Colorado State University

Extension

MJ1040
Member's Manual

# 4-H Food Preservation: Drying

# Contents

# Notes to Project Helper

This activity guide is for youth who want to learn about home food preservation. They can't do it without your help. You play a key role in helping them learn the basic information skills and safety behind food preservation. With your help they will set goals, find resources and evaluate their own progress as they complete this manual.

# Your Responsibilities

- Become familiar with the material in this book.
- Assist youth in selecting and completing food preservation projects appropriate for their skills.
- Guide youth through thinking about why something happens or why it doesn't.
- Encourage youth to complete difficult tasks to expand their skills.
- Help youth learn about their strengths and weaknesses.
- Help youth evaluate their completed activities for quality. Questions located at the end of each activity will help youth think through the steps of the project and how to apply their new skills in their everyday lives.
- Be an example with kitchen and food safety rules.

# The Home Food Preservation Series

There are four manuals for youth in the *Home Food Preservation* series: *Freezing* for ages 8-18, *Drying* for ages 8-18, *Boiling Water Canning* for ages 8-18 *and Pressure Canning* for ages 14-18. The manuals may be used by anyone in these age groups regardless of their prior knowledge of home food preservation. Each manual includes an achievement program to help youth identify their goals and keep track of their accomplishments.

At the beginning of each manual you will find a list of objectives for the project. Each activity will include a short lesson followed by hands on activities and questions for further learning.

**These manuals have been written using USDA food preservation guidelines. When preserving food at home, be sure to always follow current USDA canning recipes and guidelines. Contact your local Extension Office for a list of these resources.**

# Resources

CSU Extension Fact Sheet 9.309 Drying Fruits, 9.311 Leathers and Jerkies, and Drying Foods Bulletin -2004- Accessed June 2013 at http://www.ext.colostate.edu/pubs/pubs.html#nutrition

So Easy to Preserve, University of Georgia
2011 or most current Ball Blue Book

# Websites

http://www.ext.colostate.edu/pubs/pubs.html#nutrition

http://nchfp.uga.edu/publications/publications_usda.html

http://www.freshpreserving.com

http://www.uga.edu/nchfp

# Using Experiential Learning & Life Skills

Experiential learning is the process of "Do, Reflect, Apply." This process is used as an inquiry-based approach to learning. Rather than providing information to the participants they experience, share, process, generalize and apply what they are learning.

Do: Experience the activity, perform, do it. This could be a group activity or experience. It involves doing, it may be unfamiliar and it pushes the learner to a new level.

Reflect: Share reactions, observations. The learners talk about their experiences while doing the activity. They share their reactions and observations and freely discuss their feelings.

Apply: Generalize to connect the experience to real-world examples. Identify general trends and what are some real life examples of when they could use what they have learned.

Apply: Apply what was learned to a similar or different situation or practice. Discuss how new learning can be applied to other situations.

The Iowa State Life Skills Model helps identify the life skills that youth attain through the experiential learning process.

The Life Skills used in the manual include:

Head
- Wise Use of Resources
- Planning/Organizing
- Goal Setting
- Critical Thinking

Heart
- Communication

Hands
- Marketable Skills
- Self-Motivation

Health
- Healthy Lifestyle Choices
- Disease Prevention

# My Plans

This page is intended to help you plan how to finish this manual.

- Select your Helper and write down contact information
- Set goals and write them in your e-record story
- Complete at least four activities each year
- Complete a presentation or demonstration each year

**Project Helper: _____**
**Contact Information: _____**

# Achievement Program

Do at least four activities that are located on pages 30-37 in the manual. You can also make up your own activities. Ask your project helper to initial each activity after you've completed it.

| Selected Activities | | |
|---|---|---|
| **Activities** | **Date Completed** | **Helper's Initials** |
| | | |
| | | |
| | | |
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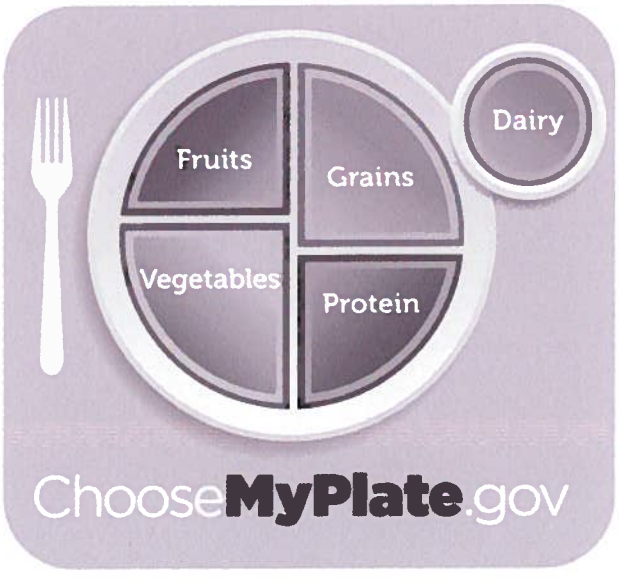
# Exploring *Choose MyPlate*

It is important to save your bounty of foods from your garden or local area to enjoy throughout the year. Preserving food yourself means having an abundant supply of a variety of foods when the fresh products are not readily available. Unless food is preserved in some manner, it begins to spoil soon after it is harvested.

It is important to learn about the nutrients that your foods contain in order to choose the best choices for a healthy eating plan. There are many foods to choose from, but some of them are better choices than others. Making food choices for a healthy lifestyle can be as simple as using these 10 tips. Use these ideas to balance your calories, to choose foods to eat more often, and to cut back on foods to eat less often.

1. Balance calories. Find out how many calories you need for a day as a first step in managing your weight. Go to www.ChooseMyPlate.gov to find your calorie level.
2. Enjoy your food, but eat less. Take the time to fully enjoy your food as you eat it. Eating too fast or when your attention is elsewhere may lead to eating too many calories.
3. Avoid oversized portions. Use a smaller plate, bowl, and glass. Portion out foods before you eat.
4. Foods to eat more often. Eat more vegetables, fruits, whole grains, and fat-free or 1% milk and dairy products. Make these foods the basis for meals and snacks.
5. Make half your plate fruits and vegetables. Choose red, orange, and dark-green vegetables like tomatoes, sweet potatoes, and broccoli, along with other vegetables for your meals. Add fruit to meals as part of the main meal or side dishes or as dessert.
6. Switch to fat-free or low-fat (1%) milk. They have the same amount of calcium and other essential nutrients as whole milk, but fewer calories and less saturated fat.
7. Make half your grains whole grains. To eat more whole grains, substitute a whole-grain product for a refined product – such as eating whole wheat bread instead of white bread or brown rice instead of white rice.
8. Foods to eat less often. Cut back on foods high in solid fats, added sugars, and salt. They include cakes, cookies, ice cream, candies, sweetened drinks, pizza, and fatty meats like ribs, sausages, bacon, and hot dogs. Use these foods as occasional treats, not everyday foods.
9. Compare sodium in foods. Use the Nutrition Facts label to choose lower sodium versions of foods like soup, bread, and frozen meals. Select canned foods labeled "low sodium," "reduced sodium," or "no salt added."
10. Drink water instead of sugary drinks. Cut calories by drinking water or unsweetened beverages. Soda, energy drinks, and sports drinks are a major source of added sugar, and calories, in American diets.



A healthy meal starts with more vegetables and fruits and smaller portions of protein and grains. One of the benefits of preservation is that you can enjoy your fruits and vegetables all throughout the year. Think about how you can adjust the portions on your plate to get more of what you need without too many calories. And don't forget the dairy – make it the beverage with your meal or add fat-free or low-fat dairy products to your plate.

- **Grains:** Grains are used to make bread, cereal, rice and pasta. These foods are made from wheat, rye, oats and rice. Whole grains are higher in fiber than others. Look for whole wheat or other whole grains on the ingredient label. Half of the foods you eat from the grains group should be whole grains. Eat at least 3 ounces of whole-grain cereals, breads, crackers, rice, or pasta every day. Foods from the grains group have carbohydrates. Carbohydrates are fuel our bodies need.

- **Vegetables:** Vegetables provide several different vitamins and minerals your body needs. Vegetables can be dried or canned, frozen or fresh. Vitamin A is found in dark green vegetables such as broccoli and spinach; and dark yellow and orange vegetables such as carrots and sweet potatoes. Vitamin A keeps the cells in our body healthy to protect us against infections. Vitamin A also aids the growth of healthy skin, bones, and teeth. We should eat a variety of vegetables every day, including cooked dry beans and peas.

- **Fruits:** Fruits provide vitamins and minerals. Fruits can be dried or canned, frozen or fresh. Choose whole or pieces of fruit that are frozen, fresh, canned or dried. Oranges, grapefruit, strawberries and melons have Vitamin C which helps our bodies to heal and resist infections and it helps your body absorb the iron in the food you eat. It is also needed for healthy teeth, gums, and blood vessels. Deep yellow fruit like apricots and cantaloupe have Vitamin A.

