6-1-2008

Sun-Drying: A Traditional Native American Method of Preserving Food

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ESS107
Revised June 2008

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Funded by
USDA CSREES National Integrated Food Safety Initiative
2003-51110-01714

South Dakota State University
College of Agriculture and Biological Sciences
Extension Family and Consumer Sciences

ESS107. Access at http://agbiopubs.sdstate.edu/articles/ESS107.pdf June 2008

Sun-Drying: A Traditional Native American Method of Preserving Food

Purpose/Goal:
Traditional food preservation methods have continued to be used among Native American tribes and communities in South Dakota. Elders teach youth about the traditional practice of sun-drying corn and wild berries through the hands-on process of working together with family. Buffalo meat was also traditionally sun-dried; this practice is now more commonly done through the use of a food dehydrator. Jerky or bapa (dried buffalo meat used in soups and stews) and sun-dried corn and wild berries are a healthy food which has traditionally provided sustenance to the Native American diet.

Justification:
Research funded through a USDA Food Safety Initiative grant was conducted to identify traditional Native American methods of food preservation and to identify techniques to reduce the risk of a food borne illness. Members of the Sisseton Wahpeton Tribe (SWT) and the Cheyenne River Sioux Tribe (CRST) were interviewed to determine methods currently being used to dry meat, corn, and berries. As the interviews were being conducted, a strong sense of family and tradition emerged through the process of sun-drying meat, corn, and berries.

Of the individuals from SWT who were surveyed about drying corn and berries, 93% learned the method from family members (grandmother, 23%; mother, 35%; father, 3%; both parents, 10%; and other relatives, 23%). The average age range of the participants was 41 to 50. With a majority of the respondents reporting the method was learned from family members, 58% reported currently sun-drying with family members, and 33% reported usually working alone. Of the 58% working with family members, 71% were adult family members, 14% were youth, and 14% were not specified.

Results of the interviews with members from CRST regarding sun-drying meat determined traditional methods have been modified, such as by using a food dehydrator. Methods used varied with each respondent.

This curriculum was developed to facilitate the education of a cultural tradition for youth in Native American and non-Native American communities. With the following lessons, youth will be able to practice sun-drying corn and wild berries using traditional Native American methods. Activities involving drying meat are not included in this curriculum in order to focus on a food product that is potentially safe. Issues of food safety and sanitation will be addressed, along with optional recipes that can be prepared with the dried food. The lessons are designed to be flexible in order to fit into the available time frame.

Thank You
Gabrielle Tiomanipi, project coordinator at Sisseton Wahpeton College, conducted interviews with members of the Sisseton Wahpeton Oyate and compiled the collected data. She also contributed recipes and information about her personal experience with sun-drying corn and berries.

Veronica O'Leary conducted interviews with members of the Cheyenne River Sioux Tribe and compiled the collect data.

Target Audience:
The target audience is youth ages 8 to 14. Lessons can be adapted for younger or older youth.

Area of Emphasis:
Food safety is the primary area of emphasis for this curriculum; secondary are cultural traditions and nutrition. This curriculum can be used with youth day camps, after-school programs, 4-H clubs, and other youth organizations. The lessons build on each other but can be used independently, depending on programming needs.

Curriculum objectives:
1. Identify foods traditional to the Native American culture.
2. Recognize food safety risks associated with sun-drying corn and wild berries.
3. Discuss contemporary food safety and food-borne-illness influences on traditional food preservation methods.
4. Practice sun-drying corn and/or wild berries using safe food handling practices.

Learning activities:
1. Introductory activity: Native American foods and My Pyramid
2. History/significance of sun-drying corn and wild berries in Native American culture: storage, food preservation
3. Food safety risks associated with sun-drying foods
4. Food preservation methods: sun-drying
5. Prepare corn to sun-dry
6. Prepare traditional recipes using sun-dried products (wasna, pemmican, wojapi)

Community resources:
Every community has numerous resources available to facilitate program planning to use this curriculum. Contact individuals in your community who have expertise on the subject of traditional foods and/or sun-drying. Work with elders, parents, and other community organizations that work with youth to carry out the objectives of this curriculum.

Evaluation:
Evaluations are included for youth and educators to assess the program. Evaluation #1 is for lower-elementary age youth, evaluation #2 is for upper-elementary age youth, and evaluation #3 is for middle-school age youth.

Learning Activity #1

Native American foods and My Pyramid.

Learning objective:

- Analyze how traditional Native American foods/diet fit into My Pyramid.

Learning outcomes:

- Youth will be able to identify traditional Native American foods.
- Youth will be able to recognize components of My Pyramid in relation to traditional Native American foods.

