the help of the students, provide the ingredients for the foods you decide to make. Go through the process of making the food products, including proper slicing, surface area, and the other components that are involved in successful **dehydration**. Use dehydrators to make the foods.

FFA Activity:

Students will write a two-minute informative speech about the different types of food processing methods. Students can identify the specific method they would like to write about for the speech. Invite guests like other teachers, administrators, or other classes, to visit and listen to the speech presentations.

SAE Activity:

Processed Product Parade – Each student will pick a food product to bring in for the class and determine how it was processed. With the processing information, create information cards to display next to the food item. Arrange the products around the room with the information cards next to each product, and allow students to walk around to each display, looking at the products and reading the information. After all the students have a chance to look at the products and learn the ways they were processed, students may sample the products.

Evaluation

MS.FS.2.1.ASSESS.A

MS.FS.2.1.ASSESS.B

Answers to Evaluation

1. A
2. C
3. C
4. A
5. B



Processing Our Foods Guided Notes

Name _____

1. _____ is a form of heat processing, meaning the product is heated to very hot temperatures.
2. _____ are small living things, like bacteria. Pasteurization destroys or kills the microorganisms in food that make people sick, but not the kind that cause food to spoil.
3. _____ is the process of removing water from foods. Examples include sun drying for sun-dried tomatoes, freeze drying for instant coffee, or by using air with a dehydrator for beef jerky. Moisture can be added back into foods that are freeze dried, but moisture cannot be added back into dehydrated foods.
4. _____ means that foods are stored at 0°F, keeps foods safe from microorganisms, and when done properly, maintains the color, quality, taste, and texture of foods. Frozen foods have a long shelf life and can remain frozen and safe to eat for months at a time.
5. _____ protects foods against microorganisms. While the foods are protected against harmful microorganisms, fermentation sometimes uses good microorganisms like yeast, mold, and some bacteria to preserve and change the state of the food.
6. _____ is also a form of heat processing. Canned products have the longest shelf-life of any heat processed food.



Processing Our Foods Guided Notes

Name _____

1. Pasteurization is a form of heat processing, meaning the product is heated to very hot temperatures.
2. Microorganisms are small living things, like bacteria. Pasteurization destroys or kills the microorganisms in food that make people sick, but not the kind that cause food to spoil.
3. Dehydration is the process of removing water from foods. Examples include sun drying for sun-dried tomatoes, freeze drying for instant coffee, or by using air with a dehydrator for beef jerky. Moisture can be added back into foods that are freeze dried, but moisture cannot be added back into dehydrated foods.
4. Freezing means that foods are stored at 0oF. Freezing keeps foods safe from microorganisms, and when done properly, maintains the color, quality, taste, and texture of foods. Frozen foods have a long shelf-life and can remain frozen and safe to eat for months at a time.
5. Fermentation protects foods against microorganisms. While the foods are protected against harmful microorganisms, fermentation sometimes uses good microorganisms like yeast, mold, and some bacteria to preserve and change the state of the food.
6. Canning is also a form of heat processing. Canned products have the longest shelf-life of any heat processed food.



Name _____

Directions: Read each statement and decide which response is appropriate by circling the correct letter that corresponds with the selected response, or by writing the response in the space provided.

1. **Canned foods have the longest shelf life of any processed foods.**
 - A. True
 - B. False
2. _____ is the process of removing water from the food products.
 - A. Pasteurization
 - B. Canning
 - C. Dehydration
 - D. Freezing
3. **Good microorganisms like yeast, mold, and some bacteria, can enhance the flavor or change the state of a food product through the process of _____.**
 - A. Canning
 - B. Dehydration
 - C. Fermentation
 - D. Freezing
4. **A microorganism is a small living thing.**
 - A. True
 - B. False
5. **Frozen foods are stored at _____, keeps foods safe from microorganisms, and when done properly, maintains the color, quality, taste, and texture of foods.**
 - A. 32°F
 - B. 0°F
 - C. -1°F
 - D. -32°F



Creative Writing Rubric

_____ A food product or processing method has been identified in the story (2 points)

_____ The food product or process has been personified (2 points)

_____ A clear story line has been identified by the reader (2 points)

_____ The story is at least three complete paragraphs in length (2 points)

_____ The story includes content as provided in the outline and lesson in class (3 points)

_____ Followed directions (3 points)

Total Score _____