- **Oils:** We do need some for good health. Get your oils from fish, nuts, and liquid oils such as corn oil, Canola oil or Olive oil. Foods that are high in fat include chips, fries, snack cakes, cookies and candy.

- **Dairy Products:** Milk gives us calcium to keep our bones and teeth strong. Milk and foods made from milk are the best sources of calcium. While you are growing, your bones need the calcium in your foods, so have three to four servings from the milk group every day.

- **Protein Foods**: Meats and Beans provide iron and protein for our body. Meats can be frozen, home canned or dried as jerky. Iron moves oxygen throughout your body in your red blood cells. Protein promotes the growth and repair of body tissues. Foods in this group include meats, poultry, fish, eggs, beans, nuts and peanut butter. When you eat a food from the protein group, it should be lean – that means it doesn't have much fat in it. Baking, broiling, or grilling are the best choices for cooking protein foods rather than frying because they do not add fat to the meat.

# *Choose MyPlate* Worksheet

***Choose MyPlate* Worksheet:** For one day keep track of all the food you eat and how much of each food you eat. Record the food you ate and the amount on the *Choose MyPlate* Worksheet. After you have listed your choices, then list each food item in its food group; for example if you had a banana for breakfast, list it under the Fruits group, milk in the Milk group and so on. Now, add up your total for each food group. Compare your totals to the amount you should be eating for your age and gender. Answer the following questions.

- What food groups were lacking?

  _____

- Do you need to eat less of any food group?

  _____

- What changes could you have made on this day to eat better?

  _____

- List two goals for yourself to improve your eating.

  1._____

  2._____

This worksheet can be used as a selected activity for multiple years. It is a good idea to track the foods you eat on a regular basis to check and see how you are doing?

# *Choose MyPlate* Worksheet:

## For Kids

**Check how you did yesterday and set a goal to aim for tomorrow. Star all the foods that were home preserved.**

| Write in your choices from yesterday | Food and Activity | Goal (Based on a 1800 Calorie Pattern | List Each Food Choice In Its Food Group* | Estimate Your Total |
|---|---|---|---|---|
| Breakfast: | **Grains**  | **6 ounces equivalents** (1 ounce equivalent is about 1 slice bread, 1 cup dry cereal, or ½ cup cooked rice, pasta or cereal | | **___ounce equivalent** |
| Lunch: | **Vegetables**  | **2-1/2 cups** (choose from dark green, orange, starchy, dry beans and peas, or other veggies) | | **___cups** |
| Snack: | **Fruits**  | **1-1/2 cups** (choose from fresh, frozen, canned or dried) 1 ½ cups is equal to ¾ dried | | **___cups** |
| Dinner: | **Dairy Products**  | **3 cups** (1 cup yogurt or 1-1/2 ounce cheese = 1 cup milk) | | **___cups** |
| Physical Activity | **Protein Foods**  | **5 ounces equivalents** (1 ounce equivalent is 1 ounce meat, chicken or turkey, or fish, 1 egg, 1 T. peanut butter, ½ ounce nuts, or ¼ cup dry beans) | | **___ounce equivalent** |
| | **Physical Activity**  | At least **60 minutes** of moderate to vigorous activity a day or most days | | |

How did you do yesterday? ☐ Great ☐ So-So ☐ Not So Great

My food goal for tomorrow is: _____

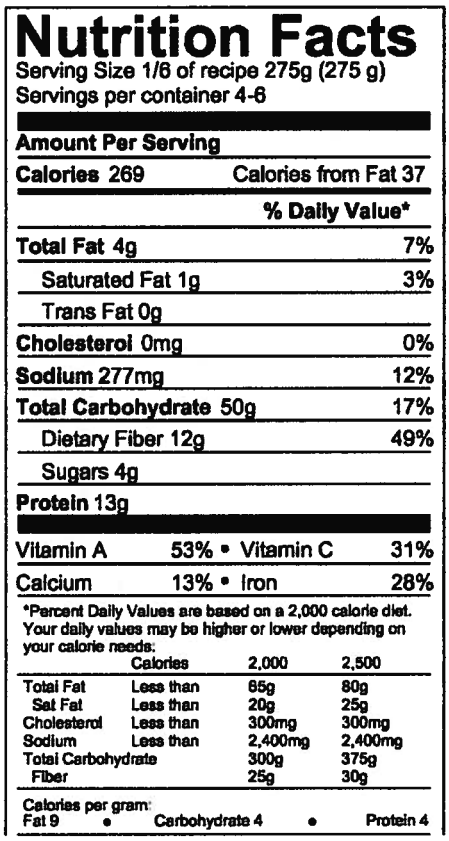
My activity goal for tomorrow is: _____

*Some foods don't fit into any group. These "extras" may be mainly fat or sugar – limit your intake of these

# Reading Food Labels

Smart eating is part of growing and staying healthy. *Choose MyPlate* helps you make good choices for a healthy, balanced diet. Pay attention to the amount of foods from each food group to help you find out if you eat enough or too much of some foods. When you completed your *Choose MyPlate* Worksheet, did you find that you were not eating all of the right foods?

It is not always easy to know what amount of food is a serving. For example, how many crackers are in a serving? How much cereal do you pour in a bowl for a serving from the Grain Group? The answers are easy if you know where to look.



**Nutrition Facts**

Serving Size 1/6 of recipe 275g (275 g)
Servings per container 4-6

| Amount Per Serving | |
|---|---|
| **Calories** 269 | Calories from Fat 37 |
| | **% Daily Value*** |
| **Total Fat** 4g | 7% |
| Saturated Fat 1g | 3% |
| Trans Fat 0g | |
| **Cholesterol** 0mg | 0% |
| **Sodium** 277mg | 12% |
| **Total Carbohydrate** 50g | 17% |
| Dietary Fiber 12g | 49% |
| Sugars 4g | |
| **Protein** 13g | |

| | | | |
|---|---|---|---|
| Vitamin A | 53% | • Vitamin C | 31% |
| Calcium | 13% | • Iron | 28% |

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

| | Calories | 2,000 | 2,500 |
|---|---|---|---|
| Total Fat | Less than | 65g | 80g |
| Sat Fat | Less than | 20g | 25g |
| Cholesterol | Less than | 300mg | 300mg |
| Sodium | Less than | 2,400mg | 2,400mg |
| Total Carbohydrate | | 300g | 375g |
| Fiber | | 25g | 30g |

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Most foods in the grocery store must now have a nutrition label and list of ingredients. Look for the Nutrition Facts Label on the food package or container. This label shows the serving size, how many servings are in the package or container, and other nutritional information, such as a list of ingredients in descending order.

**Serving Size:** The first place to start when you look at the Nutrition Facts Label is the serving size. Just below that is the number of servings in the package or container. The Nutrition Facts Label on this chili label shows that a serving size is 1/6 of the recipe. This can of chili contains 4-5 servings.

Calories provide a measure of how much energy you get from a serving. In this can of chili there are 269 calories in one serving of the chili.

**% Daily Value (%DV):** The %DV is the amount of a nutrient in one serving compared to dietary recommendations. What is the %DV for Total Fat in the can of chili?
Nutritional Analysis: The nutritional analysis is like having a Nutrition Facts Label for the recipe. We should limit our intake of Total Fat, Cholesterol, and Sodium. Look for foods low in saturated fats, trans fats, and cholesterol. (5%DV or less is low, 20%DV or more is high). Most of the fats you eat should be polyunsaturated and monounsaturated fats. Keep total fat intake between 20% to 35% of calories.

Is the %DV for saturated fat high or low on the can of chili?

**Sodium:** The Dietary Guidelines for Americans suggest that we need to lower our sodium intake to less than 2300 milligrams per day to reduce the risk of high blood pressure. Most of the sodium we eat comes from processed foods, not from the saltshaker. When we do our home preserving, we can control the amount of sodium added to our product. That is another advantage of home preserving. One teaspoon of salt equals about 2300 milligrams of sodium. Ask yourself the following questions.

How much sodium is in the can of chili if you ate the whole container? Figure that there are 4 servings in the can.
How much sodium is in one serving?
Is the %DV for sodium for one serving, high or low?

**Sugar:** Sugars are found naturally in fruits, (fructose) and fluid milk and milk products (lactose). The majority of sugars in typical American diets are sugars added to foods during processing, preparation, or at the table. The dietary Guidelines for Americans suggest that we need to reduce the intake of calories from solid fats and added sugars. In home food preservation, we can control the amount of sugar added to fruits and other products.

Be sure to get enough of Potassium, Dietary Fiber and Vitamins and Minerals. Remember that 5%DV is low and 20%DV or more is high. Is the calcium listed on the label high or low?

Going Further: You might want to collect your own label then answer the following questions. What is the food item? What is the serving size? How many calories are in the item per serving?

You may also want to collect several different brands of the same item and compare the labels. Compare cartons of fruit juice with fruit drink, or several boxes of dry cereal or energy bars.

