Make & Taste Dairy
Whipped Cream (Grades 6-8)

Lesson Activity

LESSON OVERVIEW:
During this lesson, students will be introduced to both the history and science behind the process of whipping heavy cream into a delicious topping. Participants will make whipped cream and discover ways to incorporate whipped cream into recipes featuring additional nutrient-rich ingredients.

LESSON MATERIALS NEEDED:
Ingredients for every 3-5 students:

1/2 cup heavy whipping cream (at least 36% fat)
1 tablespoon granulated sugar

Equipment
- Medium bowl
- Serving spoon
- Whisk
- Measuring spoons and cups
- Small bowls and spoons for tasting

For Tasting
Some or all of the items below to use in tasting the whipped cream:
- granola (can purchase nut-free as needed)
- fresh berries
- peach or nectarine slices
- banana slices
- graham crackers (preferably whole wheat)

LESSON OBJECTIVES:
During this lesson, students will:
- Become familiar with the history of whipped cream.
- Explain the basic science of how whipping heavy cream produces an edible foam.
- Become familiar with the nutritional composition of whipped cream.
- Using a simple recipe, students will successfully make whipped cream.
- Participate in a tasting activity which combines whipped cream with additional healthful foods.
- List at least three ways that a small portion of whipped cream can enhance the taste and acceptance of healthy foods.

ACADEMIC INTEGRATION:
- Science
- History
- Language Arts

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Leader Background

What Is Whipped Cream?

Whipped cream is made when cream – with enough fat content – is whipped into an edible foam. Heavy whipping cream, which contains at least 36% milk fat, is most commonly used to make whipped cream. It can be used to garnish desserts or to accompany fruits such as fresh berries. Because cream is bland when whipped on its own, it is sweetened with a touch of sugar. The benefit of making your own whipped cream is that you can control how much sugar is added.

Why Eat It?

Topping food and beverages with whipped cream creates products that are delicious and enjoyable. Whipped cream enhances foods and beverages such as fruit, granola, whole grain waffles and pancakes, decaf lattes, Chai tea and hot chocolate. One tablespoon of heavy whipping cream – which yields approximately two tablespoons of whipped cream – contains about 50 calories, 5 grams of fat, less than one gram of carbohydrate, negligible protein and a small amount of vitamin A. Because it contains a hefty dose of calories and fat, it is best to enjoy in small portions (like a 2 tablespoon serving).

History of Whipped Cream

There are references to whipped cream in arts and literature dating back to the 16th century. Whipped cream has been included in recipes that date back to 1549 in Italy and 1604 in France. Way back then, it was known as “milk snow.” Early writings indicate that before we had mixers or even whisks, branches from willow or other trees were used to whip the cream!

Before the late 1800s, the only way to separate cream from milk was to allow the milk to sit until the cream formed a layer on top of the milk and carefully skim off the layer of cream. That is likely where the term “skim milk” came from, since the milk left after skimming is fat-free. The milk we purchase today is homogenized, which means the fat particles are evenly dispersed in the milk and will not separate.

In the late 1800s, the Swedish engineer Gustaf de Laval invented the milk-cream separator, which featured a rapidly spinning container, known as a centrifuge, to efficiently separate the cream from the milk.

Food Science

Whipped cream is created by a chemical reaction where millions of tiny air bubbles interact with fat particles known as globules, partially breaking them down. Eventually the fat reconnects with other tiny fat particles, forming a stable foam known as a colloid. If the process continues, eventually the fat will continue to reconnect and result in the solid form we know as butter.

The scientific definition of a colloid is a mixture of very small particles of one substance distributed evenly throughout another substance. In the case of whipped cream, millions of tiny air bubbles are evenly trapped in liquid fat (cream). Other examples of colloid foams include soap suds and shaving cream.