Estimated time: 30 minutes

Materials and supplies:
White/chalk board or newsprint
Markers
Copy of Appendix C – cut apart

Activity:

1. Arrange youth in a circle either in chairs or on the floor.
2. Ask youth to introduce themselves and tell everyone their favorite food. On newsprint/board, draw the My Pyramid shape. As the youth name their favorite foods, write the foods in the appropriate food group.
3. Discuss My Pyramid. Give a brief overview of how the pyramid is set up, food groups, recommended servings, serving sizes.
4. Ask youth to determine where their favorite foods originated and the ethnic background of the food. Write responses by each food. (See appendix A for a list of common foods and their origins.)
5. Once foods have been identified by ethnic origin, discuss why foods are an important part of traditions.
6. Create a list of foods that are traditionally Native American. What are traditional Native American foods? (Depending on your audience, this may be difficult. See appendix B for a list of traditional Native American foods.) Are any of these foods still eaten today? Where are these foods found?
7. Discuss how food is selected the Native American way – have a visual of this list.
    a. Above ground - berries
    b. Below ground – root foods
    c. Finned animals - fish
    d. Winged animals - birds
    e. Four-legged – buffalo

8. Using the food list in Appendix C, have youth identify which category the food fits into by taping the strip on the visual/board in the appropriate location. How are the groups similar to My Pyramid?
Why was the grain group not present as one of the categories?

Resources:
Appendix A, B, and C
Nutritionist Uses Medicine Wheel to Illustrate Dietary Problems
http://www.rapidcityjournal.com/articles/2003/01/12/news/local/news03.ptr
Native American Food Pyramid
http://www.nal.usda.gov/fnic/Fpyr/NAmFGP.html
My Pyramid
http://www.mypyramid.gov/

Learning Activity #2

History/significance of sun-drying corn and wild berries in Native American culture – storage, food preservation.

Learning objective:
- Identify foods traditional to the Native American culture.
- Discuss contemporary food safety and food-borne-illness influences on traditional food preservation methods.

Learning outcome:
- Youth will be able to recognize characteristics of traditional Native American foods.
- Youth will be able to identify food safety risks associated with the traditional method of sun-drying buffalo meat, corn, and wild berries.
- Youth will be able to determine modern methods of sun-drying buffalo meat, corn, and wild berries that reduce the risk of a food-borne illness.

Estimated time: 30 minutes

Materials and supplies:
Copies of Learning Activity #2
Pens or pencils
Sun-drying screens
Large rocks
Meat and corn or pictures

Activity:
Youth will work in groups to complete a given scenario through group discussion. See Learning Activity #2 Scenario.

Activity adaptation for various ages:
The scenario is more appropriate for upper elementary and middle school age youth. To adapt for younger youth, use real objects and materials to create a more “real world” experience.

- Conduct the activity outside to simulate the environment Native Americans would be working in.
- Have samples or pictures of the food listed in the scenario available for youth to see and touch.
- Lay meat and/or corn on rocks or wood to simulate the traditional process.
- Show how sun-drying screens would be used for the drying process.

Additional information for the educator
Significance of the lone star in the Native American culture:
http://www.bluecloud.org/morningstar.html

Learning Activity #3

Food safety risks associated with sun-drying foods

Learning objective:
- Recognize food safety risks associated with sun-drying corn and wild berries.

Learning outcome:
- Youth will be able to use the 4Cs to reduce food safety risks associated with sun-drying corn and wild berries.

Estimated time: 20 minutes

Materials and supplies:
Copies of handouts for each group
Paper and markers

Activity:
Divide youth into four groups, assign each group a 'C' (cook, clean, cross-contaminate/separate, chill). Each group will create a list identifying practices to reduce the risk of a food-borne illness when sun-drying corn or wild berries based on the 'C' they have been assigned. Provide each group the handout for their 'C'. Give each group a large piece of paper and markers to make the list.

Once the lists are completed, have each group go over their list. Discuss each list and review each of the 4Cs (handouts) and the importance of washing hands, keeping equipment and work surface clean, properly storing fresh fruits and vegetables, and cooking/chilling food when necessary.

** This activity can be done a number of different ways; the objective is to identify and recognize risks associated with sun-drying and with general food preparation.

Resources – www.fightbac.org
Educator – Print a copy of each of the following handouts to give to the groups based on their assigned 'C'.
Clean http://www.fightbac.org/images/pdfs/clean_bw.pdf
Cook http://www.fightbac.org/images/pdfs/cook_bw.pdf
Chill http://www.fightbac.org/images/pdfs/chill_bw.pdf
Separate (cross-contaminate)
http://www.fightbac.org/images/pdfs/separate_bw.pdf

Learning Activity #4

Food preservation methods: sun-drying

Learning objective:

- Demonstrate methods for sun-drying corn and wild berries.
- Discuss the significance of the method to the Native American culture.
- Compare the cost of sun-drying corn vs. using a dehydrator.

Learning outcome

- Youth will be able to identify steps in sun-drying corn.
- Youth will be able to understand why sun-drying is a valuable Native American tradition.
- Youth will be able to use math skills to analyze the cost of drying corn by comparing sun-drying and using a food dehydrator.