# How Much Should You Eat?

ChooseMyPlate.gov or nutrition.gov to give you amounts that you should eat to stay healthy. It depends on your age, whether you are a girl or boy, and how active you are. Kids who are more active burn more calories, so they need more calories. The following guidelines are only estimates for how much you need of each food group.

**Grains:** Grains are measured in ounce equivalents. Eat 5 to 6 ounces every day, and remember that at least half of these should be whole grains. An ounce equivalent equals:

1 slice of bread
½ cup of cooked cereal, such as oatmeal
½ cup of rice or pasta
1 cup of cold cereal

4- 8 year olds need 4 to 5 ounce equivalents each day
9-13 year old girls need 5 ounce equivalents each day
9-13 year old boys need 6 ounce equivalents each day
14-18 year old girls need 6 ounce equivalents each day
14-18 year old boys need 7 ounce equivalents each day

**Vegetables:** You need to eat dark green and orange vegetables. Vegetable servings are measured in cups. Vegetables can be canned or dried, frozen or fresh.

4- 8 year olds need 1 ½ cups of veggies each day
9-13 year old girls need 2 cups of veggies each day
9-13 year old boys need 2 ½ cups of veggies each day
14-18 year old girls need 2 ½ cups of veggies each day
14-18 year old boys need 3 cups of veggies each day

**Fruits:** Fruit is part of a healthy diet. Here is how much fruit you need. Fruit can be canned or dried or frozen or fresh.

4-8 year olds need 1 cup to 1 ½ cups of fruit each day
9-13 year old girls need 1 ½ cups of fruit each day

9-13 year old boys need 1 ½ cups of fruit each day
14-18 year old girls need 1 ½ cups of fruit each day
14-18 year old boys need 2 cups of fruit each day

One-fourth cup of dried fruit is equal to ½ cup fresh fruit.

**Dairy Products:** Calcium builds strong bones to last a lifetime, so you need to get these foods in your diet.

4-8 year olds need 1 cup to 2 cups of milk or another calcium rich food each day
9-13 year old girls need 3 cups of milk or another calcium rich food each day
9-13 year old boys need 3 cups of milk or another calcium rich food each day
14-18 year old girls need 3 cups of milk or another calcium rich food each day
14-18 year old boys need 3 cups of milk or another calcium rich food each day

**Protein Foods:** These foods contain iron and lots of other important nutrients. These foods, like grains, are measured in ounce equivalents. An ounce equivalent equals:

1 ounce of meat, poultry, or fish
¼ cup cooked dry beans
1 egg
1 tablespoon of peanut butter
A small handful of nuts or seeds

4-8 year olds need 3 to 4 ounce equivalents each day
9-13 year old girls need 5 ounce equivalents each day
9-13 year old boys need 5 ounce equivalents each day
14-18 year old girls need 5 ounce equivalents each day
14-18 year old boys need 6 ounce equivalents each day

# Let's Plan a Menu

Planning a menu can be fun when you base it on the *Choose MyPlate.* Using the guidelines we have talked about, determine how much food you should eat daily from each of the food groups. Then divide the total amount of food you should eat each day among three meals and one or two snacks.

Make your meals fun and interesting. Try to include; a variety of foods to make the meal interesting and healthy; different colors and shapes of food that make the meal appealing when served together; different textures and flavors, some crunchy foods and some soft foods, chewy foods and liquids or maybe spicy foods and mild foods; and hot and cold foods.

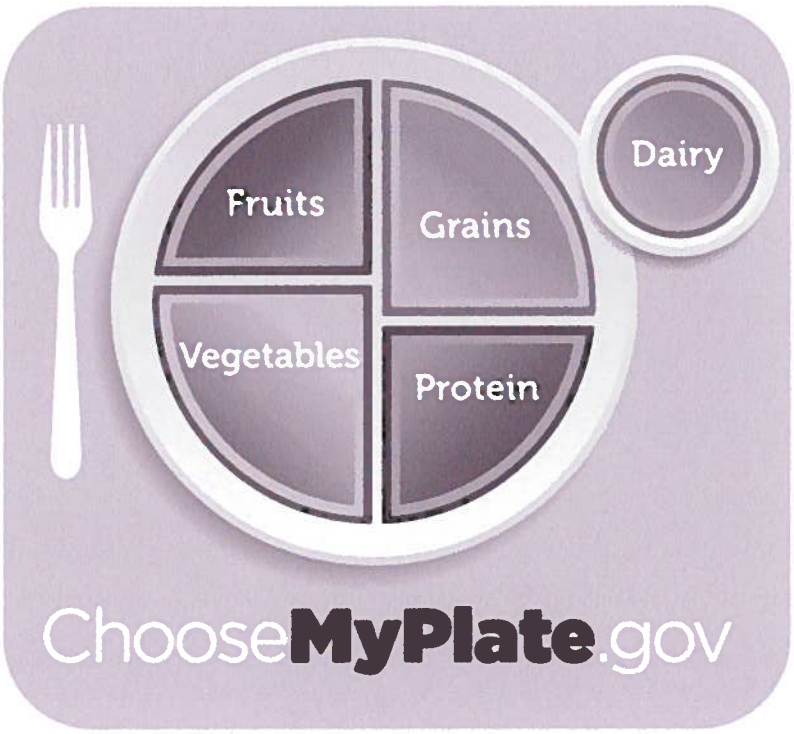
**Your menu should include foods from at least three or four of the five food groups at each meal.**

Remember to include foods that you have made in your project. It might be dried fruits or canned fruits, frozen vegetables or salsa and canned products. You might want to include your trail mix for a snack that you did in the drying manual.

If you want another challenge, plan all the meals for a day, or a week including snacks. You might choose to rate the meals for texture color and taste. You might also want to compare the meals to

*Choose MyPlate* to see if you have provided the recommended number of servings for each food group.

Going Further: Organize your menus in a binder or file. You might choose to exhibit them at your fair as part of your Food Preservation project.



# Types of Food Preservation

There are seven major methods of food preservation:

1. Refrigeration
    - Slows the growth of microorganisms
    - Slows action of enzymes
2. Freezing
    - Prevent growth of microorganisms
    - Slows, but does not stop enzyme action
3. Canning
    - Heat destroys the microorganisms that may be present in the food
    - Yeasts and molds are destroyed when food reaches 190F
    - Pressure canning enables the processing of canned foods at temperatures higher than boiling water, where dangerous bacteria are killed
    - Proper canning practices, removes air from the jars, leaving a vacuum
    - Molds and some yeasts are unable to grow in a vacuum
4. Sweetening and Acidifying Jellies and Jams
    - Added sugar and acid tie up free water and lowers pH
5. Pickling and Fermenting
    - Fermenting uses bacteria to produce lactic acid and lowers the pH
    - Added acid (fresh pack) controls pH with vinegar
6. Drying
    - Removes water and prevents growth of microorganisms
    - Dried foods must be packaged in oxygen and moisture proof containers
7. Salting
    - Chemically bonds water, inhibiting growth of microorganisms

# Kitchen and Food Safety Basics

## Kitchen Safety

Kitchens are safe! It's the people who work in the kitchens who create problems. Problems can be prevented if equipment and utensils are used properly and sharp items and hot foods and water are handled carefully. When working in the kitchen, one must be aware of safety hazards that may occur and take precautions to prevent injuries or accidents from happening by creating and maintaining a safe working environment.
The most common accidents happen in the kitchen, such as burns, cuts and falls. While cooking should be fun, you need to follow a few basic rules.

- Don't be in a hurry. Accidents happen when you're in too much of a hurry.
- Always clean up spills. Serious injury can occur when someone falls due to a wet floor.
- Never leave food unattended. Many fires develop while not paying attention to what is cooking.
- Don't use a towel in place of a hot pad. Always use potholders in both hands.
- Turn handles to the side and away from the edge of the stove.
- When cutting food, always cut away from you. Learn how to handle a knife properly.
- Never put a sharp knife or utensil in a sink of soapy water. Someone might put their hands in the sink and cut themselves on the knife.
- Don't leave a metal spoon in a pot that is boiling.
- When opening the lid on a steaming pan, always lift away from you. Steam can burn just as easily as boiling liquid.
- Don't use electrical appliances around the sink or water.
- Avoid loose clothing and flowing hair. If you have long hair, tie it back.

## Food Safety

- Wipe up spills when they happen.
- Wash hands with soap under warm water for at least 20 seconds. Dry hands on a disposable paper towel or a towel designated just for hands.
- Use clean towels and dishcloths.
- Never put a spoon in your mouth, and then back in the food.
- Avoid cross contamination by using separate cutting boards for meat and fruits and vegetables.
- Keep all preparation and cooking surfaces clean.
- Thoroughly clean all dishes, equipment and utensils with hot, soapy water after use.
- Follow the 2 hour rule. Never leave prepared foods on the counter for longer than 2 hours.

