Boiling Water Canning Project Manual

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Healthy Lifestyles
Home Food
Preservation Series

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4-H Home Food Preservation Series

The home food preservation series contains four manuals:

Freezing for ages 8–18

Drying for ages 8–18

Boiling water canning for ages 8–18

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 lists the objectives for the project, and each activity includes a short lesson followed by hands-on activities and questions for further learning. In addition, each manual includes an achievement program to help youth identify their goals and keep track of their accomplishments.

These manuals were 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.

Acknowledgments

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Special acknowledgments go to the following authors and universities for use of their material:

United States Department of Agriculture. 2009. *Complete Guide to Home Canning.* Agriculture Information Bulletin No. 539. Washington D.C.: National Institute of Food and Agriculture.

Washington State University
Powers-Hammond, Lizann, and Val Hillers. 2012. *Canning Fruits*. PNW 199. Pullman, WA: Washington State University Extension Service.

Resources

So Easy to Preserve, University of Georgia
http://www.soeasytopreserve.com

Ball Blue Book Guide to Preserving, 2011 or most current edition

Canning Fruits, PNW 199
http://cru.cahe.wsu.edu/CEPublications/pnw199/pnw199.pdf

Canning Tomatoes and Tomato Products, PNW 300
http://extension.oregonstate.edu/catalog/

Complete Guide To Home Canning, USDA Bulletin 539
http://nchfp.uga.edu/publications/publications_usda.htmlunivers

Pickling Vegetables, PNW 355
http://extension.oregonstate.edu/catalog/pdf/pnw/pnw355.pd

Ball website
http://www.freshpreserving.com

National Center for Home Food Preservation website
http://www.uga.edu/nchfp

Abbreviations

tsp = teaspoon

tbsp = tablespoon

lb = pound

ft = feet

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Contents

Notes to project helper

This manual 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 practices 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 activities 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 the quality of their completed activities. Questions at the end of each activity will help youth think through the steps in the project and how to apply their new skills in their everyday lives.
- Be an example with kitchen and food safety rules.

Using experiential learning

Experiential learning is the process of "do, reflect, apply." It is an inquiry-based approach to learning. Rather than being provided with information, learners 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 and observations. 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. Learners identify general trends and real-life examples of when they could use what they have learned.

Developing life skills

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

Use this page to help you plan how to finish this manual.

- Select your helper and write down his or her contact information.
- Set goals for each year.
- Complete the number of activities required by your state each year.
- Complete a presentation or demonstration each year.

Project helper: _____

Contact information: _____

My achievement program

Do at least four activities each year. You can also make up your own activities.
Ask your project helper to initial each activity after you've completed it.

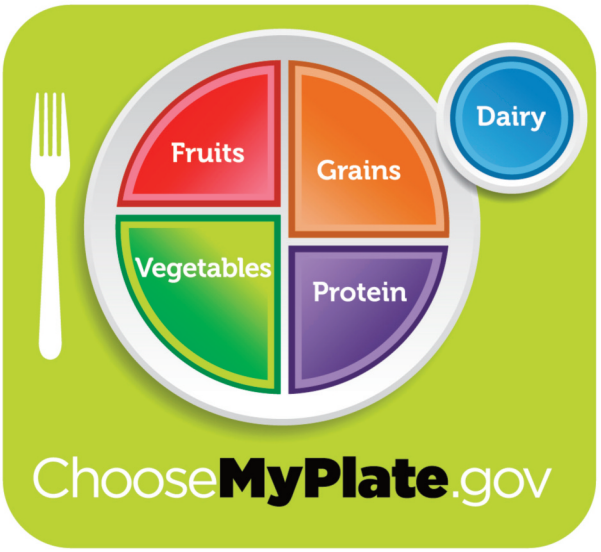
My activities		
Activities	**Date completed**	**Helper's initials**

Exploring MyPlate

10 tips for healthy eating

Learning about the nutrients that your foods contain allows you to make the best choices for healthy eating. 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:

1. Balance your calories. To balance your calories you need to know how much food you eat and how much exercise you do each day. Find out how many calories you need in 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. 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. Add fruit to meals as part of the main meal or as side dishes or 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. Eat a whole-grain product instead of a refined product. For example, eat whole-wheat bread instead of white bread and brown rice instead of white rice.



8. 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 as 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.

Food groups

A healthy meal starts with more vegetables and fruits and smaller portions of proteins and grains. 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 you drink with your meal or add fat-free or low-fat dairy products to your plate.

Grains. Grains like wheat, rye, oats, and rice are used to make bread, cereal, and pasta. Foods from the grains group have carbohydrates. Carbohydrates are fuel

your body needs. Whole grains are higher in fiber than refined grains. 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.

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

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

Oils. We do need some oils 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 provides calcium to keep your bones and teeth strong. Milk and foods made from milk are the best sources of calcium.

Protein foods. Meats and beans provide iron and protein for your body. 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. Meats can be frozen, home canned, or dried as jerky.

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.

MyPlate worksheet

For 1 day keep track of all the foods you eat and how much of them you eat on the MyPlate Worksheet for Kids (next page). First, write all your food choices in the left-hand column. Then, list each food choice in its food group. For example, if you had a banana for breakfast, list it in the fruits group. If you drank milk, list it in the dairy products group, and so on. Now, add up your total for each food group. Compare your totals to the goals for your age and gender. (See Dietary Guidelines for Youth, page 11.)

Remember to record how many minutes of physical activity you completed. Physical activity helps you to maintain a healthy weight and prevent excess weight gain. Try to get 60 minutes each day.

You can use this worksheet as a selected activity for more than 1 year. It is a good idea to track the foods you eat on a regular basis to check and see how you are doing.

Answer the following questions:

Q. What food groups were lacking?

_____

_____

Q. Do you need to eat less of any food group?

_____

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

_____

_____

_____

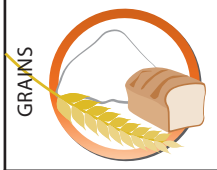
Q. List two goals for yourself to improve your eating.

_____

_____

MyPlate worksheet for kids.

Check how you did yesterday and set a goal for tomorrow. Some foods don't fit in any group. These "extras" may be mainly fat or sugar. Limit your intake of these foods. Star all the home-preserved foods.