Estimated time: 30 minutes

Materials and supplies:

Corn (sweet corn that is mature)	Large pot
Tongs	Clean cloth towels
Metal spoon (tablespoon)	Food service gloves
Sun-drying screens	Copies of Learning Activity #4

Activity:

1. Demonstrate steps in preparing corn for sun-drying and the process of sun-drying. General preparation steps for the process are listed. Set up each step before the session begins. Review ExEx14090, Sun-Drying Corn, for specific information.
   Step 1 – Husk corn
   Points to cover
   - selection of corn
   - wash hands with hot, soapy water for 20 seconds
   - remove all husks and silk

   Step 2 – Boil corn
   Points to cover
   - hand washing
   - boiling the corn stops an enzyme process and prevents loss of color during drying

- level of bacteria present on the corn is drastically reduced
- boiling time begins when water is at a full, rolling boil

Step 3 – Cool corn

Points to cover

- use tongs to remove the corn from the water
- set on clean towels

Step 4 – Remove kernels from cob

Points to cover

- hand washing
- wear gloves to reduce cross-contamination
- use metal tablespoons
- try to get the whole kernel, it takes time but you have a better product when finished

Step 5 – Place kernels on screens to dry

Points to cover

- hand washing
- screens should be washed with hot, soapy water and air dried before using
- cleanliness is critical, clean all work areas with hot, soapy water
- wear gloves and use a spoon to spread the kernels on the screens, reduce bare hand contact as much as possible
- screens should be set in a low traffic area (vehicles and people) to reduce potential contamination from dust

2. Discuss how Native Americans would have completed the process of sun-drying without the equipment and cleaning supplies available today.

3. Compare cost of using the sun-drying method vs. a food dehydrator to dry corn by completing Learning Activity #4. This activity can be completed in small groups, individually, or as a large group. In a large group, before handing out the worksheet, brainstorm costs related to sun-drying and using a dehydrator. Provide youth information about cost of the corn, energy, and equipment. To determine labor, estimate the amount of time it will take to prepare corn for sun-drying and determine whether there should be a labor cost while the corn is drying. Once the activity sheet has been completed, discuss the questions as a large group.

Activity adaptation for various ages:

Comparing the cost of sun-drying vs. using a food dehydrator is appropriate for 13-14 year olds.

To adapt for 8-10 year olds, work as a large group. Brainstorm cost of supplies, equipment, and energy for sun-drying. Write ideas on board or newsprint. Show the sun-drying screens and a food dehydrator. Give everyone a chance to make a guess on the cost of sun-drying. Give a prize to the youth who has the closest guess. Discuss how that cost compares to using a food dehydrator. Don't be concerned about coming up with a specific total.

To adapt for 11-12 year olds, divide into 2 groups. Break groups into smaller subgroups if they will be larger than 5 youth. Assign one group sun-drying and the second group food dehydrator. In their groups, brainstorm costs for supplies, equipment, and energy for their assigned method. Estimate labor required and what that would cost. Determine a total cost. When each group is finished, discuss estimated cost, what was difficult to price, and advantages of sun-drying and/or using a dehydrator.

Resources:
ExEx 14090 Sun-Drying Corn
http://agbiopubs.sdstate.edu/articles/ExEx14090.pdf
ExEx 14091 Solar Drying Fruits and Vegetables
http://agbiopubs.sdstate.edu/articles/ExEx14091.pdf
ExEx 14083 Hand Washing is Top Priority for Food Stands
http://agbiopubs.sdstate.edu/articles/ExEx14083.pdf
ExEx 14076 Guidelines for Using Disposable Gloves in Temporary Food Stands
http://agbiopubs.sdstate.edu/articles/ExEx14076.pdf
General Electric Energy Cost Calculator
http://www.csgnetwork.com/elecenergycalcs.html
Typical Appliance Energy Use and Cost
http://www.clallampud.net/docs/conservation/TypicalApplianceEnergyUseandCost2.pdf

Learning Activity #5

Sun-dry corn and/or berries

Lesson objective
- Practice sun-drying corn and/or wild berries.

Learning outcome
- Youth will be able to follow directions to sun-dry.
- Youth will be able to practice safe food handling skills.
- Youth will be able to identify steps to reduce the risk of contamination.
- Youth will be able to explain the four Cs of food safety.

Estimated time: 60 minutes (time will vary depending on setup of the activity)

Materials and supplies:

Corn (mature sweet corn)	Large pot
Tongs	Clean cloth towels
Metal spoon (tablespoon)	Food service gloves
Sun-drying screens	

Activity:

- Refer to ExEx 14090, Sun-Drying Corn, for specific information about sun-drying.
- Prepare corn for drying.
- Discuss importance of hand washing and glove use to reduce risk of contamination.
- Demonstrate correct procedure for hand washing and use of disposable gloves. Wash hands before and after handing food, even when wearing gloves.
- Husk the corn, place cobs in a pot of boiling water, boil for at least 10 minutes.
- Boiling the corn slows the action of the enzymes which are natural chemicals in fruit and vegetables that cause food to ripen and eventually spoil.
- Remove corn from boiling water, place on paper or cloth towels to cool.
- While corn is cooling review 4 Cs of food safety (clean, cook, chill, separate (cross-contaminate). Discuss sun-drying process. What happens to the corn as it dries?
- Demonstrate removing kernels from the cob. As youth are removing the kernels, put in a clean bowl. Hands should be washed before beginning this step and putting on gloves. Use gloves during this step.
- Sun-dry corn (plan this step, it may have to be done on a second day and will not be done in one day). Set up the screens in an open area away from traffic. Spread the kernels on the screens.

