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We suggest that you make your own “Candy, Culture, and Creativity” kit using this lesson plan booklet, the “Agriculture: Where Candy Comes From” reference booklet, materials for the lessons, and selected books, videos, and brochures.

Lessons in this Booklet

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For Chocolate – Scented Play Dough

- 1/4 cup flour
- 1/2 cup cocoa powder
- 1/2 cup salt
- 1/2 T. cream of tartar
- 1-1/2 T. cooking oil
- 1 cup boiling water

Heads

mixing Spoons

airtight container

plastic spoons

Activity Outline

Chocolate Books

Read a book about how chocolate is produced:

Yummy, Edible Dirt!

1. Line an 8 inch plastic or clay flowerpot with foil.
2. Crush one large package of Oreo cookies and set aside
3. Put aside for later 3/4 lb. Package of gummy worms, 1 package miniature chocolate chips and some green-colored coconut
4. Cream together 4 tbs. butter or margarine, 1 8oz. Package cream cheese and 1 cup powdered sugar.
5. Mix together 3 1/2 cups milk, 2-3 oz. Packages vanilla instant pudding, and 12 oz. whipped topping.
6. Add the creamed mixture and the pudding mixture together. Mix well.
7. Place the whipped topping lid in the bottom of the flowerpot.
8. Bottom layer (Parent Material): Begin with a layer of crushed cookies. Then mix chocolate chips with half of the creamed pudding mixture and smooth it over the cookies.
9. Second layer (Subsoil): Add more crushed cookies, than a creamed pudding layer and the gummy worms. (Save one worm for the top layer!)
10. Top layer (Topsoil): Finish with a layer of crushed cookies. Sprinkle with green coconut for “grass” and poke a gummy worm through the top to peek out of your "soil". Refrigerate over night.

Enjoy the soil!

Chocolate – Scented Play Dough

1 1/4 cup flour
1/2 cup cocoa powder
1/2 cup salt
1/2 tablespoon cream of tarter
1 1/2 tablespoons cooking oil
1 cup boiling water

Mix the dry ingredients. Add the oil and boiling water. Stir quickly, mixing well. When cool, mix with your hands. Store in an airtight container.

Trading Cocoa Beans

In Ancient Central America, people used Cacao Beans as currency. The Spanish colonists exported the beans to Spain, where as late as 1545, they were still being traded. Here is a table showing how much certain items cost in cocoa beans:

- 200 beans = male turkey
- 100 beans = daily wage of a porter
- 100 beans = female turkey
- 100 beans = rabbit
- 30 beans = small rabbit
- 3 beans = turkey egg
- 3 beans = avocado
- 3 beans = fish wrapped in maize (corn) husks
- 1 bean = tamale

Have students take 400 beans to market. Can they buy 1 male turkey, 1 female turkey, 3 small rabbits, one turkey egg, and one tamale? What would they decide to buy with any leftover beans?

Discussion Questions:

1. How is chocolate produced?
2. What types of careers are involved in chocolate production and sales?
3. Where did chocolate originate and how did it travel to other countries?
4. Why do you think cocoa beans become a form of currency? (possibly because they’re valuable, small, and easy to carry and count).

Related Activities:

2. Take an online tour of the Hershey Factory by visiting www.hersheypark.com/heritage.html.
3. Play “Name That Candybar” by visiting www.sci.mus.mn.us/sln/tf/crosssection/namethatbar.html and looking at the candybar cross-sections.
4. Visit the Field Museum in Chicago or learn about their Chocolate Exhibit online at www.fieldmuseum.org/education/education.html.
5. Ask the students to research the “Cocoa Belt.” Where is it on your classroom globe? What is the average temperature in the countries in the Cocoa Belt? How much rain do countries in the Cocoa Belt receive?

Sources:

- “Teaching with Chocolate,” Terese A. D’Amico
- Bon Appetit, December 1991, page 200
- “Consumption of Selected Ingredients by the U.S. Confectionary Industry,” Lexis-Nexis® Statistical
- Creative Classroom, September/October 2001, page 47.50
- “Chocolate Themes” ChildFun.com

A teaching unit created by the Illinois Ag in the Classroom Program of the Illinois Farm Bureau®, the Candy College® Library, and the Illinois Center for Food Safety and Technology.
LESSON 7 – Chocolate History and Activities

A LOOK AT HOW CHOCOLATE GROWS AND CHOCOLATE HISTORY.

Subjects: Math, Science, Social Studies

Illinois Learning Standards: 1.A.2a; 1.B.2; 2.A.2; 2.B.2; 3.B.2; 3.C.2; 3.D.2; 3.E.2; 3.F.2; 4.B.2; 5.A.2; 5.C.2; 5.D.2; 5.E.2; 5.F.2; 6.B.2; 6.C.2b(No); 17.A.2a; 17.A.2b; 17.B.2a; 17.C.2b; 17.C.2c.

Introduction
Did you know that chocolate means ‘the food of the god’? Theobroma cacao is the scientific name for America’s favorite type of candy. ‘Theo’ is a Greek word meaning ‘god’, while ‘broma’ means the food of the gods.

Cacao beans were used in a spicy drink called chocolatl by the Ancient Aztec. Aztec traders got cacao beans from the Maya lands and traded it to the Aztecs. Since the beans were used for money, warriors had to accompany the traders to protect them from thieves. When Cortés and his Spanish explorers came to the Aztec capital, they saw Montezuma drinking chocolatl in gold cups. The Spanish explorers took the spicy drink back to Spain and people there loved it. Soon traders from other European countries took the chocolatl drink back home, people added sugar to the drink, and chocolate became a favorite drink of the upper class. In the late 19th-century, Rudolph Lindt invented a conching machine. It squeezed cacao beans and made a smooth chocolate blend. In 1875, Daniel Peter teamed up with Henri Nestle' and they added milk to their chocolate recipes. The popularity of candy bars grew after World War I. By 1930, there were 40,000 different kinds of candy bars.