# Food Preservation Food Safety

- Be sure to use the correct equipment for each preservation technique.
    - Boiling water canner for acid foods
    - Pressure canner for low-acid foods
    - Dehydrator for drying
    - Freezer with plenty of space for freezing
- Preservation does not improve the quality of any food. Always use fresh, ripe, un-bruised, high quality produce for food preservation.
- Pre-treating fruits and vegetables before drying or freezing will help control enzyme reactions. Enzyme reactions can lead to discoloration, loss of flavor and loss of nutrients.
- Blanch vegetables before drying to stop enzyme action. Enzyme action will cause food to deteriorate faster.
- Make sure dried foods are thoroughly dried.
    - Fruits should be pliable and leather like
    - Vegetables are brittle or leathery
    - Herbs are brittle
- Always condition dried foods in order to make sure moisture in the foods is even across the whole batch. Conditioning is described further into the manual.
- Moisture must be kept from dried foods. Use suitable containers such as: plastic freezer bags, glass jars with lids, plastic containers with lids, and vacuum packaging.

# Basic Food Preservation Equipment

| Equipment | Use | Canning | Drying | Freezing |
|---|---|---|---|---|
| **Dry measuring cups** | Used to measure dry and solid ingredients. They usually come in a nesting set of 1 cup, ½ cup, 1/3 cup, and ¼ cup. | X | X | X |
| **Liquid measuring cups** | Used to measure liquids. You can see through the cup to measure and there is headspace. | X | X | X |
| **Measuring spoons** | Used to measure small quantities of dry and liquid ingredients. Measure liquid ingredients carefully to avoid spills. | X | X | X |
| **Sharp knives and Cutting boards** | Used to cut food to desired size. Wash knives and cutting boards after each use in warm soapy water. | X | X | X |
| **Potholders** | Used to protect hands when working with hot pans. | X | X | X |
| **Rubber spatula** | To scrape the side of the bowls or pans. You can use the flat side to level dry or solid ingredients when measuring. | X | X | X |
| **Large pans** | Use heavy duty pans for cooking ingredients. Do not use aluminum pans as they break down under the required heat. | X | X | X |
| **Long handled spoons** | Use to stir. Choose spoons that are tall enough that they will not fall down into the ingredients. | X | X | X |
| **Mixing bowls** | Used to hold and combine ingredients. Made of pottery, glass, metal or plastic. Come in different sizes. | X | X | X |
| **Funnel** | Used to pour liquid items into jars. | X | | X |
| **Colander** | Used to drain foods after washing. | X | X | X |
| **Timer** | Used to time food preparation and processing times. | X | X | X |
| **Dehydrator** | Used to produce the best quality dried products, and is the most popular drying method. A variety of electric dehydrators are available. | | X | |
| **Airtight Storage Containers** | Used for the containers that you can eliminate air from are best. | | X | X |
| **Food Chopper, Blender or Food Processor** | Used to chop, blend, and puree items for food preservation. These optional items can cut back on preparation time. Handle them under the supervision of an adult. | X | X | X |
| **Labels, permanent markers** | Used to identify the type of food, pretreatment step and date. | X | X | X |

| | | | | |
|---|---|---|---|---|
| **Double-Boiler** | Used to extract juice and to cook fruit leather before drying. | X | X | |
| **Cookie Sheet or Jelly Roll Pan** | Used for freezing items individually before packaging them and for oven drying. | | | X |
| **Blanching basket** | Used for blanching vegetables before freezing or drying. | | X | X |
| **Freezer Bags and Freezer Jars** | Used for safely storing frozen or dried foods for an extended period of time. | | X | X |
| **Jars and Lids** | Used to hold preserved foods. Choose Mason type, threaded, home canning jars with 2-part lids. Recommended sizes: ½ pint, 1 ½ pint, quart and ½ gallon (only for juice). | X | X | X |
| **Peeler** | Used to remove the skin of vegetables. | X | X | X |
| **Scale** | Used to weigh fruit and vegetables for preserving. | X | | X |

**Throughout this manual teaspoon and tablespoon have been abbreviated as tsp. and tbsp.**

# Drying Foods

## Objectives

In this project you will:

- Learn how to safely dry foods to maintain top quality
- Learn how to use foods you dried in healthy recipes
- Show others how to preserve foods by drying

## Why Dry Foods

Drying is the oldest method of preserving food. The early American settlers dried foods such as corn, apple slices, currants, grapes and meat. In 1795, the first food dehydrator was introduced by the French. During the Great Depression of the 1930's, people could not afford or didn't have canning equipment so foods were dried. Drying is very simple and easy to learn.

Drying foods yourself allows you to choose the best, tastiest varieties you can buy or pick fresh from your garden. With the renewed interest in gardening and natural foods and because of the high cost of commercially dried products, drying foods at home is becoming popular once again. Drying is not difficult, but it does take time and a lot of attention. Although there are different drying methods, the guidelines remain the same.

One of the biggest advantages of dried foods is that they take much less storage space than canned or frozen foods. The foods you dry yourself cost a lot less than the ones you purchase at the store. Drying is an excellent way to preserve foods that can add variety to meals and provide delicious, nutritious snacks.

## Drying Basics

Microorganisms and enzymes that spoil food and make it unsafe to eat need water to be active. Certain microorganisms are present in all foods. When they are exposed to warm temperatures and water, which is naturally present in foods, they multiply and the food spoils. If sufficient water is removed from the food, these microorganisms cannot multiply and the food is preserved. Drying works as a preservation method simply by depriving them of water. Dried foods keep well because the moisture content is so low that spoilage organisms cannot grow. Increasing temperatures of food makes its moisture evaporate. The air moving around the food carries the moisture away. The temperature is very important, you do not want the temperature so hot that you cook the food; you just want to dry it. Controlling temperature and air circulation prevents food from spoiling during the drying process. If the temperature is too low or the humidity it too high, the food will dry too slowly, allowing the growth of microorganisms. If the temperature is too high, the food will *case harden*, which is when the outside layer of the food dries and hardens, creating a hard shell on the food that traps the moisture inside, and the food will spoil.

Nutritional Value of Dried Foods

Dried fruits are a good source of energy because they contain concentrated fruit sugars. Fruits and vegetables can contain large amounts of vitamins and minerals. Drying, like all methods of preservation, can result in the loss of some nutrients. For most foods, the nutritional value retained is about the same as with freezing. Drying has a lower heat exposure than canning and therefore destroys fewer vitamins. Using a pretreatment for apples, peaches and pears lessens the loss of vitamin A and C. Fiber and carbohydrates are not affected by drying. Neither are the minerals, such as potassium or magnesium in some fruits. Minerals, however may be lost during rehydration if soaking water is not consumed. Iron is not destroyed by drying.

# Getting Ready to Dry – General Information

There are several different methods of drying foods. The different methods are: Dehydrator, Oven, Sun and Solar. These methods are explained in this section. We will look at the advantages and disadvantages of each one.

**Dehydrator Drying**: Dehydrators yield a better quality dried product than any other method of drying and is the most popular method of drying. A dehydrator should have a heat source, a thermostat, and some method of air circulation.

**Advantage:** Good quality product, not dependent on the weather and does not tie up the oven. Foods can be dried on a twenty-four hour basis.

**Disadvantage:** Cost of dehydrator and the cost of energy used, which is very reasonable.

**Oven Drying:** The oven drying method can be used to dry small amounts at a time.

**Advantage:** There is little or no investment in equipment and you don't have to depend on the weather.

**Disadvantage**: In an electric oven, drying foods has been found to be nine to twelve times as costly as canning it. The lack of a fan to provide air circulation results in slower drying and poorer products as compared to using a dehydrator. Food is usually more brittle and darker and less flavorful than food dried in a dehydrator. Oven drying also takes two or three times longer than drying in a dehydrator.

**Sun Drying:** Sun drying depends on the temperature and the relative humidity outside. Sun drying can be used when the temperature is in the 90 degree range with low humidity and low air pollution.

**Advantage:** Low cost, only investment is netting, drying trays and the fruits or vegetables. Another advantage is the sun's sterilizing effect caused by ultraviolet rays that may slow the growth of some organisms.

**Disadvantage:** Sun drying can only be done when the temperature is high and the humidity is low; it takes more time to dry in the sun than when using a dehydrator.

**Solar Drying:** Solar drying is like sun drying, only better. The sun's rays are collected in a solar box so the drying temperature is higher. If you do not want to buy a solar box, you can use the back window ledge of an automobile where the sun shines through. Crack the windows slightly to allow air flow so temperatures do not get too hot. Also, remember to cover the trays with netting to keep bugs out.

**Advantage:** Shortened drying time, as compared to sun drying.
**Disadvantage:** Solar Drying units are very expensive. Many areas do not have a suitable climate for this method. Dependable solar dehydration of foods requires 3 to 5 consecutive days when the temperature is around 95 degrees and the humidity is very low.
**Note:** Sun drying of meat jerkies is no longer recommended due to the lack of a steady, controlled heat source (145° F) and potential for contamination from air, animals, insects and bacteria. (Drying Foods Booklet; 2004; CSU Extension; pg. 3.)

# Preparing Fruits for Drying

For a good quality product, fruits must be prepared for drying as soon as possible after harvesting. Follow these steps for drying.