Resources for educator:
ExEx14090, Sun-Drying Corn
http://agbiopubs.sdstate.edu/articles/ExEx14090.pdf
ExEx14091, Solar Drying Fruits and Vegetables
http://agbiopubs.sdstate.edu/articles/ExEx14091.pdf
ExEx14083, Hand Washing is Top Priority for Food Stands
http://agbiopubs.sdstate.edu/articles/ExEx14083.pdf
ExEx14076, Guidelines for Using Disposable Gloves in Temporary Food Stands
http://agbiopubs.sdstate.edu/articles/ExEx14076.pdf

Learning Activity #6

Prepare traditional Native American recipes using sun-dried products (wasna, pemmican, wojapi).

Learning objective:

- Identify foods traditional to the Native American culture.
- Discuss contemporary food safety and food-borne illness influences on traditional food preservation methods.

Estimated time: 30-60 minutes, depending on the number of recipes prepared

Learning outcome

- Youth will be able to prepare traditional Native American foods using sun-dried products.

Materials and supplies:

Copies of recipes
Ingredients and equipment to prepare recipes

Activity:

Wasna — Traditionally, wasna was made with ground dried meat mixed with dried, crushed wild berries and tallow (fat). The mixture was shaped into patties or squares that were allowed to harden, making it easy to carry on the trail. Today, corn wasna is prepared by mixing together corn meal, sugar, dried fruit, and fat. Wasna is very rich and high in saturated fats.

Pemmican — Pemmican is ground dried meat mixed with tallow (fat) and dried, crushed chokecherries. The mixture is shaped into small patties or squares and allowed to harden. Tribes used pemmican during a move to new hunting grounds; it was lightweight, easy to carry, and a good source of energy.

Wojapi — Wojapi is a pudding-like mixture made with boiled fruit sweetened with sugar and thickened with cornstarch and flour. Traditionally it was served with wild fowl and game. Now it is commonly served warm with fry bread.

Recipes that are included have been adapted to use ingredients and equipment that are readily available.

Youth will work in groups to prepare wasna, pemmican, and/or wojapi. Recipes are included in the following publications and Appendix D.

Resources:
ExEx 14105 Using Dried Corn
http://agbiopubs.sdstate.edu/articles/ExEx14105.pdf
ExEx 14104 Drying Chokecherries
http://agbiopubs.sdstate.edu/articles/ExEx14104.pdf
ExEx 14108 Drying Plums
http://agbiopubs.sdstate.edu/articles/ExEx14108.pdf

Evaluation #1

Thank you for participating in this program. How much did you learn about the following topics during this program? Circle your answer.

Native American foods


Good news


Okay


Not so good

Sun-drying corn


Good news


Okay


Not so good

Hand washing


Good news


Okay


Not so good

Keeping cooking dishes and utensils clean


Good news


Okay


Not so good

Avoiding getting sick from food


Good news


Okay


Not so good

When someone from your family or friends asks you what you learned, what will you tell them?

Evaluation #2

Thank you for participating in this program. Please answer the following questions to let me know what you have learned about sun-drying and traditional Native American foods.

Directions: Answer question 1-4 by checking yes or no. Write your answer for questions 5–6 in the space below the question.

	Yes	No
1. Did you learn something new about Native American foods?	____	____
2. Is hand washing important to keep from getting sick?	____	____
3. Are washing dishes and sun-drying screens with hot, soapy water important to keep from getting sick?	____	____
4. Is sun-drying a safe way to preserve corn?	____	____

5. List (or describe) three foods that you learned about today that you didn't realize were traditional Native American foods.

6. When someone from your family or friends asks you what you learned about sun-drying corn during this program, what will you tell them?

Evaluation #3

Thank you for participating in this program. Please answer the following questions to let me know what you have learned about sun-drying and traditional Native American foods.

1. Describe your favorite activity from this program.

2. List three foods that you learned about today that you didn't realize were traditional Native American foods.

3. What did you know about sun-drying before participating in this lesson?

4. Why is hand washing important before and after handling the corn?

5. What can you do to reduce the risk of a food-borne illness when sun-drying corn?

6. When someone from your family or friends asks you what you learned about sun-drying corn during this program, what will you tell them?

Educator evaluation

Data collected from this evaluation will be used to assess the use and effectiveness of this educational tool. Any comments or suggestion you make will help to identify the impact of the curriculum.

1. Total number of individual participants _____

2. Age of participants _____

3. Which lessons did you use? _____
   List the learning activity number.

4. Name of communities in which the program was conducted

5. Type of program (after-school, day camp, other, explain)

6. Program set-up (time frame, number of days)

7. Community members involved (parents, grandparents, business owners, 4-H leaders, etc., but don't list names)

8. Community resources used (organizations, groups, donations from businesses, etc.)

9. List comments from participants (youth and community members) that indicate the effectiveness of this program

10. What were your goals/objectives for planning and presenting programming using the “Sun-Drying, A Traditional Native American Method of Preserving Food” curriculum?