Cacao is a natural product that comes from the cacao beans of the cacao trees. Cacao trees can grow in tropical climates - 20 degrees north or south of the equator. This is referred to as the Cocoa Belt. The most cacao trees are grown in South America and Indonesia. South America produces almost 400,000 tons per year. Indonesia is second with 410,000 tons per year. Other leading cacao growing countries are Ghana, Nigeria, Brazil, Ecuador, and Indonesia. Dominican Republic, New Guinea, and Mexico.

Cacao flowers on the cacao trees are pollinated by flies, which are tiny flies. They live and breed in the decaying leaves and pods around cacao trees. The flies are only 2-4 millimeters long, but they beat their wings 1000 times a second.

Cacao trees have pods, each with 20 to 40 almond-sized beans. It takes almost 400 cacao beans to make a pound of chocolate liquor. The pods are harvested with a machete and then broken apart to retrieve the cacao bean. The beans must then be fermented, dried, and shipped at chocolate factories in bulk bags. At the chocolate factory, cacao seeds are roasted, cracked, lanced, and then ground into chocolate liquor. Chocolate liquor is used to make chocolate. Some chocolate liquor is preserved to make cocoa butter and further processing turns it into cocoa powder.

To make chocolate, chocolate liquor is mixed with condensed milk, sugar, and extra cocoa butter till it is a coarse, brown powder. Next it is refined with steel rollers by breaking the crumb mixture into tiny, cocoa, milk, and sugar particles. Then the mixture is churned into a smooth blend. Then it is tempered-cooled and warmed for a glossy sheen and to ensure proper melting.

Chocolate manufacturers use 40 percent of the world’s almonds, 20 percent of the world’s peanuts and 8 percent of the world’s sugar. Also milk is a key ingredient in chocolate. 3.5 million pounds of whole milk is used every day to make chocolate.

The U.S. grinds the most cocoa for processing at 438,000 tons. The Netherlands and Germany are also leaders. Switzerland consumes the most chocolate per person. 23 pounds per person each year. The U.S. consumes 12 pounds per person each year. In 1998, Americans ate 3.3 billion pounds of chocolate.

Materials Needed:
- for Books:
  - Cocoa Confection by Melissa Petroun
  - The Magic School Bus in the Rain Forest by Joanna Cole
  - Chocolate. Riches from the Rainforest
- for Yummy, Edible Dirt:
  - 8 inch plastic or clay flowerpot
  - 1 large package of Oreos®
  - 3/4 pound package of gummy worms
  - 1 package miniature chocolate chips
  - green colored coconut
  - T. butter or margarine
  - 1 1/2 cups powdered sugar
  - 1 1/2 cups milk
  - 3 oz. package of cream cheese
  - 1 cup chocolate
  - 1 oz. container of whipped topping
  - Refrigerator

Where Does My Candy Come From?
1. Ask your students to create a candy of their own. It should be something they’ve never seen before. (For example: pecans and chocolates with honey and a white chocolate coating and sprinkles)
2. Next the students should write a recipe for their candy.
3. Ask the students to send down what countries their ingredients come from. Then they should use the world map included in this lesson and mark the places where their ingredients will grow. They can create a color-coded key and then color the countries as well. For example, if they need vanilla for their candy, they can make vanilla blue in the key and then color Madagascar blue since that is one place it grows. If you are studying longitude and latitude, you may want to have the students write down the information along with their candy ingredient sources.

LESSON 1 – Candy Ingredients

A LESSON ABOUT THE PRODUCTION, SMELL, AND TASTE OF CANDY INGREDIENTS.

Subjects: Science, Social Studies, Nutrition, Language Arts, Fine Arts

Illinois Learning Standards: 3.A.2; 3.B.2a; 3.B.2b; 3.B.2c; 3.B.2d; 3.C.2; 4.B.2; 5.A.2; 5.C.2; 5.D.2; 5.E.2; 5.F.2; 6.B.2; 6.C.2b(No); 16.D.2c(Us); 16.E.2b(Us); 17.A.2a; 17.A.2b; 17.B.2a; 17.C.2b; 18.C.2; 22.a.2b; 23.B.2; 27.A.2a; 27.B.2b

Introduction:
Candy ingredients are grown and processed around the world. Illinois agriculture accounts for many candy ingredients that may surprise you such as corn, soybeans, milk, sugar, eggs, and honey. For more information about the sources of candy ingredients, see the accompanying book with this unit “Agriculture: Where Candy Comes From.”

Materials:
- Small/Taste Testing Matrices: almonds, cashew chips, carob powder, coconut, corn, sugar, corn oil, corn starch, cottonseed oil, eggs, honey, maple syrup, milk, mint, peanuts, pecans, salt, soybean oil, sugar, vanilla, watermelons
- Small/Taste Testing Matrices: “Candy Ingredients From Around the World” World Map

Activity Outline:
Candy Smell/ Taste Party
1. Set up a table of candy ingredients such as nuts, oils, sugars, grains, etc.
2. Ask the students to taste the ingredients and then chart them. You may ask them to rate them salty, sour, bitter, or sweet and chart them. You may want to put the ingredients on small plates or bowls for them to taste.
3. Ask the students to write a short play about their candy ingredient’s history. (For example, they could write a play about vanilla including the officer of Cortes who noted Aztecs using vanilla in chocolate, the Spaniards establishing factories to manufacture chocolate with vanilla flavoring, and vanilla production today.) Here is a list of ingredients and their origins to get the students started:

<table>
<thead>
<tr>
<th>Candy Ingredient</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla</td>
<td>Mexico/Central America</td>
</tr>
<tr>
<td>Pecans</td>
<td>N. America</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Mexico/Central America</td>
</tr>
<tr>
<td>Almonds</td>
<td>U.S.</td>
</tr>
<tr>
<td>Cashew chips</td>
<td>U.S.</td>
</tr>
<tr>
<td>Carob powder</td>
<td>U.S.</td>
</tr>
<tr>
<td>Coconut</td>
<td>U.S.</td>
</tr>
<tr>
<td>Corn</td>
<td>U.S.</td>
</tr>
<tr>
<td>Sugar</td>
<td>U.S.</td>
</tr>
<tr>
<td>Honey</td>
<td>U.S.</td>
</tr>
<tr>
<td>Maple syrup</td>
<td>U.S.</td>
</tr>
<tr>
<td>Milk</td>
<td>U.S.</td>
</tr>
<tr>
<td>Soybeans</td>
<td>U.S.</td>
</tr>
<tr>
<td>Peanuts</td>
<td>U.S.</td>
</tr>
<tr>
<td>Cottonseed oil</td>
<td>U.S.</td>
</tr>
<tr>
<td>Eggs</td>
<td>U.S.</td>
</tr>
<tr>
<td>Honey</td>
<td>U.S.</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>U.S.</td>
</tr>
<tr>
<td>Vanilla</td>
<td>France</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Bolivia</td>
</tr>
<tr>
<td>Almonds</td>
<td>South Africa</td>
</tr>
<tr>
<td>Cashew chips</td>
<td>South Africa</td>
</tr>
<tr>
<td>Carob powder</td>
<td>South Africa</td>
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<td>Honey</td>
<td>South Africa</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>South Africa</td>
</tr>
</tbody>
</table>

Discussion Questions:
1. How is Illinois agriculture different than agriculture in other parts of the world? (rops, climate, processing, technology)
2. What is an emulsifier? (soy lecithin)
3. Why is farming important to the candy industry?
4. Name three types of nuts used in candy.
5. Name three types of oils used in candy.

Related Activities:
1. Pretend your job is to harvest vanilla trees. Write a story about it. Where would you live? How would you keep the pods from being stolen?
2. The groups of the Food Guide Pyramid are Fruits, Oils, Sweets, Milk, Yogurt, & Cheese, Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts, Vegetables, Fats, Bread, Pasta, Rice, & Cereal
3. Place the following candy ingredients in the groups of the Food Guide Pyramid: nuts, fruits, milk, butter, cream, mint, corn syrup, molasses, honey, soybean oil, eggs, barley, wheat, rice, swirch, chocolate.
4. Origins of crops. Ask the students to pick a candy ingredient that they would like to learn the history of. They should find out the origin of the ingredient, where it has been planted because it’s origin, people who were involved in transporting the crop, and people who were involved in researching the crop. Ask the students to work in groups and write a short play about the candy ingredient’s history. (For example, they could write a play about vanilla including the officer of Cortes who noted Aztecs using vanilla in chocolate, the Spaniards establishing factories to manufacture chocolate with vanilla flavoring, and vanilla production today.) Here is a list of ingredients and their origins to get the students started:

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<tbody>
<tr>
<td>Vanilla</td>
<td>Mexico/Central America</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Vanilla Mexico/Central America</td>
</tr>
<tr>
<td>Almonds</td>
<td>Peru</td>
</tr>
<tr>
<td>Cashew</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Carob</td>
<td>Korea</td>
</tr>
<tr>
<td>Coconut</td>
<td>Indonesia</td>
</tr>
<tr>
<td>Corn</td>
<td>Peru</td>
</tr>
<tr>
<td>Sugar</td>
<td>Peru</td>
</tr>
<tr>
<td>Honey</td>
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</tr>
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</tr>
</tbody>
</table>

Sources:
- “Agriculture’s Hot Spots.” World Watch. May/June 2010
Candy Ingredients from Around the World

Dr. John Harvey Kellogg applied for the first patent for peanut butter in 1895. The world was introduced to peanut butter at the Universal Exposition in 1904 in St. Louis. The peanut treat sold for about six cents per pound.

*Used with permission from the American Peanut Council's "No-Nut Peanut" teachers kit for grades 3-5. (Kellogg information)

In 1998, the U.S. confectionery industry used 320,304,000 pounds of peanuts. Peanuts can be found in candies such as Snickers®, Reese's Peanut Butter Cups®, Brachs Maple Nut Goodies®, Butterfinger®, Peanut Brittle, Mr. Goodbar®, and Pay Day®. Brachs Maple Nut Goodies® also contain peanut oil.

MATERIALS NEEDED:
- 1 pound almond bark (chocolate candy coating)
- 1 12-oz package of semi-sweet chocolate chips
- 1 box of 10 Ziploc® EZ-Fill™ Bags (gallon)
- Microwave
- 1 20-oz can of peanuts
- Waxed paper
- Peanut seed
- Sand
- Potting soil
- Pot
- Books about George Washington Carver (see suggestions below)
- Pencils
- Paper

ACTIVITY OUTLINE:
Making Candy with Peanuts
1. Place one pound of almond bark (chocolate candy coating) and one 12-oz package of semi-sweet chocolate chips in a Ziploc® EZ-Fill™ bag.
2. Microwave the bag on low under the almond bark and chips are melted.
3. Add one 20-oz can of peanuts to the bag. Seal the bag and mix with your fingers.
4. Place waxed paper on a table top.
5. Cut a corner off the bottom of the Ziploc® bag and squeeze the peanut candy in clusters onto the waxed paper.
6. Let the clusters harden and enjoy a candy peanut snack! (makes 4-5 dozen)

Growing Peanuts
You can grow your own peanut plant at home. Visit your local farm supply store to obtain a peanut seed or order one from a catalog. Plant the seed in a pot allowing for a lot of growing room. Be sure to mix some sand with the potting soil to help ensure that it is well drained. Next place the planted peanut in a location that will give it plenty of light. Make certain to water the plant every day, especially when it is very young. It will take the seed about a week to emerge through the soil. From planting to harvest it will take between 120-140 days depending on the variety obtained.