Write in your choices from yesterday	Food and activity	Goal (based on 1,800-calorie pattern)	List each food choice in its food group. Star the home-preserved foods	Estimate your total
Breakfast:		**6 ounce equivalents** 1 ounce equivalent is about 1 slice bread; 1 cup dry cereal; or ½ cup cooked rice, pasta, or cereal		**____ounce equivalents**
Lunch:		**2½ cups** Choose from dark-green, orange, starchy, or other veggies, including dry beans and peas		**____cups**
Snack:		**1½ cups** Choose from fresh, frozen, canned, or dried. 1½ cups fresh is equal to ¾ cup dried		**____cups**
Dinner:		**3 cups** 1 cup yogurt or 1½ ounces cheese = 1 cup milk		**____cups**
Physical activity:		**5 ounce equivalents** 1 ounce equivalent is 1 ounce meat, chicken, turkey, or fish; 1 egg; 1 tbsp peanut butter; ½ ounce nuts; or ¼ cup dry beans		**____ounce equivalents**
		At least **60 minutes** of moderate to vigorous activity a day or most days		**___ minutes**

How did you do yesterday? ❍ Great ❍ So-so ❍ Not so great

My food goal for tomorrow is: _____

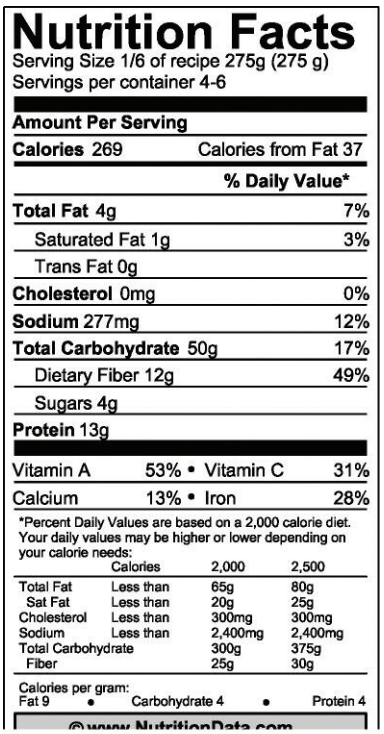
My activity goal for tomorrow is: _____

Reading food labels

When you completed your Choose MyPlate Worksheet, did you find that you were not eating enough of the right foods?

It is not always easy to know the amount of food in 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 grains group? The answers are easy if you know where to look.

Most foods in the grocery store must 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, the number of servings in the package or container, and other nutritional information. The list of ingredients is on the label elsewhere.



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

Serving size. The place to start when you look at the Nutrition Facts Label is with the serving size. Just below that is the number of servings in the package or container. The Nutrition Facts Label at left shows that a serving size is ⅙ of the recipe. A recipe in this case would include the entire can plus additional water added as directed. This can of chili contains 4–6 servings.

Calories. 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.

% daily value. The % daily value (% DV) is the amount of a nutrient in one serving compared with dietary recommendations.

Q. What is the % DV for total fat in the can of chili?

_____

_____

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% and 35% of calories.

Q. Is the % DV for saturated fat in the can of chili high or low?

_____

_____

Sodium. The Dietary Guidelines for Americans suggest that we need to lower our sodium intake to less than 2,300 milligrams per day to reduce the risk of high blood pressure. One teaspoon of salt equals about 2,300 milligrams of sodium. Most of the sodium we eat comes from processed foods, not from the saltshaker. When you preserve foods at home, you can control the amount of sodium you add to your product.

Ask yourself the following questions:

- How much sodium would you consume if you ate the whole can of chili? Figure that there are four servings in the can._____
- How much sodium is in one serving? _____
- Is the % DV for sodium in one serving high or low? _____

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

Fiber, vitamins, and minerals. Be sure to get enough 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 chili label high or low? _____

Going Further

You might want to collect your own label and 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 brands of the same food and compare the labels. Compare cartons of fruit juice and fruit drink, or several boxes of dry cereal or energy bars.

How much should you eat?

ChooseMyPlate.gov or nutrition.gov gives you amounts of different foods 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 Dietary Guidelines for Youth table gives estimates (page 11).

The following tips and measurements will help you use the table.

Grains. Grains are measured in ounce equivalents. Eat 4–7 ounce equivalents 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

Vegetables. Vegetable servings are measured in cups. Vegetables can be canned, dried, frozen, or fresh.

Fruits. Fruit is part of a healthy diet. Fruit can be canned, dried, frozen, or fresh. 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. Dairy products include milk, yogurt, and cheese.

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

Dietary guidelines for youth: Amount to eat each day

Age group	Food group				
	Grains (ounce equivalents)	Vegetables (cups)	Fruits (cups)	Dairy products (cups)	Protein foods (ounce equivalents)
4–8	4–5	1½	1–1½	1–2	3–4
9–13 (girls)	5	2	1½	3	5
9–13 (boys)	6	2½	1½	3	5
14–18 (girls)	6	2½	1½	3	5
14–18 (boys)	7	3	2	3	6

Let's plan a menu

Planning a menu can be fun when you base it on MyPlate. Using the MyPlate 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 to look at; different textures such as crunchy, soft, chewy, and liquid; different flavors such as spicy and mild; and both hot and cold foods.

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. You might choose dried or canned fruits, frozen vegetables, salsa, or other canned products. You might want to include a snack of trail mix that you made in the drying manual.

If you want another challenge, plan all the meals for 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 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.

Meal 1:

_____
_____
_____
_____

Meal 2:

_____
_____
_____
_____
_____

Meal 3:

_____
_____
_____
_____
_____

Snack:

_____
_____

Snack:

_____
_____

Kitchen and food safety basics

Kitchen safety

Kitchens are safe! It's the people who work in kitchens who create problems. You can prevent problems by using equipment and utensils properly and by handling sharp items and hot foods and liquids carefully. When working in the kitchen, be aware of safety hazards and take precautions to prevent injuries or accidents by creating and maintaining a safe working environment.

Many 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 on a wet floor.
- Never leave food unattended on the stove. Many fires develop while the cook is 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 his or her hand in the sink and get cut.
- 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 for 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 safety

- Always use a current, tested recipe. Do not make up recipes as they have not been tested to make sure the product is safe to store and eat.
- Make sure to adjust for altitude when canning. Processing times or pressure must be adjusted on most recipes because they are written for people who live at sea level. Since water boils at lower temperatures as altitude increases, it is necessary to increase processing times or pressure to ensure the food is safe.
- Add acid (lemon juice or citric acid) to canned tomato products as a margin of safety.

  Lemon juice—1 tablespoon per pint, 2 tablespoons per quart

  Citric acid—¼ teaspoon per pint, ½ teaspoon per quart
- 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, unbruised, high-quality produce for food preservation.

Types of food preservation

There are seven major methods of food preservation:

Refrigeration

- Slows the growth of microorganisms.
- Slows the action of enzymes.

Freezing

- Prevents the growth of microorganisms.
- Slows, but does not stop, enzyme action.

Canning

- Destroys the microorganisms that may be present in the food by exposing them to heat.
- Destroys yeasts and molds when food reaches 190°F.
- Pressure canning exposes foods to higher temperatures than boiling water canning, killing dangerous bacteria.
- Proper canning practices remove air from the jars, leaving a vacuum.
- Molds and some yeasts are unable to grow in a vacuum.

Sweetening and acidifying jellies and jams

- Added sugar and acid tie up free water and lower the pH of the food.

Pickling and fermenting

- Fermenting uses bacteria to produce lactic acid, which lowers the pH of the food.
- Added acid (fresh pack) reduces pH with vinegar.

Drying

- Prevents growth of microorganisms.
- Dried foods must be packaged in oxygen-proof and moisture-proof containers.

Salting

- Chemically bonds water, inhibiting growth of microorganisms.

Boiling water canning basics

Project objectives

- Learn how to safely preserve fruits, tomatoes, fruit spreads, and pickles.
- Learn how to use home-canned foods you prepared in healthy recipes.
- Show others how to preserve foods by boiling water canning.