11. Do you feel the curriculum allowed you to meet those goals/objectives? Explain.

12. List the strengths of this curriculum.

13. What changes do you suggest to improve the curriculum?

Appendix A

Ethnic origin of common foods (not inclusive)

Food	Country
Apple	Central Asia
Bananas	Asia
Carrots	Central Asia
Strawberries	America
Pineapple	Brazil
Peanut	South America
Lamb	Australia
Pasta	Italy
Pizza	Italy
Omelets	France
Apple strudel	Austria
Turkey	Belize
Rice	China
Stir fry	China
Croissant	France
French bread	France
Meatloaf	Germany
Potatoes	Ireland, Peru
Tortillas	Mexico
Salsa	Mexico
Tacos	Mexico
Calzone	Italy
Burritos	Mexico
Tamales	Mexico

Appendix B

Traditional Native American foods

Buffalo – all edible parts (meat, liver, kidney, intestine)
Corn
Beans
Squash
Sunflowers
Chokecherries
Plums
Buffalo berries
Wild raspberries
Wild strawberries
Wild currants
Wild rice
Pumpkin
Wild turnips – tinpsila
Wild potato – similar to a sweet potato
Lambsquarters - herb
Mushrooms

The above listed foods were used to make the following:
Dried corn soup
Fish head soup
Parched corn (dried corn browned with bacon)
Bean soup
Hominy soup
Buffalo berry pudding
Tripe soup (tripe is edible internal organs made from the stomach of various domestic animals)
Fried bread
Buffalo roast
Turtle soup
Wild rice soup
Pemmican (dried meat ground up and mixed with dried fruit and fat)
Wasna (corn balls)
Wojapi (pudding made from dried berries
Jerky
Bapa – (dried meat with no seasoning added)

Appendix C - **Food list to be cut apart in strips.**

Buffalo
Beans
Sunflowers
Plums
Raspberries
Currants
Pumpkin
Wild potato
Mushrooms
Fish head soup
Bean soup
Buffalo berry pudding

Fried bread
Jerky
Turtle soup
Pemmican
Wojapi
Corn
Squash
Chokecherries
Buffalo berries
Strawberries
Wild rice
Lambsquarters
Wild turnips – tinpsila

Dried corn soup
Parched corn
Hominy soup
Tripe soup
Buffalo roast
Bapa
Wild rice soup
Wasna

Garlic
Prairie chickens
Duck
Goose
Moose
Elk
Fish
Onion

Appendix D

Traditional Foods Recipes

Wasna

This recipe and more information about wasna can be found in the following publication:
ExEx14105, Using Dried Corn
http://agbiopubs.sdstate.edu/articles/ExEx14105.pdf

Ingredients:
4 cups dried corn, ground (yield 3 cups ground)
1 cup dried fruit (raisins, cherries, berries, etc)
1 ½ cups sugar
1 ½ cups nonfat dry milk
1 teaspoon salt
1 ½ cups melted butter

Directions:
Grind corn in a food processor or hand grinder to a very fine consistency. Mix ground corn, dried fruit, sugar, dry milk, and salt together. Add the melted butter slowly and mix well. Press into a baking pan (9” x 13”) or shape into small balls (1 inch) and allow to cool.

Yield: 32 pieces
Serving size: 1 piece
Servings per recipe: 32

Nutrient content per serving:
Calories: 200
Fat: 9 g
Cholesterol: 25 mg
Sodium: 95 mg
Carbohydrates: 27 g
Fiber: 2 g
Protein: 3 g

Pemmican

This recipe and more information about pemmican can be found in the following publication:
ExEx14104, Drying Chokecherries
http://agbiopubs.sdstate.edu/articles/ExEx14104.pdf

Ingredients:
4 ounces dried beef or buffalo, not seasoned (commercial jerky works well)
1 cup dried chokecherries (other dried fruits can be substituted)
3 tablespoons melted butter

Directions:
1. In a food processor, process jerky until it is in small pieces.
2. Add dried chokecherries to food processor. Process until fruit is cut into smaller pieces and is mixed well with the jerky.
3. Melt 3 tablespoons butter on high in a small microwavable dish for about 20 seconds.
4. Add melted butter to meat and fruit mixture in the food processor. Process several short pulses until well mixed.
5. Lightly grease a 9 x 13 inch pan with 1 tablespoon of butter.
6. Using a rubber spatula, press pemmican into a thin layer in the pan. Cover with aluminum foil and refrigerate.
7. When chilled, cut into small pieces.

Yield: 16 pieces
Serving size: 2 pieces
Servings per recipe: 8

Nutrient content per serving:
Calories: 180
Fat: 8 g
Cholesterol: 20 mg
Sodium: 320 mg
Carbohydrates: 24 g
Fiber: 1 g
Protein: 6 g

Wojapi

This recipe and more information a wojapi can be found in the following publication: ExEx 14108
http://agbiopubs.sdstate.edu/articles/ExEx14108.pdf

Ingredients:
2 cups dried plums, rehydrated (fresh, frozen, or canned can be substituted)
1 ½ cups water, divided
½ cup sugar
2 tablespoons corn starch

Directions:
1. Rehydrate plums by putting in a bowl and adding enough water to cover. Let sit for 30 to 60 minutes until plums are plump. Pour off remaining water, reserve to use in step 2.
2. In a medium saucepan, combine plums with 1 ¼ cup water (measure reserved water and add enough to equal 1 ¼ cup). Bring to a boil, stirring occasionally. Lower heat.
3. Add sugar.
4. In a small bowl, mix cornstarch with remaining ¼ cup water. Add mixture to sweetened plums; blend well. Cook over low heat for about 4 minutes to thicken, stirring constantly, until consistency of a very thick sauce.
5. Serve hot.