*Used with permission from the Georgia Farm Bureau® Federation Ag in the Classroom Program.

George Washington Carver
1. Discuss the above information and read a book about George Washington Carver with your students.
2. Ask each student to write their own biography of George Washington Carver from what they have learned. For young students, this may be one picture with a sentence underneath that the teacher has written. For older students, it may be a 10-20 page book with writing and illustrations.

DISCUSSION QUESTIONS:
1. What did George Washington Carver do for farmers, particularly black farmers?
2. What types of honors did George Washington Carver receive?
3. Where do peanuts grow?
4. How long does it take for peanuts to grow from planting to harvesting?
5. What types of candy do you like to eat with peanuts in it?

RELATED ACTIVITIES:
1. The peanut has many names: grober, groundnut, monkey nut, earthenut, and ground pea. Teach your students these names and the word for peanut in other countries:
   - Spain: Mani (my-knee)
   - Greece: Fystiki (fee-stee-kee)
   - France: Cacahuete (ka-ka-wet)
   - Germany: Erdnuss (aird-noose)
   - Russia: Zemlyanoy Grek (zem-ya-noy arek)
2. Have the students pretend they are the Dr. John Harvey Kellogg who invented peanut butter in the 1890’s. He marketed the peanut butter as a health food for elderly people and introduced it at the 1904 World’s Fair. Ask the students to write a musical jingle that Dr. John Harvey Kellogg may have used at his exhibit. Your students can even write the music on a piece of poster board using peanuts as the notes. Your students can be creative in how to show whole notes, half notes, quarter notes, eighth notes, rests, etc.
3. Bill Cosby once said, “Man cannot live by bread alone. He must have peanut butter.” Ask your students to research Bill Cosby’s life and his contribution to entertainment.

RESOURCES:
- "Georgia's Growing," Newsletter for Ag in the Classroom, Spring 2000
- "A New World of Food: Peanuts," Gourmet, March 1992
Farmers take their harvested peanuts to local peanut buying stations. At this station, the peanuts are sampled and graded to determine their value. About 75% of peanuts grown are used domestically. The remaining are usually shipped to major buyers like Western Europe, Canada and Japan.

After the peanuts are purchased, they are placed in dry storage and eventually shells or processed in the shell. Shelling peanuts is simply taking the outside covering off the peanut so that only the nut and its skin remains. Shelled peanuts are then blanched to remove the skin from the nut. Most of the blanched peanuts are eventually made into peanut butter.

Many people only think of peanut butter or peanuts in a can. But there are many ways peanuts are processed. One half of all peanuts are consumed as peanut butter. The remaining half is used for confections, roasted or many other common uses for peanuts. Peanuts are also crushed to make oil. Peanut oil is excellent for cooking, because it is basically tasteless and can be heated very hot (about 405 degrees F) before it burns.

There are even some non-food uses for peanuts. The shells can be used in making wallboard, fireplace logs, livestock feed and cat litter. The skins can be used in making paper. Peanuts can also be an ingredient in many everyday materials like detergent, bleach, ink, shaving cream, soap, rubber, cosmetics, paint, shampoo, medicine and much more.

Peanuts are not only a fan staple, but also a good nutritional source. Peanuts contain about 25% protein, which is higher than eggs, dairy products and many cuts of meat. Two peanut butter sandwiches and a cup of milk meet 100% of a child’s daily requirement for protein.

CANDY LOVERS FROM AROUND THE WORLD.

George Washington Carver was an agricultural researcher of the early 1900’s. He is especially noted for his research with peanuts. George Washington Carver received many awards such as the Simpson Medal from the National Association for the Advancement of Colored People and the Theodore Roosevelt Medal for his valuable contributions to science. There is a George Washington Carver National Monument on the Missouri farm where Carver was born and January 5 is named George Washington Carver Day.

Carver’s interest in plants began when he was a child. Although he was too sick to work in the fields, he kept a personal garden. Carver attended a school for black children in Neosho, Missouri as a child and gained further education at Simpson College in Indianola, Iowa and Iowa State College in Ames. In 1896, George Washington Carver joined the faculty of Tuskegee Institute, an industrial and agricultural school for blacks. Carver was the head of the agricultural department, the director of a state agricultural station, and later the head of Tuskegee’s Department of Research. He worked hard to teach more productive agricultural practices to Southern farmers, black farmers in particular. After finding over 300 uses for peanuts, Carver lectured later the head of Tuskegee’s Department of Research. He worked hard to teach more productive agricultural practices to Southern farmers, black farmers in particular. After finding over 300 uses for peanuts, Carver lectured later the head of Tuskegee’s Department of Research.
**LESSON 2** (cont.)

Candy Traditions

1. Ask the students what types of candy traditions they have in their family. (pizzelles for birthdays, jelly bean hunts at Easter, making peanut brittle at Christmas, sugar skulls for Mexico’s Day of the Dead, building gingerbread houses, etc.)