Why can foods?

Food preservation can be a safe and economical way to preserve quality food at home. We preserve foods to prevent food spoilage and to have an abundant supply of a variety of foods when fresh produce isn't available. You can control the quality of the food you preserve. Canning is one way to preserve the foods from your garden or those that are grown locally. In this manual, we will review safe canning procedures using a boiling water canner.

The following methods are NOT recommended for any type of food:

- Open-kettle canning
- Oven canning
- Microwave oven canning
- Dishwasher canning
- Steam canning

Canning low-acid vs. high-acid foods

Foods are processed either in a pressure canner or boiling water canner to control molds, yeasts, and bacteria. Whether food should be processed in a pressure canner or boiling water canner depends on the acidity (pH) of the food. The term "pH" is a measure of acidity; the lower the pH, the more acid is the food.

High-acid foods have a pH of 4.6 or lower. They contain enough acid to block bacteria growth or to destroy bacteria rapidly when heated. All high-acid foods must be canned at a temperature of 190°F to destroy bacteria. These temperatures are attainable in any container that is large enough to have 1–2 inches of boiling water above the jars. The exact time needed in the boiling water canner depends on the type of food being canned, the way it is packed into the jars, the size of the jars, and your altitude. Use only USDA-approved recipes for canning.

High-acid foods include:

- Fruits
- Pickles
- Sauerkraut
- Jams
- Jellies
- Marmalades
- Fruit butters
- Salsas
- Tomatoes (after acid is added)

In low-acid canned foods, there is not enough acid to prevent the growth of dangerous bacteria such as botulism. Low-acid foods have a pH higher than 4.6. These foods must be processed in a pressure canner. They include:

- Meats (bear, beef, lamb, pork, veal, and venison)
- Seafood
- Poultry
- Milk
- All fresh vegetables

Making altitude adjustments

Using processing times recommended for canning food at sea level can result in food spoilage if you live at altitudes of 1,000 feet or higher. Water boils at lower temperatures as you go higher in altitude. Lower boiling temperatures are less effective in killing bacteria; therefore, you must increase the processing time to compensate for the lower temperature.

To adjust for altitudes above 1,000 feet, you need to increase the processing time. Foods may spoil if you fail to add time for elevations above 1,000 feet, process for fewer minutes than specified, or cool jars in cold water.

The table below indicates the amount of processing time to add when processing jars at different altitudes. Processing times for ½-pint and pint jars are the same, and processing times for 1½-pint and quart jars are the same.

Boiling water canner altitude adjustments

Altitude (ft)	Increase in processing time (minutes)
1,001–3,000	5
3,001–6,000	10
6,001–8,000	15
8,001–10,000	20

Hot packing vs. raw (cold) packing

Hot packing is the practice of heating prepared food to boiling, simmering for 2–5 minutes, and promptly filling jars loosely with the hot food. It is the best way to remove air from food. Also, the color and flavor of hot-packed foods will last longer than that of raw-packed foods.

Raw (cold) packing is the practice of filling jars tightly with freshly prepared, but unheated, food. Some foods processed this way may float. The air that was not released before processing can cause food to discolor within 2–3 months. Raw packing is more suitable for vegetables processed in a pressure canner or soft fruits that may be bruised by handling.

With both practices, the food is covered with boiling juice, syrup, or water. This practice will help to remove air, thereby shrinking the food, keeping food from floating, increasing the vacuum seal, and improving shelf life.

Getting ready to boiling water can

Selecting produce

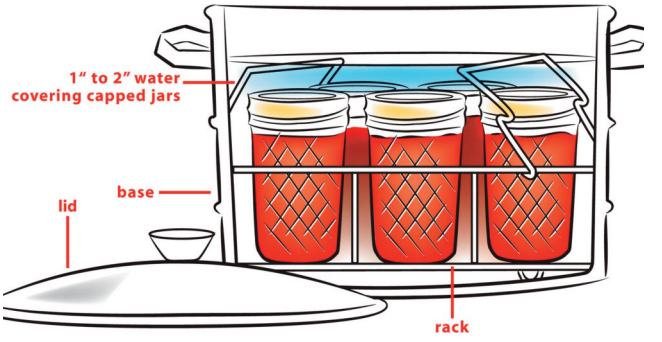
Produce needs to be canned at its peak quality—within hours of harvest. Examine produce carefully for freshness. Discard small pieces that are damaged or moldy. Trim small diseased spots from large produce. Apricots, nectarines, peaches, pears, and plums will have more flavor if they have been ripened for 1 or more days between harvest and canning. If you delay canning, store produce in a shady, cool place.

Washing and peeling

Rinse produce in cold water; don't soak it. For dirty garden produce, first rinse it with an outside hose, and then rinse it one to three times in the kitchen sink.

Selecting jars

Use regular or wide-mouth Mason-type, threaded, home canning jars with self-sealing lids. Do not use other commercial jars with mouths that cannot be sealed with two-piece canning lids. Use only ½-pint, pint, 1½-pint, or quart jars. Half-gallon size jars may be used only for canning very acid juices. With careful use and handling, Mason jars can be reused



Boiling water canning equipment

Equipment	Use
Dry measuring cups	Used to measure dry and solid ingredients. They usually come in a nesting set of 1 cup, ½ cup, ⅓ cup, and ¼ cup.
Liquid measuring cups	Clear measuring cups used to measure liquids. You can see through the cup to measure, and there is headspace.
Measuring spoons	Used to measure dry and liquid ingredients. They usually come in a nesting set of 1 tbsp, ½ tbsp, 1 tsp ½ tsp, and ¼ tsp. When you measure liquid ingredients, measure carefully to avoid spills.
Sharp knives and cutting boards	Used to cut food to desired size. Wash knives and cutting boards after each use in warm, soapy water.
Potholders	Used to protect hands when working with hot pans.
Rubber spatula	Used to scrape the sides of bowls or pans. You can use the flat side to level dry or solid ingredients when measuring.
Large pans	Heavy-duty pans are best for cooking. Don't use aluminum pans.
Long-handled spoons	Choose spoons that are tall enough that they will not fall down into the ingredients.
Mixing bowls	Made of pottery, glass, metal, or plastic, they come in different sizes.
Funnel	Used to pour liquids into jars.
Colander	Used to drain foods after washing.
Timer	For timing food preparation and processing.
Food chopper, blender, or processor	Equipment that will 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.
Labels, permanent markers	Used to identify the type of food, pretreatment step, and date.
Double boiler	Used to extract juice.
Boiling water canner	Made of stainless steel, enamel on steel, or aluminum. They need to have a wire rack and tight-fitting lid and be deep enough to have 1–2 inches of boiling water above jars. Flat bottoms are best on electric ranges. To ensure uniform processing of all jars, the canner should be no more than 4 inches wider in diameter than the element on which it is heated.
Jars and lids	Mason-type, threaded, home canning jars with 2-part lids. Recommended sizes: ½ pint, 1½ pint, quart, and ½ gallon (only for juice).
Jar lifter	Used to safely lift hot jars from canners. These large, sure-grip tongs work with regular and wide-mouth canning jars.
Bubble remover and headspace measurer	Has graduations on one end to accurately measure headspace and a tapered tip on the other end to remove bubbles from the jar. Only use plastic versions.
Lid wand	Plastic utensil with a magnetic tip for removing lids from simmering water.
Peeler	Used to remove the skin from vegetables.
Cheesecloth/Jelly bag	Very thin cloth or bag used to hold spices for some canned products.
Scale	Used to weigh vegetables and meat.
Crock	5-gallon stone crock or food-grade plastic container. Used for fermenting foods.
Scale	Used to weigh fruit and vegetables.

many times. Each year, check for cracks and chips throughout the jar as well as on the sealing surface (rim of the jar).