Yield: 4 cups
Serving size: ½ cup
Servings per recipe: 8

Nutrient content per serving:
Calories: 120
Fat: 0 g
Cholesterol: 0 mg
Sodium: 5 mg
Carbohydrates: 33 g
Fiber: 2 g
Protein: 1 g

Learning Activity #2 – **Scenario**

The Plains tribes moved around the region to hunt buffalo. The buffalo was an important source of food along with providing supplies for shelter, clothes, cooking equipment, and tools. The whole tribe moved camp to follow the large buffalo herds. Every member of the tribe became very efficient at moving household belongings and food supplies.

Buffalo meat, corn, squash, wild rice, and wild berries were food that Native Americans carried with them as they traveled from camp to camp. The food needed to be preserved and stored so moving the food from camp to camp would be easier. Refrigerators, freezers, and coolers were not available for storing or preserving the food. Cans or jars took up a lot of space, were breakable, and were not easy to move. So Native Americans preserved their food by drying it in the sun. Sun-dried food was safe to be stored without a refrigerator and took up a lot less space. Buffalo meat was cut into thin slices and laid out in the sun to dry. Berries were either pounded into a pulp and made into patties to dry or dried whole. Corn was also dried either on the cob or by removing the kernels from the cob and spreading out in the sun to dry. The dried food was carried in sacks made out of tanned buffalo hide.

Step 1

Work with your small group to discuss the statements listed below about the above story. You will be given diamond-shaped pieces of paper in different colors. Write your answers on the paper using the color listed after each question. Use as many diamonds as you need to answer each statement. Select one person in your group to be the leader. The leader will read each question and make sure answers are written on the diamond shapes. You have 15 minutes to complete this step.

1. List problems with food that Native Americans may have faced when traveling from camp to camp with their tribe. (red diamonds)

2. List characteristics of typical Native American foods. Think about food available to the tribe and how it was gathered, prepared, and stored. (yellow diamonds)

3. Describe what Native Americans had to do to keep meat safe to eat when they traveled from camp to camp. (white diamonds)

4. Explain how you could dry meat in your home that would keep it from possibly making you sick from a food-borne illness. (blue diamonds)

5. Describe what Native Americans had to do to keep corn and wild berries safe to eat when they traveled from camp to camp. (green diamonds)

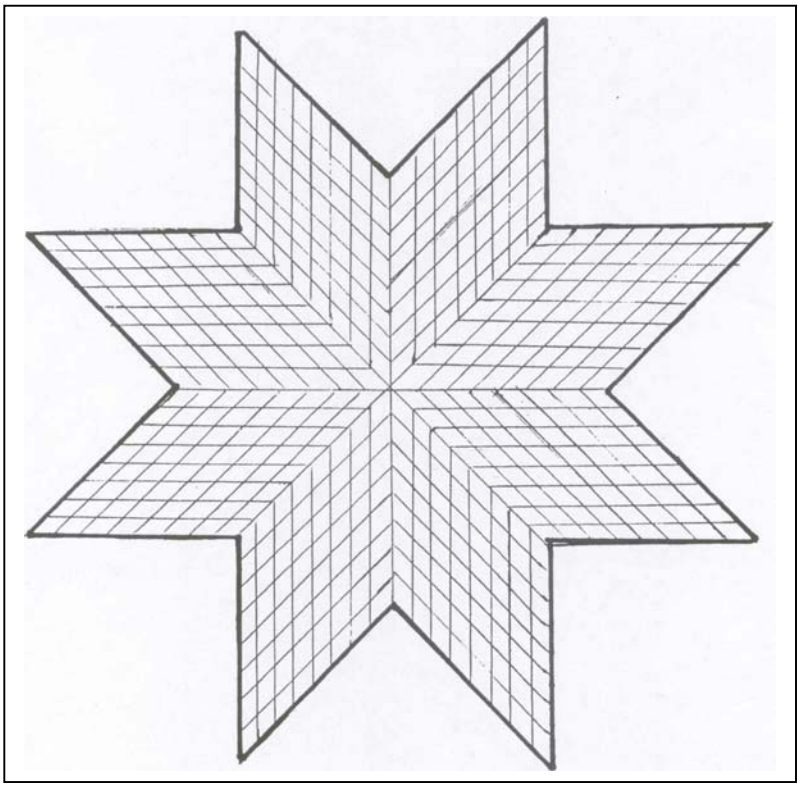
6. Explain how you could sun-dry corn and wild berries in your home that would keep them from making you sick from a food-borne illness. (orange diamonds)

Step 2

When you have finished talking about each statement and written all group members' answers on the diamond shaped pieces of paper begin putting together the diamond shapes into a star pattern in the space assigned to your group. Use blank diamond shapes if needed to complete the star design. Use the supplies provided to assemble the star. You have 10 minutes to complete this step.