2. Ask the students to find recipes for traditional candies of other countries. You can create a book with the recipes or try to make a few and share them with your class. You can find some traditional recipes at:
   - *Sugar Skulls*:
     
     http://mexico.about.com/library/weekly/af991015_recipe.htm
   - *Candy Skulls*:
     
     http://mexico.about.com/library/weekly/af991015_recipe.htm
   - *Macaroni Bars* (Scottish candy bars):
     
     http://www.recipescross.com/search/recipese.asp?tit=22197867=1=H0
   - *Edinburgh Rock* (Scottish candy bar):
     
     http://www.recipescross.com/search/recipese.asp?tit=22197867=1=H0
   - *Spatchetti* (Italian Chocolate-Failatra Merrigan):
     
     www.edibletravel.com/projects/italian.html
   - *Recipes for Saint Nicholas candy* ( Dutch candy-night recipes):
     
     http://www.santasclaus.com/antsanta.htm
   - *West African Peanut Butter Fudge*:
     
     www.globaljoumlet.com/destinations/sugastica/fudge.htm
   - *Sakurakot Sormoicon* (Crunch Sesame Seed Candies of the Middle East and North Africa):
     
     http://mexico.about.com/library/weekly/ab101312.htm

Candy Lovers from Around the World

Ask the students to complete the *Candy Lovers from Around the World* worksheet. The answers can be found throughout this candy unit. Specifically see the “Agriculture: Where Candy Comes From” packet. Emphasize to the students that without global influence, we would not have the same candy culture we have today.

**Key**

- Andreas Marggraf, German, proved there was sugar in sugar beets
- George Washington Carver, African American, researched peanuts and found over 300 uses
- Leo Hinsdill, Austrian immigrant, began to produce Tootsie Rolls® in New York
- Montezuma, Aztec, drank cocolatl from golden cups
- Daniel Peter and Henri Nestle, Swiss, candy maker (Daniel) and chemist (Henri) who teamed up to add milk to chocolate

**DISCUSSION QUESTIONS:**

1. What types of candy are eaten in other countries?
2. Why is it difficult to find the original source of some candies?

**RELATED ACTIVITIES**

Look at these web sites for more information on candy history:

- *Salt Water Taffy*:
  
  www.saltwatertaffy.com/history.html
- *American Candy Bar*:
  
  http://www.scrapbook.com/America/CandyBar.asp
- *St. Nick*:
  
  http://www.sjchronicle.com/stnick.html
- *Jelly Beans*:
  
  www.jellybeans.com/2000/05/26.html
- *Tootsie Roll*:
  
  www.tootsieroll.com/history.html
- *Candy Corn*:
  
  www.tootsie.com/products/candycorn.html
- *Candy Skulls*:
  
  www.candyland.com/products/what/ertos.html

**SOURCES:**

- *Sugar Skulls*:
  
  http://mexico.about.com/library/weekly/a991015_recipe.htm
- *Teaching with Chocolate*:
  
  Terese A. D’Amico
- *A History of the American Candy Bar*:
  
  www.scrapbook.com/America/CandyBar.asp
- *Sugar, All Around Wrigley*, Winter 1985
- *Georgia’s Grooving*:
  
  Newsletter for Ag in the Classroom, Spring 2000
- *What do Mexicans celebrate on the Day of the Dead?*:
  
  www.public.iastate.edu/~rjsalvad/smcfaq/muertos.html
- *Day of the Dead, *
  
- *Valentine’s Day in Japan, *
  
  http://candytech.com/specials/valentine.html
- *Survey: Valentine’s Day and White*:
  
- *Valentine’s Day in Japan, *
  
- *PEZ Candy Inc. *
  
  www.pez.com
- *Neces*:
  
  www.mex.com

**ACTIVITY OUTLINE:**

Make Your Own Gumdrops

1. Pour a teaspoon of Jelli-\(\text{P}^{5}\) powder on a paper plate.
2. Add drops of water to the powder while you mix it with your finger.
3. Roll the mixture into a ball
4. Next roll the gumdrop in some sugar.
5. Pick it up with your fingers and enjoy!

**Sugar Consumption**

1. Ask your students to research which country eats the most sugar confectionery per capita. *(You may want them to refer to www.CandyUSA.com)*
   - Their site has candy statistics. Here are the 1998 figures:
     - Denmark: 17.13 pounds per capita
     - Netherlands: 14.11 pounds per capita
     - Poland: 13.05 pounds per capita
     - Ireland: 12.92 pounds per capita
     - United States: 12.20 pounds per capita
     - Sweden: 12.19 pounds per capita
     - Germany: 10.03 pounds per capita
     - France: 7.74 pounds per capita
     - Belgium: 7.39 pounds per capita


2. Have the students create a graph to show the top ten countries in confectionery sugar consumption per capita.

**Holidays**

1. Holidays are a popular time to eat candy. Here is a chart showing holiday candy sales in 2000:

<table>
<thead>
<tr>
<th>Holiday</th>
<th>Sales in Millions of Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valentine's Day</td>
<td>$1,059</td>
</tr>
<tr>
<td>Easter</td>
<td>$1,811</td>
</tr>
<tr>
<td>Halloween</td>
<td>$1,983</td>
</tr>
<tr>
<td>Christmas</td>
<td>$2,010</td>
</tr>
</tbody>
</table>


2. Ask your students to transfer the numbers into their actual dollar amounts. *(For example: since the chart is in Millions of Dollars, Valentine’s Day sold $1,059,000,000 worth of candy, not just $1,059.)*