Preparing jars

Check all jars to make sure that they are free of cracks or chips, especially on the rim of the jar. If the sealing surface is damaged, you may not get a good seal and the jar could break. Before every use, wash jars in hot water with detergent and rinse well. Jars may also be washed in a dishwasher.

Jars that will be processed for less than 10 minutes must be sterilized. (At altitudes above 1,000 feet, processing times are longer, so jar sterilization is not necessary.)

To sterilize jars, place them right-side up on the rack in a boiling water canner. Fill the canner and jars with hot (not boiling) water to 1 inch above the tops of the jars. Boil 10 minutes. Remove and drain hot sterilized jars one at a time, fill with food, add lids, tighten screw bands, and process.

Preparing lids

Lids should be preheated in simmering water for 2–3 minutes before placing them on jars. DO NOT boil lids unless the package directions specifically say to do so. Boiling lids could destroy the sealing agent.

Headspace

The unfilled space in a jar above the food and below the lid is called headspace. All approved recipes will tell you how much headspace is required for that product. This space is needed for the food to expand during processing and for the vacuum seal to form.

Too little headspace may cause food to expand and bubble from the jar during processing. Too much headspace may cause the food at the top to discolor during storage.

Filling jars

Using a funnel, fill jars with food and add liquid to cover the food. Release air bubbles using a bubble remover. Move the bubble remover up and down around the edges and in the center of the jar to allow air bubbles to escape. Adjust the headspace by adding or removing liquid. Then clean the jar rim (sealing surface) with a dampened paper towel. Place the preheated lid onto the cleaned jar rim. Then fit the metal screw band over the flat lid.

Tightening screw bands

Use your thumb and two fingertips to turn the screw band very gently until you feel the slightest resistance. Then reposition your hand and tighten another 1½ inches.

- If rings are too loose, liquid may escape from jars during processing, and seals may fail.
- If rings are too tight, air cannot vent during processing, and food will discolor during storage. Over-tightening may also cause lids to buckle and jars to break, especially with raw-packed, pressure-processed food.

Testing for a seal

There are three ways to test for a good seal in processed jars:

1. Press the middle of the lid with your finger. If the lid springs up when you release your finger, the lid is not sealed.
2. Tap the lid with the bottom of a teaspoon. If you hear a dull sound, the lid is not sealed. If the food is in contact with the underside of the lid, it will also cause a dull sound. If the jar is sealed correctly, it will make a ringing, high-pitched sound.
3. Hold the jar at eye level and look across the lid. The lid should be concave (curved down slightly in the center). If the center of the lid is flat or bulging, it may not be sealed.

Storing canned food

Do you leave screw bands on jars after food is processed? Screw bands are not necessary for storage. When stored properly, screw bands can be used for years. If they are left on jars, they can become difficult to remove, often rust, and may not work properly a second time. After jars have cooled, remove screw bands, wash them with warm, soapy water, and then dry and store them for future use.

Wipe the jars with a damp cloth to remove any food residue. Label the jars and store them in a cool, dark, dry location.

Labeling

Labeling is very important for canned foods. Below is a list of information that should be on the label of each jar that you can.

- Name of product
- Date canned
- Ingredients
- Processing information (raw or hot pack, processing time, altitude adjustment)
- Source of recipe (for example, Ball Blue Book Guide to Preserving, USDA's Complete Guide to Home Canning, So Easy To Preserve, 4-H project manual)
- Other information you may want to know about the canned product

Using your boiling water canner

Boiling water canners must be deep enough so that at least 1–2 inches of briskly boiling water will cover the tops of the jars. If using an electric range, a flat-bottom canner must be used to ensure adequate heat transfer. To ensure uniform processing of all jars, the canner should be no more than 4 inches wider in diameter than the element on which it is heated.

Step 1: Fill the canner half full with water and bring the water to a simmer (180°F for hot pack, 140°F for raw pack). Position the canner rack over the simmering water by its handles. If the rack you are using is not designed to hang over the water while you fill it with jars, place the rack on the bottom of the canner.

Step 2: Prepare the recipe according to USDA directions.

Step 3: Fill hot jars, leaving appropriate headspace, and adjust lids and rings.

Step 4: Place jars on the canner rack immediately after each jar is filled. Lower the rack into the canner.

Step 5: Make sure the water completely covers the jars and lids by 1–2 inches. Add boiling water if needed.

Step 6: Put the canner lid in place and adjust the heat to high, bringing the water to a rolling boil.

Step 7: When the water is boiling, set a timer for the processing time. Maintain a rolling boil for the entire processing time. If the water stops a rolling boil, bring it back up to a full rolling boil and begin counting the processing time again. You may need to adjust heat to maintain a rolling boil without allowing the water to boil over.

Step 8: After processing is complete, turn off the heat and remove the lid. Allow the jars to sit for 5 minutes in the canner before removing.

Step 9: Remove jars from the canner and place them upright on a dry towel. Make sure there is plenty of space around the jars for air to circulate.

Step 10: Allow jars to cool naturally, undisturbed, for 12–24 hours before checking for a seal.

Activities

1. Let's Can Fruit: Making Syrup

Adding syrup to a canned fruit helps retain its flavor, color, and shape. Using the chart below, prepare each type of syrup and taste test each sample.

Many fruits that are typically packed in heavy syrup are excellent and tasteful products when packed in lighter syrups. Try using lighter syrups, since they contain fewer calories from added sugar.

Journaling

Which syrup did your prefer and why?

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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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Preparing and using syrups

Syrup type	Approximate % sugar	for 9-pint or 4-quart load		for 7-quart load		Comments
		Water (cups)	Sugar (cups)	Water (cups)	Sugar (cups)	
Very light	10	6½	¾	10½	1¼	Approximates the natural sugar level in most fruits and adds the fewest calories.
Light	20	5¾	1½	9	2¼	Use with very sweet fruit. Try a small amount the first time to see if your family likes it.
Medium	30	5¼	2¼	8¼	3¾	Use with sweet apples, sweet cherries, berries, and grapes.
Heavy	40	5	3¼	7¾	5¼	Good for tart apples, apricots, sour cherries, gooseberries, nectarines, peaches, pears, and plums.
Very heavy	50	4¼	4¼	6½	6¾	Best with sour fruit. Try a small amount the first time to see if your family likes it.

2. Let's Can Fruit: Raw Pack vs. Hot Pack

Select a fruit from the chart on the following page. Prepare the fruit by washing, draining, coring, and peeling if necessary. Cut into uniform pieces. Process this fruit both as a raw pack and a hot pack according to chart instructions, remembering to adjust for altitude.