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Glossary:
Fat: Fat in food belongs to a group of substances called lipids, and includes both animal and plant sources. The fat found in milk is known as cream and is also used to make butter. Fat is also an essential nutrient that we need to help our brains develop, keep our cells healthy and provide a source of stored energy on our body.
Foam: A substance formed by trapping gas bubbles in a liquid. Foams are classified as a colloid, which is a mixture made of very small particles of one substance distributed evenly throughout another substance.
Heavy Cream: A liquid dairy product commonly made up of approximately 36% fat with the remaining volume coming primarily from water.
Homogenization: A mechanical process that breaks fat globules into smaller droplets so that they stay suspended evenly in milk rather than separating out and floating to the top.
Whipped Cream: Edible foam created by introducing air into heavy cream. This is done by rapidly beating the cream, breaking up the fat particles and introducing millions of tiny air bubbles.

Teaching the Lesson

Class Discussion

1. Begin the lesson by finding out what students know about the history of whipping cream. Describe how recipes featuring "milk snow" have been found as early as the 1500s in Italy. Students may be interested to know that cream once had to be hand skimmed and the process of whipping was once done with tree branches! (see page 2 under the "History of Whipped Cream").

2. Ask students if they can describe the chemical reaction of how heavy cream becomes whipped cream. Explain the basic chemical reaction that occurs when whipping cream. (See page 2 under the "Food Science").

3. Ask students if they can name the primary nutrient found in whipped cream (fat). Discuss how whipped cream on its own may not contribute a lot of nutrients but that it can be paired with fresh fruit, berries and other nutrient-rich foods to enhance the taste and acceptability.

4. Describe how the class will break into small groups and take turns preparing the whipped cream. Once the group completes their whipped cream, they will move to a separate table with bowls, spoons and toppings such as granola, berries, peaches, banana slices, and graham crackers.

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Making and Tasting

Make Your Own Whipped Cream
Number of participants in a group: 3-5

Ingredients
½ cup heavy whipping cream
2 tablespoons granulated sugar

Equipment
Medium bowl – best if chilled
Whisk – best if chilled
Measuring spoons and cups
Serving Spoon
Small bowls and spoons for tasting

Directions

1. Food Safety:
   - Thoroughly clean table or preparation area with soap and warm water before starting this project.
   - Students should thoroughly wash their hands with soap and warm water immediately prior to beginning the food preparation.
   - All ingredients, bowl and whisk should be kept chilled up until the time of preparation. Chill finished product in bowl after the project is complete.
2. In a medium bowl, combine the whipping cream and granulated sugar.
3. Using a whisk or handheld mixer, whip a few minutes or until soft peaks form.
4. Use whipped cream immediately or cover and store in the fridge for up to 1 week.

Yield: 1 cup

Variation: To make Vanilla Whipped Cream, add 1 teaspoon vanilla extract to the cream. This is sometimes also known as Chantilly cream or crème Chantilly.

Tasting
Once a group of students completes their whipped cream, they can move to a separate table with bowls, spoons and toppings such as granola, berries, peach or nectarine slices, banana slices, graham crackers, etc.

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References

1. Cream Science: On Whipping, Butter, and Beyond
http://www.seriouseats.com/2014/10/the-science-of-whipped-cream-butter-creme-fraiche.html

2. Colloids, Libretexts Chemistry
https://chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Physical_Properties_of_Matter/Solutions_and_Mixtures/Colloid

3. Gustaf de Laval – The milk-cream separator National Museum of Science and Technology, Sweden;
https://www.tekniskamuseet.se/en/learn-more/swedish-inventors/gustaf-de-laval-milk-cream-separator/

4. Terence Scully, trans., The Opera of Bartolomeo Scappi (1570): L'arte et prudenza d'un maestro Cuoco; The Art and Craft of a Master Cook, 2008, ISBN 0-8020-9624-7, p. 105, note 2.39, with many menus including "neve di latte servita con zuccaro sopra" 'milk snow with sugar on top'

5. 5 Things You Didn't Know About Whipped Cream, Food & Wine Blog
http://www.foodandwine.com/blogs/5-things-you-didnt-know-about-whipped-cream

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Lesson Activity

Directions: Answer the following questions after completion of the lesson.

1. How does the volume of cream change when it is whipped?

2. What happens if you whip the cream too long?

3. Review the Nutrition Facts label for heavy whipping cream:
   - What is the primary nutrient in heavy whipping cream?

   - What additional nutrients are present in heavy whipping cream?