1. Select good quality, fresh, fully ripe fruit.
2. Prepare fruit soon after harvesting. The less time between garden and drying the better the nutritional value, texture and flavor will be.
3. Wash fruit.
4. Peel, slice, or cut fruit into smaller, equal size pieces for even drying.
5. Pretreatments include ascorbic acid and/or citric acid dip or sulfuring. Fruits can be pretreated in a syrup solution.
6. Pretreating fruits is a personal preference. Pretreating some fruits before drying will reduce vitamin loss, flavor loss, browning, and deterioration during storage. Food safety is enhanced by use of some pretreatments that reduce pathogen activity during drying.

Pretreating Fruits for Quality and Safety

Pretreating fruits prior to drying is highly recommended. Pretreating helps keep light colored fruits (apricots, pears, peaches, apples) from darkening during drying and storage and it speeds the drying of fruits with tough skins, such as grapes and cherries. Pretreating those fruits can decrease browning during processing and storage and lower losses of flavor and of vitamins A and C. Research studies have shown that pretreating with an acidic solution also enhances the destruction of potentially harmful bacteria during drying (Taken from CSU-Drying Foods Bulletin).
Below are options for various pretreatments for both quality and safety.

**Preparing Optional Pretreatment Dips for Fruits**

| **Type of dip** | **For quality (preserve fruit color and reduce vitamin loss)** | **For quality and safety (enhanced pathogen destruction)** |
|---|---|---|
| Ascorbic acid | ½ tsp. per quart water | 8 tsp. per quart water |
| Citric acid | Bottled lemon juice<br>Or equal parts lemon juice to water<br>i.e. 1 c. lemon juice per 1 c . water | 1 tsp. pure citric acid per quart |
| Sodium Metabisulfite | 1 to 3 tsp. per quart water | |

| | |
|---|---|
| Sodium bisulfite | ½ to 1 tsp. per quart water |
| Sodium sulfite | 1 to 2 tsp. per quart water |
| Syrup blanch | 1 part sugar to 2 parts water |
| Honey | 1 part honey to 4 parts water |

Resource: PNW 397 – *Drying Fruits and Vegetables*, page7. Drying Foods Bulletin, 2004. Colorado State University Extension, pg. 3-8.
Footnote: Citric acid can usually be obtained where wine making or brewing supplies are sold.

**Ascorbic Acid/Citric Acid Dips**: Ascorbic acid/citric acid dips are often used as a pretreatment for fruits. They prevent fruits such as apples, pears, peaches and apricots from turning brown when cut and exposed to air. An ascorbic acid (another name for this is Vitamin C) dip also increases the vitamin C content of the dried fruit. Vitamin C tablets can also be used.

To prepare the solution for prevention of browning, combine ½ tsp. of ascorbic acid crystals or three crushed, 500 milligram tablets of vitamin C in 1 quart of water. Place the cut fruit in the solution and leave in the solution for 5 minutes. Approximately 1 quart of solution will treat 8 cups of fruit.

A more concentrated ascorbic acid solution is required to help destroy pathogens during drying. Refer to the above chart for these instructions and leave the fruit in the solution for 10 minutes.

Pineapple juice or juice from citrus fruits such as lemons, oranges, or grapefruit may also be used as a pretreatment. These juices contain a mixture of citric and ascorbic acids. Citric acid does not prevent browning as well as ascorbic acid, but it's more effective at destroying harmful bacteria. Refer to the above chart for preparing the pretreatment. Place fruit in the solution and soak for 10 minutes.

**Syrup Blanching:** Prepare fruit for drying. Prepare a sugar syrup made with 1 part sugar and 2 parts water. You may use less sugar. Bring the sugar solution to a boil. Add the fruit, simmer for 5 minutes, and then drain the fruit. Place the fruit on drying trays and dry. The fruit is more like a candied fruit.

**Honey Dip**: A honey treatment for fruit can be used to minimize browning and softening the light-colored fruit. Prepare the honey-water dip in the above instructions. Dip the fruit in the honey solution, let it soak for about 5 minutes, and drain well. The dried fruit will have a slight honey taste.

**Sulfiting:** Sulfur dioxide treatments are effective to prevent browning. However due to implication in causing allergic reactions in sensitive individuals, it is recommended to use other methods discussed.

# Drying Guidelines for Fruits

Arrange your fruit in a single layer on a dehydrator tray.

It is important to dry the fruit quickly at first to eliminate the growth of bacteria. If you can control the temperature on your dehydrator, start at 140 °F. to 150 °F., then turn it down to 130°F. or 140°F. after 2-3 hours.

Factors that affect drying include:

- The type of food you are drying
- How thick or thin you slice your fruit
- How well air circulates in and out of the dehydrator
- The temperature and humidity where you live

To check your fruit, remove one slice and let it cool at room temperature. Condition fruit before use.

| Fruit | Selection and preparation (thoroughly wash all fruits) | Pretreatment | Tests for dryness and drying time guidelines* |
|---|---|---|---|
| **Apples** | Peel (optional) and core. Cut into slices or rings about ¼ inch thick. | None, ascorbic acid/citric acid dip, syrup blanch, honey dip, salt solution dip, or sulfiting | Leathery to crisp; no moist area in center 6-12 hours |
| **Apricots** | Cut in half and pit. Fruits dry more rapidly if quartered or sliced. | Ascorbic acid/citric acid dip, syrup blanch, honey dip, or sulfiting | Springy; no moist area in center 24-36 hours for halves |
| **Bananas** | Peel and slice ¼ to ½-inch thick, crosswise or lengthwise. | None or ascorbic acid/citric acid dip | Pliable to crisp 8-10 hours |
| **Blueberries/ Huckleberries** | Remove stems. | None or dip larger berries in boiling water to crack the skins | Shriveled; leathery 24-36 hours |
| **Cherries** | Remove stems. Slice in half and remove pit, or pit and dry whole. | None or sulfiting | Pliable; leathery 24-36 hours |
| **Coconuts** | Drain milk. Steam fruit 1 minute to loosen meat or pry meat out with a knife. Trim dark outer skin, and grate meat or slice in chunks. | None | Leathery to crisp Dry at 110° |
| **Cranberries** | Remove stems. | Dip in boiling water to crack skins or syrup blanch | Shriveled 24-36 hours |
| **Figs** | If figs are small or have partly dried on the tree, they may be dried whole. Otherwise, cut in half. Dry with skin-side down. | None, or syrup blanch | Pliable; leathery; slightly sticky; no moist area in center 6-12 hours |
| **Grapes** | Select seedless varieties. | Dip in boiling water 30 seconds to crack skins. Plunge in ice water to stop cooking. Drain on paper towels. | Pliable; leathery 12-20 hours |

## Drying Guidelines for Fruits (cont.)

| Fruit | Selection and preparation (thoroughly wash all fruits) | Pretreatment | Tests for dryness and drying time guidelines* |
|---|---|---|---|
| **Kiwi fruit** | Remove outer skin. Slice ¼ inch thick. | None | Pliable; leathery |
| **Papayas** | Cut in half and remove seeds. Peel and slice. | None, or syrup blanch | Pliable; leathery |
| **Peaches** | Peel and slice peaches. Fruits dry more rapidly if quartered or sliced. | None, ascorbic acid/citric acid dip, syrup blanch, honey dip, salt solution dip, or sulfiting | Pliable; leathery 24-36 hours for halves |
| **Pears** | Peel, cut in half lengthwise, and core. Section or slice about ¼ inches thick. | None, ascorbic acid/citric acid dip, syrup blanch, honey dip, salt solution dip, or sulfiting | Pliable; leathery 24-36 hours for halves |
| **Pineapples** | Peel and remove thorny eyes; cut into ¼ inch thick slices. | None, or syrup blanch | Leathery but not sticky 24-36 hours |
| **Plums** | Cut in half and pit. Fruits dry more rapidly if quartered or sliced. | None, or sulfiting for light-colored fruit | Pliable; leathery 24-36 hours for halves |
| **Prunes** | Cut in half and pit. Fruits dry more rapidly if quartered or sliced. | None | Pliable; leathery; a handful of properly dried prunes will fall apart after squeezing 24-36 hours for halves |
| **Rhubarb** | Cut in 1 inch lengths. | None, or blanch for 1-2 minutes | Very brittle; tough |
| **Strawberries** | Remove stems. Cut strawberries in half. Dry skin-side down. | None | Pliable; leathery |
| *Drying times are guidelines only. Test food frequently for dryness according to the criteria described in the chart. Cool food before testing. | | | |

Source: Swanson, Marilyn, 2009. Drying Fruits and Vegetables, PNW 397. Moscow, ID: University of Idaho Extension

# Making Fruit Leathers

Fruit leather is a pureed fruit which is dried in a thin layer and rolled into chewy fruit taffy. It makes a nutritious snack for lunch boxes, after school treats, or to take with you backpacking or anywhere.

Apples, apricots, berries (all kinds), cherries, nectarines, peaches, pears, pineapple, and plums make good fruit leathers. Many fruits can be combined with other fruits to make delicious combinations. For example bananas can be combined with apples, berries, and many other fruits.