Canning method: Fruits are acid enough to be safely processed in a boiling water canner.

Headspace: Leave ½ inch headspace for both the fruit and liquid, unless stated otherwise in the chart.

Several types of anti-darkening and ascorbic acid treatments are available:

- Pure powdered form. Seasonally available among canners' supplies in supermarkets or health food stores. One level teaspoon of pure powder weighs about 3 grams. Use 1 teaspoon per gallon of water as a treatment solution.
- Vitamin C tablets. Economical and available year-round in many stores. Buy 500-milligram tablets; crush and dissolve six tablets per gallon of water as a treatment solution.
- Commercially prepared mixes of ascorbic and citric acid. Seasonally available among canners' supplies in supermarkets. Sometimes citric acid powder is also sold in supermarkets, but it is less effective in controlling discoloration. Follow manufacturer's directions for amounts to use.

Journaling

What fruit did you choose to can?

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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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Hot packing and raw packing fruit

Fruit	Preparation	Jar size	Minimum processing time (minutes)			
			0–1,000 ft	1,001–3,000 ft	3,001-6,000 ft	Over 6,000 ft
Apricots, nectarines, peaches, pears	Wash. Peel if desired. (Peaches peel best when first dipped in boiling water, then in cold water.) Halve fruits, remove pits or cores. Slice if desired. To prevent darkening, place fruit into ascorbic acid solution. Drain. **Hot pack.** Heat fruit through in hot syrup. Pack fruit and cover with boiling syrup.	Pints Quarts	20 25	25 30	30 35	35 40
	Raw pack. Pack fruit and cover with boiling syrup.	Pints Quarts	25 30	30 35	35 40	40 45
Berries	Choose firm berries with no mold. Wash and drain. **Hot pack.** Bring berries and sugar (½ cup per quart) to a boil in a covered saucepan. Shake the pan to prevent sticking. Pack hot berries and extracted juice.	Pints and Quarts	15	20	20	25
	Raw pack. Pack berries. Shake the jar gently to obtain a full pack. Cover with boiling syrup Note: The quality of canned strawberries is poor.	Pints Quarts	15 20	20 25	20 30	25 35
Cherries (sweet or pie)	Wash cherries. Remove pits, if desired. **Hot pack**. Add ½ cup water, juice, or syrup per quart of cherries. Bring to a boil in a covered saucepan. Pack hot cherries and cover with cooking liquid.	Pints Quarts	15 20	20 25	20 30	25 35
	Raw pack. Pack cherries. Shake jar to obtain a full pack. Add ½ cup hot liquid to each jar. Add more liquid if necessary.	Pints and Quarts	25	30	35	40
Plums	Remove stems and wash. To can whole, prick skins on two sides of plums with a fork to prevent splitting. Freestone varieties may be halved and pitted. **Hot pack.** Add plums to hot syrup and boil 2 minutes. Cover saucepan and let stand 20–30 minutes. Fill jars with hot plums and cover with cooking syrup.	Pints Quarts	20 25	25 30	30 35	35 40
	Raw pack. Fill jars with raw plums, packing firmly. Cover with hot syrup.	Pints Quarts	20 25	25 30	30 35	35 40

Source: Powers-Hammond, Lizann, and Val Hillers. 2012. *Canning Fruits*. PNW 199. Pullman, WA: Washington State University Extension.

3. Let's Can Tomatoes

Select a tomato product from the canning tomato products chart on page 23 and follow the instructions for canning that product.

Yields vary. The amount generally needed per quart is as follows:

- Whole or halved tomatoes — 2¾ pounds per quart
- Tomato juice — 3¼ pounds per quart
- Tomato sauce — 5–6½ pounds per quart

Select firm, underripe to ripe tomatoes. Use of decayed or overripe tomatoes may result in spoilage of canned products. Do not can tomatoes from dead or frost-killed vines. Wash the tomatoes in cool running water.

To can crushed, whole, or halved tomatoes, remove the skins by dipping the tomatoes in boiling water for 30–60 seconds, or until the skins split. Then dip them in cold water, slip off the skins, and remove the cores.

Adding acid: To ensure safety in tomato products, add acid to jars of whole, crushed, or juiced tomatoes before processing.

- Bottled lemon juice: 1 tablespoon per pint; 2 tablespoons per quart
- Citric acid USP: ¼ teaspoon per pint; ½ teaspoon per quart
- Vinegar (5%): 2 tablespoons per pint; 4 tablespoons per quart (flavor changes may be undesirable)

Sugar may be added to mask the sour flavor of the acids: 1 teaspoon per pint; 2 teaspoons per quart

Adding salt: Salt is added to tomatoes for flavor, not to preserve them. Therefore, it may be omitted. If you use salt, add ½ teaspoon to each pint jar, 1 teaspoon to each quart jar.

Journaling

What tomato product did you choose to can?

What challenges did you have with this activity?

What other observations do you have about this activity?

Canning tomato products

Tomato product	Preparation	Jar size	Minimum processing time (minutes)			
			0–1,000 ft	1,001–3,000 ft	3,001-6,000 ft	Over 6,000 ft
Whole or halved, packed in water	Prepare tomatoes as directed. Leave whole or halve. **Raw pack.** Fill hot jars with raw, peeled tomatoes. Cover with hot water, leaving ½ inch headspace.	Pints Quarts	40 45	45 50	50 55	55 60
	Hot pack. Add enough water to cover tomatoes in a large pan and boil gently for 5 minutes. Fill hot jars with hot tomatoes and cover with hot cooking liquid, leaving ½ inch headspace. Add acid to jars of both hot-and raw-pack products. If desired, add salt. Adjust lids and process in a boiling water canner.	Pints Quarts	40 45	45 50	50 55	55 60
Whole or halved, packed in tomato juice	Prepare tomatoes as directed. To prepare tomato juice, wash tomatoes, remove stems, and trim off bruised or discolored portions. To prevent juice from separating into water and pulp layers, quickly cut about 1 lb of tomatoes into quarters and heat immediately to boiling in a sauce pan while crushing the tomatoes. Continue to slowly add and crush freshly cut tomato quarters to the boiling mixture. (Make sure the mixture boils constantly and vigorously while you add the remaining tomatoes.) Simmer 5 minutes after adding all pieces. **Raw pack.** Heat tomato juice in a saucepan. Fill hot jars with raw tomatoes and cover with hot tomato juice, leaving ½ inch headspace.	Pints Quarts	85 85	90 90	95 95	100 100
	Hot pack. Completely cover tomatoes with tomato juice in large pan. Boil gently for 5 minutes. Fill jars with hot tomatoes and cover with hot tomato juice, leaving ½ inch headspace. Add acid as directed to jars of both hot- and raw-pack products. If desired, add salt. Adjust lids and process in a boiling water canner.	Pints Quarts	85 85	90 90	95 95	100 100
Whole or halved, packed raw without added liquid	Prepare tomatoes as directed. Leave whole or halve. **Raw pack.** Loosely fill jars with raw tomatoes, pressing until spaces fill with juice. Leave ½ inch headspace. Add acid and, if desired, salt. Adjust lids and process in a boiling water canner.	Pints Quarts	85 85	90 90	95 95	100 100
Tomato sauce	**Hot pack.** Wash tomatoes, remove stems, and trim off bruised or discolored portions. Heat and press as for making tomato juice. Simmer in a large-diameter pan until sauce reaches the desired consistency. (Volume should be reduced by about one-third for thin sauce, or by about one-half for thick sauce.) Fill jars, leaving ½ inch headspace. Add acid and, if desired, salt. Adjust lids and process in a boiling water canner.	Pints Quarts	35 40	40 45	45 50	50 55

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

4. Let's Can Tomato Salsa

Recipe source: USDA. 2009. *Complete Guide to Home Canning.* Agriculture Information Bulletin 539.