Step 3

Once all groups have finished, each group will share their responses with the large group. Your educator will lead the discussion.



Learning Activity #2 – For Educator

Possible correct responses to each question

* Commonly expected responses are underlined.

1. List problems with food that Native Americans faced when traveling from camp to camp with their tribe.
   - ✓ Storage
   - ✓ Portable cooking equipment
   - ✓ Food spoiling
   - ✓ Moving food
   - ✓ Availability of food

2. List characteristics of typical Native American foods. Think about food available to the tribes and how it was gathered, prepared, and stored.
   - ✓ Wild vegetables and fruit (berries)
   - ✓ Food available in the growing season
   - ✓ Food that provided energy and was filling
   - ✓ Food available to trade with other tribes
   - ✓ Food that could be dried to reduce bulk

3. Describe what Native Americans had to do to keep meat safe to eat when they traveled from camp to camp.
   - ✓ Warm weather that allowed for extended days of drying
   - ✓ Clean equipment and work area (cross-contamination)
   - ✓ Natural elements contaminating the meat (dust, animals)
   - ✓ Storage of dried meat
   - ✓ Allowing meat to dry enough to prevent spoilage
   - ✓ Individuals working with the meat having dirty hands

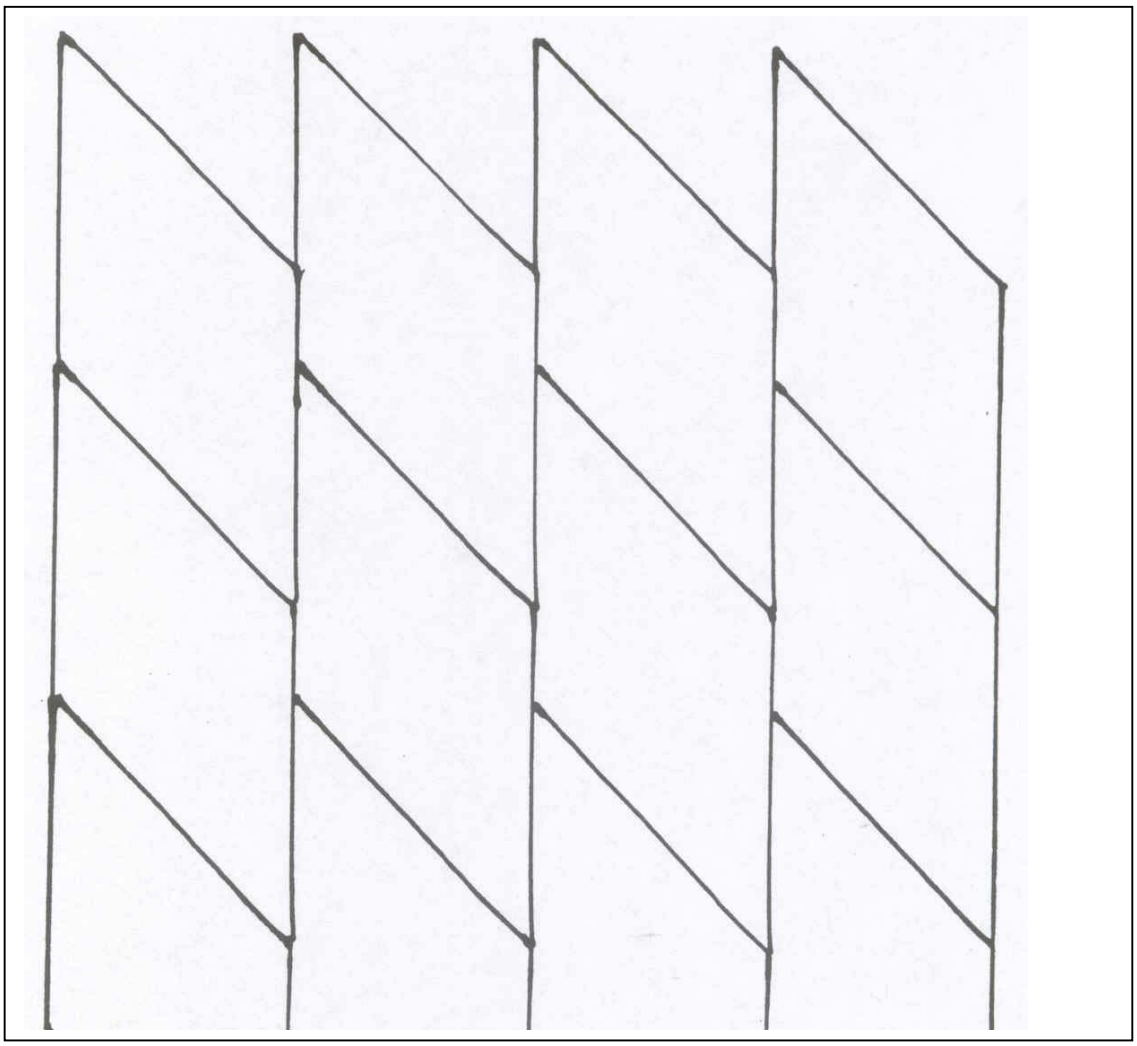
4. Explain how you could dry meat in your home that would keep it from possibly making you sick from a food-borne illness.
   - ✓ Safest method is to use a food dehydrator or oven to dry meat
   - ✓ Washing equipment with warm, soapy water
   - ✓ Refrigerating meat before drying
   - ✓ Storing dried meat in the refrigerator or freezer
   - ✓ Drying meat at or above 165 F to prevent bacteria from multiplying
   - ✓ Wear rubber gloves