Fresh fruits in season make excellent fruit leathers; however canned and frozen fruits also work well. Fruit leathers are a good way to use slightly overripe or bruised fruit that might otherwise be discarded. Canned fruits, such as applesauce, can be mixed with more expensive fresh fruits to help stretch the concentrate and may improve the texture of the dried product.

**Pretreatment for Safety.** Because of the increasing concerns with bacteria such as E. coli being able to survive the drying process if it is present, it is best to heat the fruit to 160°F before drying. Choose either the Double Boiler Method (Steam Blanching) or the Microwave Method listed below.

## I. Double Boiler Method

I. Select, wash, and prepare fruit as described for uncooked fruit leathers.
II. Cut the fruit into slices or chunks and place them in the top of a double boiler.
III. Add water to the bottom of the double boiler. Cover the double boiler and steam the fruit for 15 minutes or until fruit is soft and a thermometer placed in the mixture registers 160°F. If you do not have a double boiler, you may use a small pan containing the fruit in a larger pan partially filled with boiling water.
IV. Then follow steps 4-9 for uncooked fruit leather.

## II. Microwave Method

1. Place cut fruit in a glass casserole dish. Cover and microwave on full power (high) for 6 to 8 minutes per two cups of fruit, stirring every 2 minutes.
Follow steps 3-9 uncooked fruit leathers.

## Uncooked Fruit Leather

1. Select ripe or overripe fruit or fruit combinations.
2. Wash fruit and cut away blemishes. Remove stones or pits. Remove larger seeds from berries, grapes, and tomatoes if you wish. Peel all tough-skinned fruits, peel others if you wish.
3. Cut fruit into chunks and place them in a food chopper, blender, or food processor.
4. Add 2 tablespoon lemon juice per 2 cups of fruit to protect the color and help destroy bacteria during drying.
5. Chop, grind, or blend the fruit into a thick puree. If the fruit has little juice, you may add several spoonful's of water or fruit juice to obtain a uniform puree.
6. Add sugar, honey, or corn syrup to taste if you choose. This is optional. Most fruits do not need any added sugar, because fruit tastes sweeter after being dried.
7. Add spices if you choose. This is also optional. Spices such as cinnamon, nutmeg, cloves or allspice may be added to taste. Start with a small amount such as ½ teaspoon per quart of pureed fruit. Remember, spice flavors are intensified when food is dried.
8. Use a dryer tray designed for fruit leather. You may also line a portion of a drying tray with light oiled heavy plastic wrap. Do not cover the entire tray, or the air will be unable to circulate to other trays. Pour the puree onto the lining wrap. Spread the puree to no more than ¼ inch thick almost to the edge of the plastic wrap. Approximately 2 cups of puree will cover a 12 by 17 inch drying tray.
9. You may sprinkle the puree with chopped nuts, seeds or grated coconut. This is optional.

## Fruit Leather from Canned Fruit

Thoroughly drain home-canned or commercially canned fruit, or last year's canned fruit, use baby food fruit, without tapioca. Follow the above steps 3 and 5-9 for uncooked fruit leather. Since canned fruits have been heat processed to stop enzymatic action, you don't need to add ascorbic acid.

**Drying and Storing Fruit Leather**

Dry fruit leather until the leather is sticky, generally 6-8 hours at 140°F. Properly dried fruit leather will be translucent and slightly tacky to the touch but will still peel away from the plastic wrap. It should not be soft to the touch. When the leather is sufficiently dried, you will be able to pull it up. If it sticks to the tray in the center, it is not dried completely. If the fruit leather cracks or chips, it is dried too long. However, it is still edible.

The fruit leather can now be rolled and wrapped in plastic wrap or stored flat in sheets with plastic wrap separating the sheets. Place the wrapped pieces in an air-tight container in a cool, dark, dry place. You can also store fruit leather in the refrigerator or freezer. It will retain good quality for up to one year in the freezer, several months in the refrigerator, or one to two months at room temperature (70°F). Discard leathers that develop off smells or flavors or show signs of mold.

# Drying Canned Fruits

Using canned fruits is a quick way to prepare fruit for drying. Drain the syrup, rinse the fruit, and cut it into ½ inch slices, then dry as usual. Drying times will take longer than for fresh fruit, because the canned fruit will contain absorbed syrup. Dried canned fruit resembles candied fruit and can be used in similar ways. This works very well with last year's canned apricots.

# Conditioning Fruits

Some pieces of fruit will be a little more-moist than others after drying, due to the size variation of the pieces of fruit or where they were located in the dryer; therefore you need to condition fruits before long-term storage. Conditioning is a process used to distribute the moisture evenly in the fruit. It reduces the chance of spoilage, particularly from mold.

To condition, loosely pack cooled, dried fruit in plastic or glass containers to about two-thirds full. Cover the containers tightly. Shake them daily for about 2 to 4 days. The excess moisture in some places will be absorbed by the drier pieces. If you notice moisture forming on the container lid, place the fruit back in the dehydrator.

Vegetables dry to a nearly waterless state; therefore, conditioning vegetables is not necessary.

# Preparing Vegetables for Drying:

Follow these steps for drying vegetables.

1. Select vegetables in prime condition.
2. Time from garden to dryer should be as short as possible.
3. Wash to remove dirt.
4. Peel, trim, core, cut, slice or shred, keeping pieces about the same size or thickness.
5. Almost all vegetables should be blanched before drying. Vegetables deteriorate rapidly because of enzymes. Enzymes are destroyed by heat in blanching.
6. There are two types of blanching:
   Hot water blanching. Vegetables are placed in a basket and submerged in boiling water for a specific time.
   Steam blanching. Vegetables are suspended above the boiling water in a colander or wire basket. Only steam is in contact with the food. This is the preferred method because there is less loss of water-soluble vitamins.
7. Blanched vegetables should feel and taste firm, but tender. They should be heated through but not be cooked as for eating.
8. Drain vegetables before drying. Blot with a paper towel if there is extra moisture.

## Drying Guidelines for Vegetables

| Vegetable | Selection and preparation (thoroughly wash all vegetables) | Pretreatment and blanching time guidelines* | Tests for dryness and drying time guidelines* |
|---|---|---|---|
| **Beets** | Select small, tender beets of good color and flavor, free from woodiness. Steam or boil until cooked through. Cool, trim off roots and crowns, and peel. Cut into shoestring strips or into slices about ¼ inches thick. | Steam or boil until tender<br>25-30 minutes for small beets | Tough; brittle<br>10-12 hours |
| **Broccoli** | Trim and cut as for serving. Quarter stalks lengthwise. | Water or steam blanch<br>2-3 minutes in water<br>3-5 minutes in steam | Crisp<br>12-15 hours |
| **Cabbage** | Remove outer leaves, quarter, and core. Cut into shreds about 1/8 inches thick. | Steam blanch<br>2-3 minutes | Crisp<br>10-12 hours |
| **Carrots** | Select crisp, tender carrots, free from woodiness. Wash; trim off the roots and tops. Cut into slices or strips about ¼ inches thick. | Steam blanch<br>3-4 minutes | Tough; brittle<br>10-12 hours |
| **Cauliflower** | Separate into flowerets; cut large ones in half. | Water blanch (add 1 tablespoon vinegar per 1 gallon water)<br>3-4 minutes | Tough; brittle<br>12-15 hours |
| **Celery** | Strip off leaves; cut stalks into ¼ inch pieces. Stir occasionally during drying. | Water blanch<br>30 seconds to 2 minutes | Crisp<br>10-16 hours |
| **Corn (cut)** | Select tender, sweet corn. Husk. Steam on the cob for 5 to 10 minutes, or until milk is set. Cut from cob. | Steam blanch | Crisp; brittle<br>6-10 hours |