RECIPE: TOMATO SALSA

INGREDIENTS:

- 4 CUPS PEELED, CORED, CHOPPED SLICING TOMATOES
- 2 CUPS SEEDED, CHOPPED LONG GREEN CHILES
- ½ CUP SEEDED, CHOPPED JALAPEÑO PEPPERS
- ¾ CUP CHOPPED ONION
- 4 CLOVES GARLIC, FINELY CHOPPED
- 2 CUPS VINEGAR (5%)
- 1 TSP GROUND CUMIN (OPTIONAL)
- 1 TBSP OREGANO LEAVES (OPTIONAL)
- 1 TBSP FRESH CILANTRO (OPTIONAL)
- 1½ TSP SALT

YIELD: ABOUT 4 PINTS

Procedure: Peel and prepare chile peppers as described below. *Caution: Wear plastic or rubber gloves and do not touch your face while handling or cutting hot peppers. If you do not wear gloves, wash your hands thoroughly with soap and water before touching your face or eyes.*

Wash tomatoes and dip in boiling water for 30–60 seconds or until skins split. Dip in cold water, slip off skins, and remove cores. Combine all ingredients in a large pot and bring to a boil, stirring frequently. Reduce heat and simmer 20 minutes, stirring occasionally. Fill hot salsa into hot pint jars, leaving ½ inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process according to the processing times for tomato salsa chart below.

Choosing and peeling peppers: Peppers range from mild to scorching in taste. It is the "heat" factor that makes many salsa fans want to experiment with recipes. Use only high-quality peppers, unblemished, and free of decay. You may substitute one type of pepper for another, including bell peppers (mild) for some of the chilies. However, do not increase the total amount of peppers in any recipe.

To peel peppers, wash and dry them. Then slit each pepper along the side to allow steam to escape. Blister skins using one of these two methods:

- **Oven or broiler method.** Place peppers in a hot oven (400°F) or under a broiler for 6–8 minutes until the skins blister.
- **Range-top method.** Cover a hot burner (either gas or electric) with heavy wire mesh. Place peppers on the burner for several minutes until skins blister.

After blistering skins, place peppers in a pan and cover with a damp cloth. (This will make peeling the peppers easier.) Cool several minutes and then peel off the skins. Discard the skins and seeds and chop the peppers.

Journaling

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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Processing times for tomato salsa in a boiling water canner

		Processing time by altitude (minutes)		
Type of pack	**Jar size**	**0-1,000 ft**	**1,001-6,000 ft**	**Above 6,000 ft**
Hot	Pints	15	20	25

5. Let's Can Jams and Jellies with Added Pectin

Purchase pectin from the store. Using the recipes that come with the container, prepare a jam and/or jelly. Remember to adjust for altitude when processing.

Journaling

What fruit did you choose for your jam or jelly?

What challenges did you have with this activity?

What other observations do you have about this activity?

6. Let's Can Jams without Added Pectin

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

Procedure: Wash all fruits thoroughly before cooking. Do not soak. For best flavor, use just-ripe fruit. Remove stems, skins, and pits from fruit; cut fruit into pieces and crush. For berries, remove the stems and blossoms and crush the fruit. Seedy berries may be put through a sieve or food mill. Measure crushed fruit into a large saucepan, using the quantities specified in the ingredient quantities chart.

Add sugar and bring to a boil while stirring rapidly and constantly. Continue to boil until the mixture thickens. Use one of the following tests to determine when jam is ready to place in the jars. Remember to allow for thickening during cooling.

- **Temperature test:** Use a jelly or candy thermometer and boil until the mixture reaches the temperature for your altitude (see activity 7, Let's Can Jelly without Added Pectin).
- **Refrigerator test:** Remove the jam mixture from the heat. Pour a small amount of boiling jam on a cold plate and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it is ready to place in the jars.

Remove jam from the heat and quickly skim off the foam. Fill sterile jars with jam. Use a measuring cup, or ladle the jam through a wide-mouthed funnel, leaving ¼ inch headspace. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process according to the processing times chart.

Journaling

What fruit did you choose for your jam?

What challenges did you have with this activity?

What other observations do you have about this activity?

Ingredient quantities for jams without added pectin

Fruit	Crushed fruit (cups)	Sugar (cups)	Lemon juice (tbsp)	Yield (half pints)
Apricots	4–4½	4	2	5–6
Berries[1]	4	4	0	3–4
Peaches	5½–6	4–5	2	6–7

[1]Includes blackberries, boysenberries, dewberries, gooseberries, loganberries, raspberries, and strawberries.

Processing times for jam without added pectin in a boiling-water canner

		Processing time by altitude (minutes)		
Type of pack	Jar size	0–1,000 ft	1,001–6,000 ft	Above 6,000 ft.
Hot	Half pints or pints	5	10	15

7. Let's Can Jelly without Added Pectin

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

Use only firm fruits naturally high in pectin. Do not use commercially canned or frozen fruit juices. Their pectin content is too low.

Procedure: Select a mixture of about three-quarters ripe and one-quarter underripe fruit. Wash all fruits thoroughly before cooking. Crush soft fruits or berries; cut firmer fruits into small pieces. Using the peels and cores adds pectin to the juice during cooking. Add water to fruits that require it, as listed in the chart below. Put fruit and water in a large saucepan and bring to a boil. Then simmer according to the times in the chart below until fruit is soft, while stirring to prevent scorching.

When fruit is tender, strain through a colander; then strain through a double layer of cheesecloth or a jelly bag. Allow juice to drip through, using a stand or colander to hold the bag. Pressing or squeezing the bag or cloth will cause cloudy jelly. One pound of fruit should yield at least 1 cup of clear juice.

Using no more than 6–8 cups of extracted fruit juice at a time, measure juice, sugar, and lemon juice according to the ingredients in the chart and heat to boiling. Stir until the sugar is dissolved. Boil over high heat to the jellying point. To test jelly for doneness, use one of the following methods:

continued on page 28

Journaling

What fruit did you choose to use for your jelly?