3. Which holiday sells the most candy?

4. Ask your students to plan an advertising campaign to promote candy sales at holidays which are not in the top four. *(Chinese New Year, St. Patrick’s Day, Casimir Pulaski Day, Mothers Day, Fathers Day, Agriculture Day, Thanksgiving, 4th of July, Grandparents Day, Snowstorm Day, Secretaries Day, etc.)*

**RELATED ACTIVITIES**

- *Ask your students to research where sugar beets grow in the U.S.* and mark the locations on a map.
- *Ask the students to research the life of Andreas Marggraf and write a short biography.*
- *Ask your students to research the process of making sugar in a factory and draw a flow chart on a piece of poster board showing the process.*

**SOURCE:**

- *How Candy Sugar is Made:*
  
  www.sucrose.com/history.html
- *How Beet Sugar is Made:*
  
  www.candyusa.com/history.html
- *Sugar Consumption of Selected Ingredients by the U.S. Confectionery Industry:*
  
  LEXIS-NEXIS® Statistical
- *‘Sugar, All Around Wrigley*, Winter 1985
LESSON 5 – Make Your Own Gumdrops:
The Story of Sugar

A LESSON ABOUT SUGAR PRODUCTION AND THE ECONOMICS OF CANDY.

Subjects: Science, Math, Social Studies


INTRODUCTION:
Americans today consume about 11.8 pounds of sugar candy each year. In 1998, the U.S. confectionery industry used 2,789,837,000 pounds of sugar (cane and beet). Sugar can also be used by nonfood industries: mixing cement, tanning leather, making plastics, medicines (to disguise or enhance taste). Sugar is made from sugar cane or sugar beets. 61% of refined sugar comes from sugar cane and 39% comes from sugar beets.

Sugar Cane
Sugar cane is a tall grass plant that grows in tropical and semi-tropical climates. The top producers are Brazil, India, China, Cuba, and Mexico. In Europe during the Middle Ages, the high cost of sugar made sugar candy a delicacy available only to the wealthy. Sugar cane is harvested by chopping down the stems and leaving the roots so that it re-grows for the next harvest. Canes must be extracted from the cane. The cane is crushed in a series of large rollers and the juice comes out. Since the juice still has cell, small fibers, and green extracts in it, it must be cleaned with slaked lime. The juice is thickened into syrup by boiling off the water using steam and evaporation. The syrup is put into large pans for boiling. Most water is boiled off until the sugar crystals can grow. This is spun in a centrifuge to separate the crystals and mother liquor. The crystals are dried with hot air before storage. The final raw sugar looks like a sticky brown mountain, so it is usually refined when it gets to the country where it will be used.

Sugar Beets
Sugar beets originated in Ancient India. In 1747, a German chemist named Andreas Marggraf proved that there was sugar in sugar beets and it could be extracted. Sugar beets grow in temperate climates. Top sugar beet growing countries are France, the Ukraine, Germany, Russia, and the U.S. Success is stored in the sugar beet’s fleshy root. The tops of sugar beets are fed to livestock or used as fertilizer. Beets are harvested in autumn and early winter by digging them out of the ground. They are taken to the factory and washed and separated from any beet leaves, stones, or trash materials that was collected with them during harvest. To extract the sucrose, the beets are sliced into thin chips. The chips are put into a diffuser for about an hour with hot water. (Similar to the color and flavor of tea coming out of tea leaves in a teapot.) Next the sugar beet chips are pressed to squeeze as much juice from them as possible. The pulp leftover from the pressing is sent to a drying plant where it is turned into pellets which are used for some animal feeds. The juice is cleaned before it’s used for sugar production. This is done by growing small clumps of chalk in the juice. The chalk collects the non-sugars so when the chalk is filtered out, so are the non-sugars. The juice is then put in a multi-stage evaporator. As the water is boiled, sugar crystals grow. This mixture is spun in a centrifuge to separate the crystals and mother liquor. The crystals are dried with hot air before being packed or stored. The final sugar is white. Because you can’t get all the sugar out of the juice, a by-product is made, beet molasses.

Sugar can be found in candies such as Hershey’s bars, Snickers®, Reese’s® Peanut Butter Cup, Almond Joy®, Skittles®, Starburst®, M&M’s®, 100 Grand®, Mars®, Junior® Mints, Dots®, York® Peppermint Patties, Payday® Mints, Laffy Taffy® Original, Candy Corn, Brach’s Maple Nut Goodies, Whoppers®, Butterfinger®, Chocolate Covered Cherries, Peppermint Puffs, Tootsie Rolls®, Chocolate Orange®, and Peeps®.

MATERIALS NEEDED:
-Jello® powder (one teaspoon per child)
-Water
-Paper Plates
-Sugar
-Eyedropper

Candy Lovers from Around the World

MATCH EACH OF THE FOLLOWING NAMES TO THEIR COUNTRY/HERITAGE AND THE REASON FOR THEIR FAME WITH CANDY.

<table>
<thead>
<tr>
<th>Name</th>
<th>Country/Heritage</th>
<th>Reason for Fame with Candy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andreas Marggraf</td>
<td>American (Boston)</td>
<td>Drank chocolate in gold cups</td>
</tr>
<tr>
<td>Oliver R. Chase</td>
<td>African American</td>
<td>Added milk to chocolate</td>
</tr>
<tr>
<td>George Washington Carver</td>
<td>Austrian immigrant</td>
<td>Inventor of Necco Candy</td>
</tr>
<tr>
<td>Goelitz Brothers</td>
<td>Aztec</td>
<td>Produced candy corn and eventually Jelly Belly® jelly beans</td>
</tr>
<tr>
<td>Daniel Peter and Henri Nestle'</td>
<td>German</td>
<td>Researched peanuts and found over 300 uses</td>
</tr>
<tr>
<td>Leo Hinshfield</td>
<td>German immigrant</td>
<td>Proved there was sugar in sugar beets and that it could be extracted</td>
</tr>
<tr>
<td>Montezuma</td>
<td>Swiss</td>
<td>Began to produce Tootsie Rolls® in New York City</td>
</tr>
</tbody>
</table>

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LESSON 3 – What’s in a Tootsie Roll® Label?