| | | | |
|---|---|---|---|
| **Green beans** | Remove defective pods. Remove strings if necessary. Split pods lengthwise to hasten drying. | Water or steam blanch<br>2-3 minutes in water<br>3-4 minutes in steam | Brittle<br>8-14 hours |
| **Mushrooms** | Slice off woody stems. Slice, or dry whole if small. Spread not more than ½ inch deep on trays. | None | Crisp; brittle<br>Dry at 120°F |
| **Warning:** Use only commercially grown mushrooms. Only an expert can differentiate between poisonous and edible varieties. | | | |
| **Okra** | Use young, tender pods only. Cut ½ inch crosswise, slice, or split lengthwise. Spread not more than ½ inch deep on trays. | Water blanch<br>2-3 minutes | Tough; brittle<br>8-10 hours |
| **Onions** | Remove outer, discolored layers. Slice ¼ inch thick or chop. | None | Brittle; light colored; feels like paper<br>3-9 hours |
| **Parsley and other herbs** | No precooking necessary. Hang bunches or whole plants in a dry, warm place to dry. When dry, crush leaves and remove stems. When drying in dehydrator or oven, keep temperatures below 120°F. | None | Brittle<br>Dry at 100°F<br>1-2 hours in a dehydrator |
| **Vegetable** | **Selection and preparation (thoroughly wash all vegetables)** | **Pretreatment and blanching time guidelines*** | **Tests for dryness and drying time guidelines*** |
| **Parsnips** | Select crisp, tender parsnips, free from woodiness. Wash; trim off the roots and tops. Cut into slices or strips about ½ inches thick. | Water or steam blanch<br>2-3 minutes in water<br>3-5 minutes in steam | Tough; brittle |
| **Peas** | Select young, tender peas of a sweet variety. Shell. Stir frequently while drying. | Steam blanch quickly after shelling<br>2-3 minutes | Hard; wrinkled; shatter when hit with a hammer<br>8-10 hours |
| **Peppers (green, red, or yellow)** | Cut in ½ inch strips or rings. Remove seeds and "partitions." Spread rings two layers deep; spread strips not more than ½ inch deep. | None, or water or steam blanch<br>2-3 minutes water<br>3-5 minutes in steam | Tough; brittle<br>8-12 hours |
| **Potatoes** | Peel; cut into shoestring strips 3/16 inch in cross section or slice about ¼ inch thick. | Rinse in cold water.<br>Water or steam blanch, and rinse well.<br>5-6 minutes in water<br>6-8 minutes in steam | Crisp<br>8-12 hours |
| **Pumpkin, yellow** | Chop into strips about 1 inch wide. Peel off rind; scrape off fiber and seeds. Cut peeled strips into pieces about 1/8 inch thick. | Water or steam blanch until tender<br>1 minute in water<br>2-3 minutes in steam | Tough to brittle<br>10-16 hours |
| **Soybeans** | Blanch pods until beans are tender but firm. Shell. | Water or steam blanch | Shatter when hit with hammer |
| **Spinach and other greens** | Select young, tender leaves. Wash. See that leaves do not form wads when placed on trays. Cut large leaves crosswise into several pieces. | Water or steam blanch until wilted | Brittle |
| **Squash (Hubbard or winter types)** | Chop into strips about 1 inch wide. Peel off rind; scrape off fiber and seeds. Cut peeled strips into pieces about 1/8 inch thick. | Water or steam blanch until tender<br>1 minute in water<br>2-3 minutes in steam | Tough to brittle<br>10-16 hours |
| **Squash (summer, crookneck,** | Wash, trim and cut into ¼ inch thick slices. | None, or water or steam blanch | Leathery to brittle<br>10-12 hours |

| | | | |
|---|---|---|---|
| **scallop, zucchini, etc.)** | | | |
| **Tomatoes (meaty varieties)** | Select tomatoes of good color. Steam or dip in boiling water to loosen skins. Chill in cold water; peel. Cut into sections not more than ¾ inch wide. Cut small pear or plum tomatoes in half. | None | Leathery to crisp 10-18 hours |
| *Blanching and drying times are guidelines only. Test food frequently for dryness according to the criteria described in the chart. Cool food before testing. | | | |

### Drying Frozen Vegetables

Frozen vegetables may be thawed, drained and dried. Blanching was done before freezing.

### Drying Herbs

Many herbs can be dried very successfully. Herbs such as parsley, basil, chives, mint, oregano, dill, rosemary, sage, tarragon and thyme work well to dry.

### Preparing Herbs for Drying

- Use scissors to cut leaves and stems when gathering herbs. The leaves of most herbs should still be green and tender and harvested just before the plant begins to flower.
- Wash and carefully roll in a clean, dry towel to remove excess water.
- Dry in a single layer on a dryer rack. The dehydrator is the most efficient and produces the highest quality dried herbs because it takes only one to three hours and has controlled temperature and good air circulation.
- Small bundles of stems can be hung in a warm, dry place. The more sturdy herbs such as rosemary, sage, thyme, and parsley are the easiest to dry without a dehydrator. Tie them into small bundles and hang them to air dry. You might also tie the bundle in a brown paper bag with a few holes in it. When the herbs are hung upside down the flavoring oils from the stems concentrate in the leaves. Then hang it up to air dry in the kitchen, attic, or anywhere there is a warm, even temperature and good air circulation.
- Herbs are dry when they crumble easily and are crispy. Stems should be brittle and break when bent. When dried, place the herbs in airtight containers and store in a cool, dry, dark area to protect the color and fragrance.

# Packaging Your Product

Good packaging and storage techniques are critical. Packaging protects your dried food from oxygen, moisture, light, microorganisms and pests. After you have checked foods and found them to be thoroughly dry and cool, pack them immediately for storage.

Packaging and storage containers should be:

- Clean and dry
- Food grade or meant for use with food
- Sturdy
- Protective against light
- Airtight and moisture resistant
- Easily disposable or recyclable

- Easily opened and closed
- Durable
- Low-cost

Unfortunately, no single food container has all of these characteristics. Make your choice based on the type of dried food, your intended storage conditions and storage time. Glass, plastic and metal (never galvanized steel) are used for packaging most dried foods. Plastic bags are suitable if they are easily opened and closed.

## Labeling Your Dried Food is Important

Be sure to label each package of your dried foods. Label with the type of food, the pretreatment step, (if you did one) and date. Labels can be taped on the outside of a package, tied on with string or inserted into a clear glass or plastic package.

## Storage of Dried Foods

The length of time you can store your dried foods depends on the following conditions:

- The type of food
- The storage location
- Factors related to the drying process such as pretreatment and final level of moisture in the dried food
- Packaging of the dried food.

An ideal place for storage of dried foods is in a cool, dark, and dry area. Dark areas are ideal because light fades fruit and vegetables and decreases their vitamin A and C contents.

Storing dried foods in the refrigerator or freezer takes up little space and there are no problems with mold or insects. This also keeps the food quality high.

If stored at room temperature, the most common type of spoilage is mold growth. Molds can grow on foods that are not completely dry and in foods that absorb water when they are packaged or stored in moist conditions. **Remember, don't eat moldy foods, because some toxic molds can grow at room temperature. Discard all of the contents of a package if mold is spotted.**

# Activities

## Let's Dry Fruits

### 1. Making Trail Mix

Let's prepare some dried fruits for our Trail Mix. Making trail mix is easy and fun and you get to choose what goes in it. Different fruits and ingredients create different tastes.

Some fruits are good for drying and some are not. Consider what tastes you want to add in your trail mix. The following fruits dry well:

| | | |
|---|---|---|
| Apples | Cherries | Figs |
| Grapes | Peaches | Plums |
| Blueberries | Cranberries | |
| Huckleberries | Pears | |

Fruits such as Blackberries, Cantaloupe, Oranges, Watermelon and Rhubarb do not dry as well.

For this activity, you can dry your fruits in a dehydrator or use a conventional oven.

Follow these steps for using a dehydrator:

1. Prepare fruit for drying according instructions and table on page 21 & 22.

2. Arrange your fruit in a single layer on a dehydrator tray.

3. It is important to dry the fruit quickly at first to eliminate the growth of bacteria. If you can control the temperature on your dehydrator, start at 140 °F. to 150 °F., then turn it down to 130°F. or 140°F. after 2-3 hours.

   Factors that affect drying include:
   - The type of food you are drying
   - How thick or thin you slice your fruit
   - How well air circulates in and out of the dehydrator
   - The temperature and humidity where you live

4. To check your fruit, remove one slice and let it cool at room temperature. Check the chart on *Drying Guidelines for Fruits* on pages 21 and 22, to see if it is done. Condition fruit before use.

5. Mix ¼ cup of your dried fruit in a bowl with ¼ cup of any of the following:

| | | |
|---|---|---|
| Rice crackers | Cereal squares | Granola |
| Cashews | Mini-pretzels | Cheese crackers |
| Almonds | Walnuts | Sunflower seeds |

Cereal O's Raisins

6. Store ½ cup servings of your trial mix in zip lock plastic bags.

7. Write down your own special mixture recipes.

8. Trade trail mixes with friends.

Journaling

What fruits did you dry for your trail mix?

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What challenges did you have with this activity?

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What other observations did you have for this activity?

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## 2. Making Fruit Leather

Make your fruit leather following the directions in this project. Try mixing different flavors of fruits. Canned fruits, such as applesauce, can be mixed with more expensive fresh fruits to help stretch the fruit concentrate and soften the flavor of sharp-tasting fruits, such as cranberries. The addition of applesauce to juicy fruits improves handling and texture and also eases drying. You might want to try adding spices or flavorings such as allspice, cloves, cinnamon, ginger, mint, nutmeg or pumpkin pie spice. Start with just a pinch of spice or ¼ tsp. per quart of puree.

You may want to add dried pieces of fruit in your leather to add some extra texture and variety to your fruit rolls. Bits of dried cherries, dried strawberries, raisins or dried mango work well.

Journaling

What kind of fruit leather did you make and what if any extra flavoring or spices did you add?

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What challenges did you have with this activity?

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What other observations do you have for this activity?

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## 3. Making a Berry Cobbler

You can use dried fruit in many recipes. Use chopped dried fruit or whole dried berries or cranberries instead of raisins or nuts in cakes, quick breads and cookies.