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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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Making jelly without added pectin

	Water to add per pound of fruit (cups)	Time to simmer fruit before extracting juice (minutes)	Ingredients added to each cup of strained juice		Yield from 4 cups of juice (half pints)
			Sugar (cups)	Lemon juice (tsp)	
Apples	1	20–25	¾	1½ (optional)	4–5
Blackberries	None or ¼	5–10	¾–1	None	7–8
Crab apples	1	20–25	1	None	4–5
Grapes	None or ¼	5–10	¾–1	None	8–9
Plums	½	15–20	¾	None	8–9

7. Let's Can Jelly without Added Pectin: continued

- **Temperature test:** Use a jelly or candy thermometer and boil until the mixture reaches the temperature for your altitude:

  Sea level: 220°F
  1,000 feet: 218°F
  2,000 feet: 216°F
  3,000 feet: 214°F
  4,000 feet: 212°F
  5,000 feet: 211°F
  6,000 feet: 209°F
  7,000 feet: 207°F
  8,000 feet: 205°F

- **Sheet or spoon test:** Dip a cool metal spoon into the boiling jelly mixture. Raise the spoon about 12 inches above the pan (out of the steam). Turn the spoon so the liquid runs off the side. The jelly is done when the syrup forms two drops that flow together and "sheet" or hang off the edge of the spoon.

- **Refrigerator test:** Remove the jam mixture from the heat. Pour a small amount of boiling jam on a cold plate and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it is ready to place in the jars.

When the jelly is ready, remove it from the heat and quickly skim off the foam. Fill jars with jelly. Use a measuring cup, or ladle the jelly through a wide-mouthed funnel, leaving ¼ inch headspace. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process according to the chart below.

Processing times for jelly without added pectin in a boiling water canner

		Processing time by altitude (minutes)		
Type of pack	**Jar size**	**0–1,000 ft**	**1,001–6,000 ft**	**Above 6,000 ft**
Hot	Half pints or pints	5	10	15

8. Let's Make a Low-Sugar or No-Sugar Jam or Jelly

Purchase a low-sugar pectin or a pectin that is acceptable to use with alternative sweeteners. You can try honey, agave, sucralose (Splenda), or Stevia. Use the recipes that come with the product to prepare a jam, a jelly, or both. Remember to adjust for altitude when processing.

Journaling

What jam or jelly did you choose to can?

Did you choose a low-sugar, no-sugar, or sugar-substitute recipe?

What challenges did you have with this activity?

What other observations do you have about this activity?

9. Let's Make Fresh-Pack Dill Pickles

Procedure: Wash cucumbers. Cut 1/16-inch slice off blossom end and discard, but leave ¼ inch of the stem attached. Dissolve ¾ cup salt in 2 gallons water. Pour over cucumbers and let stand 12 hours. Drain. Combine vinegar, ½ cup salt, sugar, and 2 quarts water. Add mixed pickling spices tied in a clean white cloth. Heat to boiling. Fill hot jars with cucumbers. Add 1 teaspoon mustard seed and 1½ heads fresh dill per pint. Cover with boiling pickling solution, leaving ½ inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process as indicated in the processing times chart below.

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

RECIPE: QUICK FRESH-PACK DILL PICKLES

INGREDIENTS:

- 8 LBS OF 3- TO 5-INCH PICKLING CUCUMBERS
- 2 GALLONS WATER
- 1¼ CUPS CANNING OR PICKLING SALT (DIVIDED)
- 1½ QUARTS VINEGAR (5%)
- ¼ CUP SUGAR
- 2 QUARTS WATER
- 2 TBSP WHOLE MIXED PICKLING SPICE
- ABOUT 3 TBSP WHOLE MUSTARD SEED (1 TSP PER PINT JAR)
- ABOUT 14 HEADS OF FRESH DILL (1½ HEADS PER PINT JAR)
  OR 4½ TBSP DILL SEED (1½ TSP PER PINT JAR)

YIELD: 7-9 PINTS

Journaling

What challenges did you have with this activity?

What other observations do you have about this activity?

Processing times for quick fresh-pack dill pickles in a boiling water canner

	Processing time by altitude (minutes)		
Jar size	**0–1,000 ft**	**1,001–6,000 ft**	**Above 6,000 ft**
Pints	10	15	20
Quarts	15	20	25

10. Let's Make Bread-and-Butter Pickles

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

RECIPE: BREAD-AND-BUTTER PICKLES

INGREDIENTS:

6 LBS OF 4- TO 5-INCH PICKLING CUCUMBERS
8 CUPS THINLY SLICED ONIONS (ABOUT 3 LBS)
½ CUP CANNING OR PICKLING SALT
4 CUPS VINEGAR (5%)
4½ CUPS SUGAR
2 TBSP MUSTARD SEED
1½ TBSP CELERY SEED
1 TBSP GROUND TURMERIC
1 CUP PICKLING LIME (OPTIONAL) FOR USE IN VARIATION BELOW FOR MAKING FIRMER PICKLES

YIELD: ABOUT 8 PINTS

Procedure: Wash cucumbers. Cut 1/16 inch off the blossom end and discard. Cut cucumbers into 3/16-inch slices. Combine cucumbers and onions in a large bowl. Add salt. Cover with 2 inches of crushed or cubed ice. Refrigerate 3–4 hours, adding more ice as needed.

Combine remaining ingredients in a large pot. Boil 10 minutes. Drain and add cucumbers and onions and slowly reheat to boiling. Fill hot pint jars with slices and cooking syrup, leaving ½ inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process as indicated in the processing times chart below.

After processing and cooling, jars should be stored 4–5 weeks to develop ideal flavor.

Journaling

What challenges did you have with this activity?

What other observations do you have about this activity?

Processing times for bread-and-butter pickles in a boiling water canner

	Processing time by altitude (minutes)		
Jar size	**0–1,000 ft**	**1,001–6,000 ft**	**Above 6,000 ft**
Pints or quarts	10	15	20

11. Let's Make Fermented Dill Pickles

See notes on ingredients and containers for making fermented pickles, page 33.

Procedure: Wash cucumbers. Cut 1/16-inch slice off blossom end and discard. Leave ¼ inch of the stem attached. Place half of the dill and spices on the bottom of a clean, suitable container. Add cucumbers, remaining dill, and spices. Dissolve salt in vinegar and water and pour over the cucumbers.

Cucumbers must be kept 1–2 inches under the brine while fermenting. After adding prepared vegetables and brine, insert a suitably sized dinner plate or glass pie plate inside the fermentation container. The plate must be slightly smaller than the container opening, yet large enough to cover most of the cucumbers. To keep the plate under the brine, weight it down with 2 or 3 sealed quart jars filled with water or a very large clean, plastic bag filled with 3 quarts of water and 4½ tablespoons of canning or pickling salt. Be sure to seal the plastic bag. Freezer bags are suitable for use with 5-gallon containers. Covering the container opening with a clean, heavy bath towel helps prevent contamination from insects and molds while the vegetables are fermenting.

Fermenting pickles cure slowly. Store the fermenting pickles where the temperature is between 70°F and 75°F for about 3–4 weeks. Temperatures at 55–65°F are acceptable, but the fermentation will take 5–6 weeks. Avoid temperatures above 80°F, as pickles will become too soft during fermentation. Check the container several times a week and promptly remove surface scum or mold. Caution: If the pickles become soft, slimy, or develop a disagreeable odor, discard them.

continued on page 33

Recipe source: USDA. 2009. *Complete Guide to Home Canning.* Agriculture Information Bulletin 539.