A NUTRITIONAL LESSON ABOUT AN ILLINOIS PRODUCT.

Subjects: Science, Nutrition, Social Studies


INTRODUCTION:
What is a Tootsie Roll® made of and where do these ingredients come from? If you were to look at the list of ingredients, you would find that some of them come from the United States and a few are imported from other countries. How does a company get all of the ingredients to make a Tootsie Roll®?

Some ingredients found in Tootsie Rolls® are sugar, corn syrup, partially hydrogenated soybean oil, condensed skim milk, cocoa, whey, and soy lecithin. Here are the sources of those ingredients (you can read more about the processing of these ingredients in the accompanying ‘Ag: Where Candy Comes From’, reference with this unit.)

- Sugar—sugar beet pulp or sugar cane
- Corn syrup—corn
- Partially hydrogenated soybean oil—soybeans (hydrogen is infused into soybean oil at a controlled temperature. This helps solidify the soybean oil.)
- Condensed skim milk—dairy cattle
- Cocoa—cocoa beans
- Whey—whey is the watery part of milk that is separated from the curd
- Soy lecithin—soybeans. (It is an emulsifier it keeps the ingredients from separating.)

In this lesson, students will research the food label of a Tootsie Roll® to determine where the ingredients originated. Food labels provide the consumer with information on ingredients, nutritional values, and how the product meets our daily needs of specific vitamins and nutrients. Food labeling became a law in the United States under the Nutrition Labeling and Education Act of 1990. In 1994, the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA) implemented regulations on nutrition labels. These regulations give specific requirements for the labels’ format, nutrient values, nutrient content claims, and health claims.

Fun Tootsie Roll Facts®
- Tootsie Rolls® were first made in 1896 when Austrian immigrant, Leo Hindhede, began producing 200 of the candies a day in New York City.
- By 1905, Tootsie Rolls® were produced in a four-story candy factory in New York City.
- A dentist in Philadelphia uses Tootsie Rolls® to make molds of patients’ teeth.
- Tootsie Roll® Industries has its world headquarters in Chicago and operations in Massachusetts, New York, Tennessee, Mexico, Canada, Eastern Europe, and Pacific Rim.
- Over 49 million Tootsie Rolls® are produced each day!
- Since 1970, over 20,000 letters from children around the world have been sent to Tootsie Roll® Industries. These children believe they have solved the mystery behind how many leeks it takes to get to the center of a Tootsie Pop®.

MATERIALS NEEDED:
- “What’s in My Tootsie Roll® worksheet”
- Tootsie Roll® for each student
- Copies of Tootsie Roll® Nutrition Facts
- Encyclopedias and other resource books

ACTIVITY OUTLINE:
1. Distribute a Tootsie Roll® and a Nutrition Label to each student. Have the students read the ingredients on their Nutrition Label.
2. Discuss with the class how the ingredients are grown, transported, processed, and made into a candy bar.
3. Have students complete the “What’s in My Tootsie Roll®” worksheet. Provide encyclopedias and other resource books to help students complete the worksheet.

DISCUSSION QUESTIONS:
1. What ingredients did you find on the label that you did not know were in a Tootsie Roll®?
2. How nutritional is a Tootsie Roll®?
3. Where do Tootsie Roll® ingredients come from?
4. What types of jobs are involved in the making of a Tootsie Roll®? (Remember—someone needs to grow the ingredients, transport them, make the product, sell the product, and much more!)

RELATED ACTIVITIES:
1. Enlarge a world map and a United States map. Create a bulletin board so students can link where their Tootsie Roll® ingredients are from (the source) to their hometown. This will give them an idea of the size of the world and how much we use products from other places.
2. How do you think the first Tootsie Rolls® were made in 1896? Discuss possibilities and then tell the students that Tootsie Roll® Industries did not use a conveyor belt system until 1938. How do you think Tootsie Rolls® are made now? Draw a picture of the types of machines you think are used.
3. Discuss portion size with the students. Servings are smaller than you may think. Here are some examples to use:

   Serving Size
   1/2 cup cooked pasta
   1 oz. bread
   1 medium fruit
   1 oz. cheese
   3 oz. meat, fish, poultry
   2 tbsp. peanut butter
   2 tbsp. salad dressing

   Relate with
   ice cream scoop
   CD case
   a fist
   part of size, a thumb
   cassette tape, deck of cards
   ping pong ball
   ice cube

   Sources:
   - Tootsie Roll®, www.tootsie.com
   - “Visualizing Portions” http://family2.go.com

4. Refrigerate or freeze foods to prevent spoilage and make sure foods are properly cooked.

5. Clean fruits and vegetables before eating or cooking.

6. What is another food safety method? Draw a right and wrong picture for this method.

3. Do not cut meat and vegetables on the same surface or with the same knife. Wash the surface and the knife with hot, soapy water to kill bacteria.

   Right
   Wrong
Food for Thought

Draw a picture for each statement that shows the right method and the wrong method. (Example for #1-Someone washing their hands vs. someone sitting at a table with dirty hands.)

1. Always wash your hands before preparing or consuming food.

   Right
   Wrong

2. Eat food before the expiration date on the package.

   Right
   Wrong

What’s in My Tootsie Roll®?