To soften the dried fruit and make it more chewable, before adding to a recipe you can plump it by covering it with boiling water, and letting it stand for 5 minutes, then drain. When making cobblers that require you to soak the berries for 3 to 4 hours, this is not a required procedure.

Use your imagination with the Dried Berry Cobbler; you can use blueberries, cranberries, gooseberries or other berries that you have dried. You might want to even try mixing two of your dried berries together.

**Filling:**
2 cups dried berries
2 cups boiling water
2 tbsp. tapioca
1 to 1 ½ cups sugar, depending on tartness of the berries
Pour boiling water over the berries and let them soak for 3-4 hours. Place soaked berries and liquid in a shallow baking dish. Combine sugar and tapioca; sprinkle over the berries. Cover the berries with batter (see below), and bake 30 minutes at 400°F.

**Batter:**
¼ cup butter or margarine
½ cup sugar
1 egg, well beaten
1 ½ cups flour
2 tsp. baking powder
½ tsp. salt
½ cup milk

Cream together butter and sugar. Add beaten egg. Thoroughly mix flour, baking powder and salt. Add the flour mixture to the butter mixture one-half cup at a time, alternately with the milk.

Journaling
What dried fruit or fruits did you use in your cobbler?

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What challenges did you have with this activity?

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What other observations do you have about this activity?

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## 4. Peanut Butter and Fruit Spread

This is a great after school snack that is easy to make with your dried fruit. You could serve it on toast, crackers, celery sticks or apple wedges.

1 cup smooth or crunchy peanut butter
2 tbsp. butter at room temperature
1/3 cup finely chopped dried fruit, try bananas, apricots, peaches or any fruit you have dried
1 tbsp. fresh or bottled lemon juice
2 tbsp. honey (optional)

Mix all of the ingredients in a small bowl and stir until well blended. Serve on your choice of toast, crackers, celery or apples.

Journaling
What dried fruits did you use for your spread?

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What challenges did you have with this activity?

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What other observations do you have for this activity?

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### 5. Make Your Own Granola

Granola is not only good to eat, its' good for you. Try blending your dried fruit with oats, coconut, nuts and seeds. You can choose from a variety of fruits, nuts and seeds. You can use a number of different ingredients to vary the flavor. Check your recipe books for a granola recipe. Record the recipe in your recipe file. Check out the granola recipe on the So Easy to Preserve website at: www.soeasytopreserve.com.

Journaling
What dried fruit did you use in your granola?

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What challenges did you have with this activity?

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What other observations did you have for this activity?

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# Let's Dry Vegetables

### 6. Vegetable Soup

Serves 6
4 cups water
¾ to 1 cup dried vegetables (green beans, corn, peas, tomatoes or a mixture of different vegetables)
2 packages bouillon granules or cubes
1 cup tomato puree, sauce or crushed tomatoes
1 tsp. salt
¼ tsp. pepper
Seasonings to taste (herbs such as thyme, and parsley, or any herbs that you have dried in this project, soy sauce, or curry)

**Variation:** Add 1 pound of browned ground beef, or 1 cup of cooked and cubed chicken or you can use canned beef or chicken. You may also want to add ½ cup rice, noodles, lentils or barley with the other ingredients.

Bring water to a boil. Add dried vegetables, bouillon, and seasonings. Add meat and/or rice if you prefer. Simmer about 20 minutes or until vegetables are tender, though chewy. (Freshly dried vegetables will not take as long to reconstitute as those that have been stored for a long time.) Enjoy your soup, and remember to refrigerate the leftovers.

Journaling
What dried vegetables did you use in your soup?

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What challenges did you have with this activity?

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What other observations do you have about this activity?

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### 7. Making a Vegetable Leather

You might want to try making vegetable leather. Cooked sweet potatoes work well just plain or mixed with a fruit such as strawberries. You may also want to mix orange, lime or pineapple juice with your cooked sweet potatoes. Use 1 cup cooked sweet potato, ¾ cup water and ¼ cup fresh lime juice. Puree all the ingredients in a blender until smooth. Dry as you would your fruit leather.

Journaling
What dried vegetable did you use for your leather?

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What challenges did you have with this activity?

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What other observations do you have with this activity?

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# Let's Dry Herbs

### 8. Drying Herbs in a Paper Bag

To bag dry, you will need a small paper bag and string. After gathering the herbs, and washing, tie a small bunch together at the ends of the stems. Suspend them upside down in a small paper bag which has been labeled. Tie a string firmly around the top of the bag. Cut several ½ inch holes in each side of the bags to allow the air to circulate. Hang them in the kitchen, attic or anywhere there is a warm even temperature and good air circulation.

When the leaves are dry, usually in 5 to 10 days they will crumble easily. Check by opening the bag and feeling the leaves. If they are dry enough, roll the bag gently between your hands so the leaves will fall from the stems to the bottom of the bag. Leaves that are not completely dried will mold during storage.

Journaling
What herb did you dry?

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What challenges did you have with this activity?

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What other observations do you have about this activity?

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# Other Drying Activities

### 9. Labeling

All foods should be labeled. Determine what type of dried food storage container you need to use for your dried food. Label the container. Here are some important items to include on your label:

- List the type of food you dried
- List the date you dried your product
- List the pretreatment if you did one
- List any other information you may want to know about the dried product

Journaling
What type of storage container did you choose to label?

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What challenges did you have with this activity?

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What other observations do you have with this activity?

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### 10. Conduct Taste Tests

Select a fruit or vegetable and dry using different methods. Some suggestions are:

- Dry canned peaches and fresh peaches – compare the flavor
- Dry bananas using no pretreatment and a pretreatment such as an anti-darkening agent on different trays
- Make fruit leather with cooked and uncooked fruit
- Make a soup with dried vegetables vs. fresh vegetables
- Use a combination of fruits for your fruit leather
- Make a fruit leather using baby food vs. canned fruit or home processed fruit
- Compare a commercially prepared item with a home preserved item

After drying your item or items, share them with a panel of at least four people. Here are some suggestions for your taste test:

- Do not tell the panel how you dried your fruit or vegetable
- Ask each panel member to write down comments about each of the samples they are comparing

- Ask each panel to indicate which sample they prefer, then rank the samples from best to worse
- Share the drying methods used with the panel
- Record the results of your taste test

Journaling
What types of dried foods did you compare in your taste test?

What challenges did you have with this activity?

What other observations do you have about this activity?

# Going Further with Drying Activities

**Create Your Own Activity**

Using one of the resource materials listed in the front of this manual, create your own activity. Resource materials are available at your local Extension Office.

Here are some suggestions to help you:

- Identify the resource you will be using, for example: *So Easy to Preserve or How to Dry Foods*
- Decide on the recipe or method you want to use
- Get equipment, food and packaging ready
- Follow the information and directions listed carefully
- Evaluate your end results
- Check labels of dried foods in grocery store
- Create a nutrition label for a product

Journaling
What activity did you decide to do?

What challenges did you have with this activity?

What other observations do you have about this activity?

**Menu Planning**

Using the menu planning information listed in the front of this manual; develop a menu plan for your friends or family. Use some foods that you have dried for the healthy recipes you include in your menu plan.

Journaling

What menu or menus did you plan?

What challenges did you have with this activity?

What other observations do you have about this activity?

**Label Reading Activity**

Check the labels of dried fruits in the grocery store. Compare the labels. Record the ingredients of the labels.

Journaling

List the ingredients in the dried foods.

What challenges did you have with this activity?

What other observations do you have about this activity?

Create a nutrition label for one of the dried products that you did in this project. Be sure to list the ingredients in the descending order by weight.

# Show What You Have Learned

The purpose of a presentation is for you to share some of the fun activities you completed or important information you learned about preserving foods by drying. You are required to give a demonstration or illustrated talk to complete this project. Some ideas you might consider are:

- Explain the different drying methods
- Display different drying storage containers and tell the pros and cons of each
- Show how to label your dried food properly
- Define what blanching is and tell why it is important

- Show how to conduct a taste test
- Share something from one of the recipes you made in this project
- Explain what conditioning is and why it is important
- Show how to prepare fruits or vegetables for drying
- Show how to make fruit leather
- Compare the costs of drying foods in a dehydrator vs. oven drying vs. sun drying
- Compare pretreatment methods

# Reflections on Drying

Do, Reflect and Apply are how 4-H youth, "Learn by Doing." You have experienced several activities in this project, shared the results and discussed them with your club members, leaders, and families and applied what you learned by showing others how to preserve food by drying. To show what you have learned answer at least two of the following questions.

- Explain why drying is an effective and economical way to preserve food.

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  _____

- Why do vegetables need to be blanched before drying?

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- Why is it important to condition your fruit?

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- Explain the different ways to pre-treat your fruit prior to drying and why it is important.

  _____

  _____

- Explain the different drying methods, which you used in your project and why you used it.

  _____

  _____

- Explain your menu plan you developed using foods that you preserved in the drying project.

  _____

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