5. Describe what Native Americans had to do to keep corn and wild berries safe to eat when they traveled from camp to camp.
   - ✓ Produce spoiling because it isn't dried enough
   - ✓ Clean equipment and work area (cross-contamination)
   - ✓ Dirty hands
   - ✓ Natural elements contaminating the produce (dust, animals)
   - ✓ Starting with spoiled produce

- ✓ Weather

6. Explain how you could sun-dry corn and wild berries in your home that would keep them from making you sick from a food-borne illness.
   - ✓ Boiling corn and washing berries with clean water before beginning the drying process
   - ✓ Clean hands, equipment and work area
   - ✓ Using equipment that reduces contamination from natural elements (covered screens that are raised off the ground)
   - ✓ If weather is not ideal, use a food dehydrator
   - ✓ Storing product in the refrigerator at night to prevent re-hydration
   - ✓ Wear plastic/food safe gloves

Template for diamond shapes



Learning Activity #4

Compare the cost of sun-drying corn vs. by a food dehydrator

Directions: Work with a small group or individually to complete the following steps and questions.

1. Drying food is a time consuming but rewarding process. If you were to pay yourself for the time you spent drying corn (labor), how much would you earn per hour?

2. From what you have learned about the drying process, how many hours do you think it would take you to prepare the corn and then dry it for each method?

3. Complete the following chart using price information provided.

Food Preservation method	Sun-drying	Using a food dehydrator
A. Corn – 2 dozen ears (24)		
B. Equipment		
C. Energy		
D. Labor # hours x $		
Total cost estimate= A+B+C+D		

4. Answer the following questions.

Which method is more cost effective? Explain.

Which costs are difficult to put a price on? Why?

What are advantages of sun-drying corn compared to using a dehydrator?

What are advantages of using a dehydrator to dry corn compared to sun-drying?

Deni Food Dehydrator - $31.49

Excalibur 4-Tray Food Dehydrator - $109.95

Back to Basics 5-Tray Food Dehydrator - $49.95

Deni Food Dehydrator – Five Stackable Trays - $44.95

Learning Activity #3 – For Educator with possible answers

Directions: Work with a small group or individually to complete the following steps and questions.

1. Drying food is a time consuming but rewarding process. If you were to pay yourself for the time you spent drying corn (labor), how much would you earn per hour? (minimum wage, pay for baby sitting, chores, etc.)

2. From what you have learned about the drying process, how many hours do you think it would take you to prepare the corn and then dry it for each method? (preparation – about 2 hours; sun-drying – 3-5 days; dehydrator – 10 hours)

3. Complete the following chart using price information provided.

Food Preservation method	Sun-drying	Using a food dehydrator
A. Corn – 2 dozen ears (24)	6 ears/$3.00 = $12.00	$12.00
B. Equipment	$15.00 for set of screens	$45.00 (see examples)
C. Energy = $ x time	Stove - $.02 (20 min.) Solar – free	Stove - $.02 (20 min.) Electricity - $.49 (10 hours)
D. Labor # hours x $5(example)	Preparation – 2 hrs = $10 Sun-drying – 3-5 days @ 10 hrs/day = $200.00	Preparation – 2 hrs = $10 Drying – 10 hours = $60.00
Total cost = A+B+C+D	w/drying time = $237.02 w/out drying time = $37.02	w/drying time = $127.51 w/out drying time = $67.51

Appendix E

Directions to make sun-drying screens – 1 set (2 screens)

Supplies:
2 2-inch x 2-inch x 8-foot untreated pine (cut into 2 25-inch lengths and 2 23-inch lengths)
two 2x2-foot aluminum screens
8 3-inch x ½ inch corner braces
2 ¼-inch x ¾-inch 8-foot screen mold (cut into 2 -25-inch lengths and 2 23-inch lengths)

Tools:
Staple gun and staples
Brads for staple gun
Electric drill

Directions:
1. Lay out wood so the 25-inch pieces are parallel and the 23-inch pieces are parallel, forming a square. Using the drill, attach the braces in each corner. See view A. Make two.
2. Lay the aluminum screen over the frame, staple edges to the frame. Pull the screen tight. See view B. Repeat on second frame.
3. Cover the raw edge of the screen with the screen mold. Attach with the brads. Repeat on second frame. See view C.

View A

View B

View C

View D