Heavy Whipping Cream

Nutrition Facts

32 servings per container

Serving size **1 Tbsp (15ml)**

Amount Per Serving	
Calories	**50**
	% Daily Value*
Total Fat 5g	6%
Saturated Fat 3.5g	18%
Trans Fat 0g	
Cholesterol 20mg	7%
Sodium 5mg	0%
Total Carbohydrate 1g	0%
Dietary Fiber 0g	0%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Protein 0g	0%
Vitamin D 0mcg	0%
Calcium 0mg	0%
Iron 0mg	0%
Potassium 15mg	0%
Vitamin A	4%

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

4. Name at least 3 foods or beverages that can be enhanced with a small portion (2 tablespoons) of whipped cream.

5. Why do you think fat-free milk is also sometimes referred to as “skim or skimmed” milk?

6. BONUS: Why are cold equipment and cold whipping cream more effective at producing whipped cream?

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Lesson Activity *(continued)*

Answer Key

1. How does the volume of cream change when it is whipped?
   Answer: The volume doubles, so 1 tbsp. of heavy whipping cream becomes 2 tbsp. of whipped cream.

2. What happens if you whip the cream too long?
   Answer: The fat globules will continue to become attracted to each other until a solid mass is formed – butter!

3. Review the Nutrition Facts label for heavy whipping cream.
   - What is the primary nutrient in heavy whipping cream?
     Answer: Fat
   - What additional nutrients are present in heavy whipping cream?
     Answer: A small amount of vitamin A and a tiny amount of potassium.

4. 4. Name at least 3 foods or beverages that can be enhanced with a small portion (2 tablespoons) of whipped cream.
   Answer: There are several possible answers, including different fruits, whole grain versions of pancakes, waffles and French toast, low-fat hot chocolate, decaf lattes, etc.

5. Why do you think fat-free milk is also sometimes referred to as “skim or skimmed” milk?
   Answer: At one time, milk was allowed to sit until a cream layer formed on top and then skimmed off, leaving only the fat-free version of the milk. Today, milk goes through a process known as homogenization which breaks up the fat particles and al lows them to evenly disperse throughout the milk.

6. BONUS: Ask students if anyone has thoughts on why cold equipment and cold whipping cream are more effective at producing whipped cream.
   Answer: Fat is a substance that easily melts so keeping everything cold will keep whipped cream from breaking down.

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Take Home Activity

TRY THIS AT HOME!

Now that you have created this delicious whipped cream, you can make it at home for your family and use it to dress up these dishes and more!

Make Your Own Whipped Cream
Ingredients:
½ cup heavy whipping cream
2 tablespoons granulated sugar

Equipment:
Medium bowl – best if chilled
Whisk – best if chilled
Measuring spoons and cups
Serving Spoon

Directions:
1. In a medium bowl, combine the whipping cream and granulated sugar.
2. Using a whisk or handheld mixer, whip a few minutes or until soft peaks form.
3. Use whipped cream immediately or cover and store in the fridge for up to 1 week.
Yield: 1 cup

Variation: To make Vanilla Whipped Cream, add 1 teaspoon vanilla extract to the cream. This is also known as Chantilly cream or crème Chantilly.

Creative Way to Use Whipped Cream

1. Waffles, Pancakes or French Toast: Enjoy a whole wheat waffle or slice of French toast topped with a dollop of whipped cream and sliced peaches.
2. Strawberries: Dip fresh strawberries in whipped cream and enjoy as dessert or snack.
3. Ice cream: Top your ice cream with a dollop of whipped cream and sprinkle with pecans.
4. Frozen Banana Sandwich: Spread 2 tablespoons of whipped cream and 3 slices of banana between two square graham crackers. Freeze for at least an hour and enjoy!
5. Fruit Compote: Top fruit compote with a dollop of whipped cream.
6. Beverages:
    - Warm up on a chilly day with hot chocolate made with warmed low fat chocolate milk topped with a tablespoon of whipped cream.
    - Experiment with topping apple cider with a small dollop of whipped cream.
    - Try topping cold drinks such as chocolate or strawberry milk with a touch of whipped cream.