RECIPE: FERMENTED DILL PICKLES

INGREDIENTS:

USE THE FOLLOWING QUANTITIES FOR EACH GALLON CAPACITY OF YOUR CONTAINER:

4 LBS OF 4-INCH PICKLING CUCUMBERS
2 TBSP DILL SEED OR 4-5 HEADS FRESH OR DRY DILL WEED
½ CUP SALT
¼ CUP VINEGAR (5%)

8 CUPS WATER AND ONE OR MORE OF THE FOLLOWING INGREDIENTS:

2 CLOVES GARLIC (OPTIONAL)
2 DRIED RED PEPPERS (OPTIONAL)
2 TSP WHOLE MIXED PICKLING SPICES (OPTIONAL)

Journaling

What challenges did you have with this activity?

What other observations do you have about this activity?

Processing times for fermented pickles in a boiling water canner

	Processing time by altitude (minutes)		
Jar Size	**0–1,000 ft**	**1,001–6,000 ft**	**Above 6,000 ft**
Pints	10	15	20
Quarts	15	20	25

11. Let's Make Fermented Dill Pickles: continued

Fully fermented pickles may be stored in the original container for about 4–6 months, provided they are refrigerated and surface scum and molds are removed regularly. Canning fully fermented pickles is a better way to store them. To can them, pour the brine into a pan, heat slowly to a boil and simmer 5 minutes. Filter brine through paper coffee filters to reduce cloudiness, if desired. Fill hot jars with pickles and hot brine, leaving ½ inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process as indicated in the chart on page 32.

Notes on ingredients and containers for making fermented pickles

Suitable containers, covers, and weights for fermenting foods. A 1-gallon container is needed for each 5 pounds of fresh vegetables. Stone crocks and food-grade plastic and glass containers work well. Other 1- to 3-gallon non-food-grade plastic containers may be used if lined inside with a clean food-grade plastic bag. Caution: Be certain that foods contact only food-grade plastics. Do not use garbage bags or trash liners.

Salt. Use of canning or pickling salt is recommended. Fermented and non-fermented pickles may be safely made using iodized or non-iodized table salt. However, the additives used to prevent caking in table salts may make the brine cloudy. Iodized salts can result in discolored or streaked pickles.

Vinegar. White distilled and cider vinegars of 5% acidity are recommended. White vinegar is usually preferred when canning a light-colored fruit or vegetable.

Firming pickles. Alum can be used to safely firm fermented pickles. Alum does not improve the firmness of quick-process pickles. Food-grade lime-water solution may also be used to firm pickles. Soak fresh cucumbers in the lime-water solution for 12–24 hours before pickling them. Excess lime must be removed from the cucumbers for safe pickling. To remove excess lime, drain the lime-water solution, rinse the pickles, and then resoak them in fresh water for 1 hour. Repeat the rinsing and soaking steps two more times.

12. Let's Make Pickle Relish

Recipe source: USDA. 2009. *Complete Guide to Home Canning*. Agriculture Information Bulletin 539.

RECIPE: PICKLE RELISH

INGREDIENTS:

- 3 QUARTS CHOPPED CUCUMBERS
- 3 CUPS EACH CHOPPED SWEET GREEN AND RED PEPPERS
- 1 CUP CHOPPED ONIONS
- ¾ CUP CANNING OR PICKLING SALT
- 4 CUPS ICE
- 8 CUPS WATER
- 2 CUPS SUGAR
- 4 TSP EACH MUSTARD SEED, TURMERIC, WHOLE ALLSPICE, AND WHOLE CLOVES
- 6 CUPS WHITE VINEGAR (5%)

YIELD: ABOUT 9 PINTS

Procedure: Add cucumbers, peppers, onions, salt, and ice to water and let stand 4 hours. Drain and re-cover the vegetables with fresh ice water for another hour. Drain again. Combine spices in a spice or cheesecloth bag. Add spices to sugar and vinegar. Heat to boiling and pour this mixture over the vegetables. Cover and refrigerate 24 hours. Heat the mixture to boiling and place hot relish into hot jars, leaving ½ inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rim of jars with a dampened clean paper towel. Adjust lids as indicated in the processing times chart chart.

Journaling

What challenges did you have with this activity?

What other observations do you have about this activity?

Processing times for pickle relish in a boiling water canner

	Processing time by altitude (minutes)		
Jar size	**0–1,000 ft**	**1,001–6,000 ft**	**Above 6,000 ft**
Half pints or pints	10	15	20

Source: USDA Complete Guide to Home Canning

13. Conduct a Taste Test

Select a fruit or tomato product and can it using two different methods. Some suggestions are:

- Can a fruit using two different syrup types (see activity 1).
- Can a fruit as a raw pack and a hot pack (see activity 2).
- Can tomatoes with tomato juice and without (see activity 3).
- Compare a commercially prepared item with a home-preserved item.

After preparing the two items, share them with a panel of at least four people. Here are some suggestions for your taste test:

- Do not tell the panel the preservation method used.
- Ask each panel member to write down comments about each of the samples.
- Ask panel members to indicate which sample they prefer.
- Share the results with the panel.
- Record the results of your taste test.

Journaling

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

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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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14. Label Your Product

It is important to label all home-canned foods. Decide whether you can use the top of the lid or whether you need to attach a label to the jar. Here are some important things to include on the label:

- Name of product
- Date canned
- Ingredients
- Processing information (for example, raw pack or hot pack, processing time, altitude adjustment)
- Source of recipe (for example, Ball blue book, USDA canning guide, *So Easy To Preserve*, 4-H project manual)

Journaling

What canned food did you choose to label?

What challenges did you have with this activity?

What other observations do you have about this activity?

15. Going Further: 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*.
- Decide the recipe or method you want to use.
- Get equipment, food, and packaging ready.
- Follow the information and directions listed carefully.
- Evaluate your results.

Journaling

What activity did you choose to do?

What challenges did you have with this activity?

What other observations do you have about this activity?

16. Make a Menu Plan

Using the menu planning information listed in the front of this manual, develop a menu plan for your friends and family. Include some foods that you have preserved by boiling water canning to develop a healthy menu plan.

Menu plan:

Journaling

What menu or menus did you plan?

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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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Show what you have learned

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

- Explain how to select suitable produce for canning.
- Demonstrate the proper equipment for boiling water canning.
- Explain and show how to peel tomatoes.
- Explain how to make a brine solution for pickling.
- Explain the difference between jams and jellies made with and without added pectin.
- Explain the difference between raw and hot pack.
- Explain why you need to adjust for altitude and how to make the adjustment.

Reflections on boiling water canning

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. You have applied what you have learned by showing others how to preserve food by boiling water canning. To show what you have learned, answer at least two of these questions.

Q. Why is boiling water canning an effective and economical way to preserve food?

Q. Why does produce need to be at its peak quality for canning?

Q. Why do we need to make elevation adjustments to canning recipes?

Q. Explain how to test for a seal in home-canned foods.

Q. How could you use your boiling-water-canned foods as a way to help with long-term menu planning for your family?