1. Look at a nutrition fact label for a Tootsie Roll®. Find the ingredients. They are listed in order of greatest amount to the least.
   What ingredient is used the most? ________________________
   What is used the least? ____________________________

2. Using an encyclopedia, determine what ingredients are obtained from the United States. Name the ingredients and what state or part of the United States they came from.
   __________________________________________________________________________________________________________________________

3. Which ingredient(s) is/are most likely to come from Illinois?

4. Which ingredients were imported from another country? Name them and the country or countries they would come from.

5. What are the possible ways the ingredients were shipped to a food processor?

6. Look at the nutrition part of the label.
   How many calories are there? _____________________
   How many calories come from fat? _______________

7. Make a ratio comparing fat calories to total calories. __________
   Simplify it. ________________
   Make it a percent. _______________

8. Percent daily values on a nutrition fact label tell you what percentage of your daily allowance for fat, cholesterol, sodium, etc. one serving of this food would provide. How many Tootsie Rolls® would you have to eat to exceed 100 percent of the DV of:
   (remember that multiple Tootsie Rolls® make one serving)
   Saturated fat? ____________________________
   Carbohydrates? __________________________
   Dietary fiber? ____________________________

9. Look up sodium in the dictionary. What is a synonym for it? __________

10. Using an encyclopedia, look up Calcium, Iron, Vitamin C, and Vitamin A. Define these and name other foods that are good sources of these:
    Calcium: _________________________________________
    Iron: ___________________________________________
    Vitamin C: _______________________________________
    Vitamin A: _______________________________________  

11. Now enjoy your Tootsie Rolls®!
A LOOK AT FOOD SAFETY IN THE CANDY INDUSTRY, AGribusinesses, and at Home

Subjects: Social Studies, Science, Health


INTRODUCTION:
Agribusiness is the growing of food and fiber. Agribusinesses are involved in food processing, storage, or distribution. Retailers and grocery stores sell food to us, therefore, they are considered to be agribusinesses. They must follow health standards concerning food safety and are responsible for providing us with safe, quality food. Health inspectors routinely inspect these agribusinesses to make sure they are following the guidelines. If they fail, other wise, they can penalize the business by closing it for a specific amount of time or perhaps indefinitely.

In the United States we are fortunate to have a government that makes food safety a priority. In some countries food may be produced or imported, but can be spoiled by pests or microorganisms due to poor storage. Pests (insects and rodents) and microorganisms (bacteria, mold, yeast) are the two chief causes of food storage. Food must be transported, stored, and prepared/ consumed, correctly to ensure its safety. Agribusinesses that deal with food must know where their food is coming from. They must also know how their food was grown and how it was transported.

All food spoil it if it is not preserved in some way. Some foods such as nuts and grains can be stored for a long time without spoiling. Other foods such as bread and milk must be consumed quickly. Foods can be preserved in many ways. Canning, freezing, and dehydrating are just a few methods. Salt is also used as a preservative. Spoilage may occur before there is a change in taste or color. Therefore consumers should read expiration dates of food products brought from grocery stores before purchasing and eating them.

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People can reduce their risk of foodborne illnesses by handling food properly. Eighty-five percent of the cases of foodborne illness, a sickness caused by bacteria, can be avoided with proper food handling. Keys to food safety are:

- washing hands (use warm water, apply soap, and rub hands for 20 seconds before rinsing)
- checking expiration dates
- washing surfaces and utensils with hot, soapy water
- refrigeration, heating, and freezing
- cleaning fruits and vegetables
- storing foods in proper places

According to the U.S. Food and Drug Administration (FDA), food safety hazards may crop up in candy. One example is carelessness in quality control and sanitation. This is a violation of the good manufacturing practices on which the safety of all our packaged foods depend and it could result in contamination with microorganisms that cause illness. However, in the candy industry, this only happens on rare occasions and when it does happen, most cases are discovered before the product reaches the public. Manufacturers are responsible for the safety of their candy and the FDA conducts unannounced plant inspections, taking random samples for analysis. The FDA also inspects all imported foods to be sure they contain no substances that are not approved by the FDA as safe for humans to eat. Examples of this in imported candy may be certain flavors and/or food coloring agents.

MATERIALS NEEDED:
- “Fight Bac” Colorado Reader
- “Food for Thought” worksheet
- cooking spray or vegetable oil
- cinnamon
- water
- soap

DISCUSSION QUESTIONS:
1. What are the chief causes of food spoilage?
2. What are some of the safe food handling practices that can be used in your home?
3. What are some food preservation methods that are used before foods reach the grocery store?
4. What responsibilities do agribusinesses such as grocery stores, restaurants, and candy manufacturers have?
5. Why is it important to use soap and warm water when washing your hands?

RELATED ACTIVITIES:
1. Tour a candy factory. What types of food safety methods are used?
2. Add a slice of bread and a little water to a sealable plastic bag. What happens? Chart your observations over time.
3. Visit the web site www.gloger.com to gain more information about the importance of hand washing. You will find lesson plans, per grade level, related activities, and GloGerm™ products. When you are ready to order, visit the ordering information on the GloGerm™ products.

OTHER RESOURCES:
- Order a free curriculum from the FDA and NSTA (National Science Teachers Association). Science and our Food Supply Curriculum with the 46-minute video “Dr X and the Quest for Food Safety, read more at http://www.foodsafety.gov/drx/drxbch.html
- Visit the web site “Resources for Food Safety” at www.rfsa.org and research food safety and storage for emergency situations.
- Order “The Safe Food Journey” poster from the National Cattlemans Beef Association. Code #17-516. $1.50. 800-368-3138