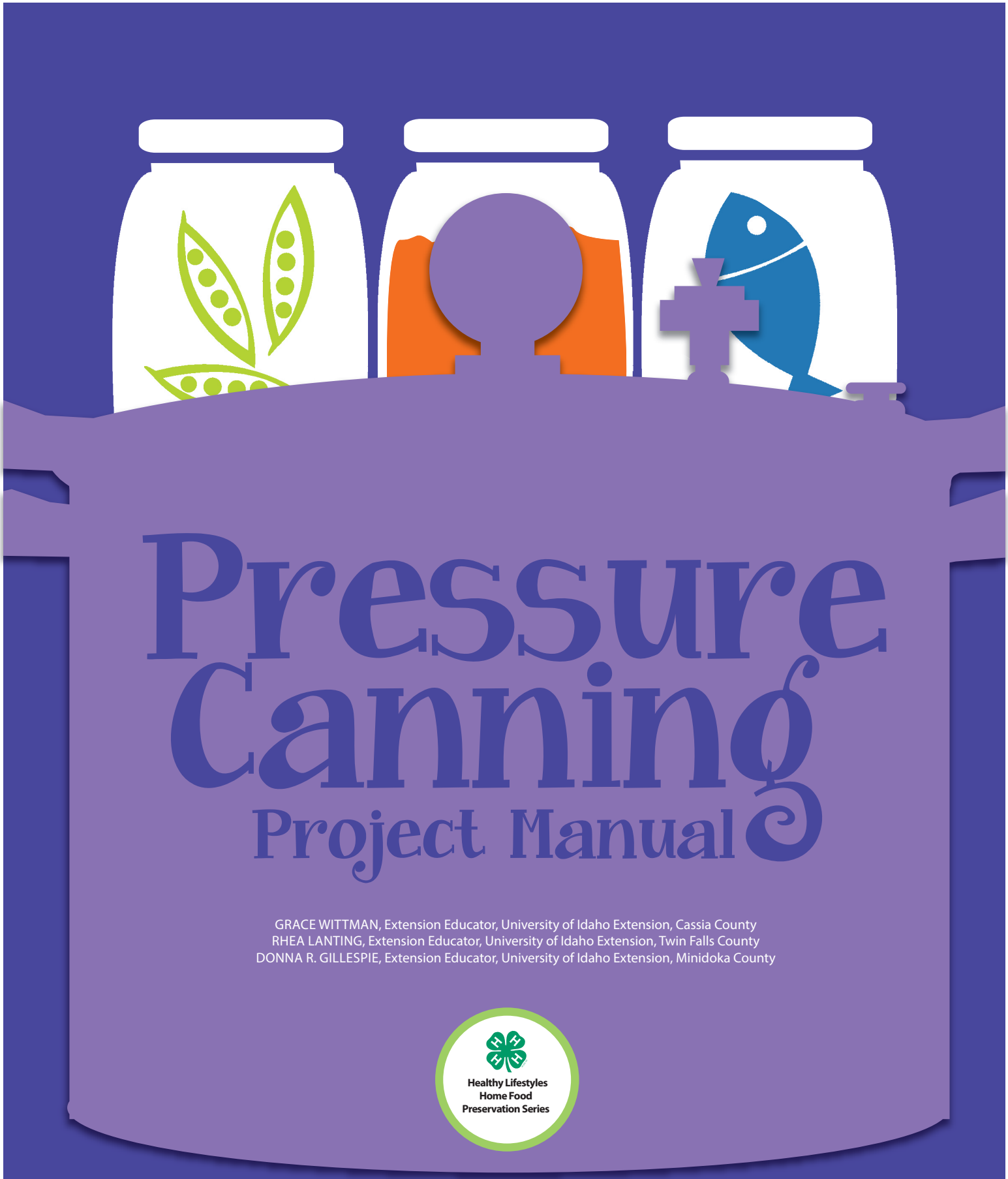

Pressure Canning Project Manual

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Healthy Lifestyles
Home Food
Preservation Series

PNW 653 A Pacific Northwest Extension Publication
University of Idaho • Oregon State University • Washington State University

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

Many colleagues have taken time to review the curriculum and conduct pilot tests. A special thanks goes out to Extension staff, educators, and specialists at University of Idaho, Washington State University, Oregon State University, and Colorado State University.

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. 2011. *Canning Vegetables*. PNW 172. 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 Vegetables, PNW 172
http://cru.cahe.wsu.edu/CEPublications/PNW172/PNW172.pdf

Using and Caring for Your Pressure Canner, PNW 421
http://www.cals.uidaho.edu/edcomm/pdf/PNW/PNW0421.pdf

USDA Complete Guide to Home Canning
http://nchfp.uga.edu/publications/publications_usda.html

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

min = minutes

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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.

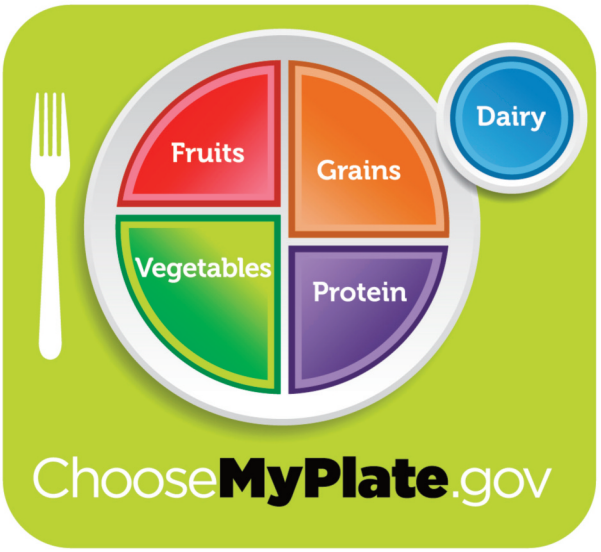
My activities		
Activities	**Date completed**	**Helper's initials**

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?

_____

_____

_____

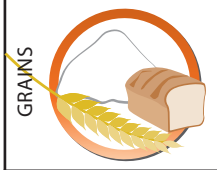
Q. List two goals for yourself to improve your eating.

_____

_____

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: _____

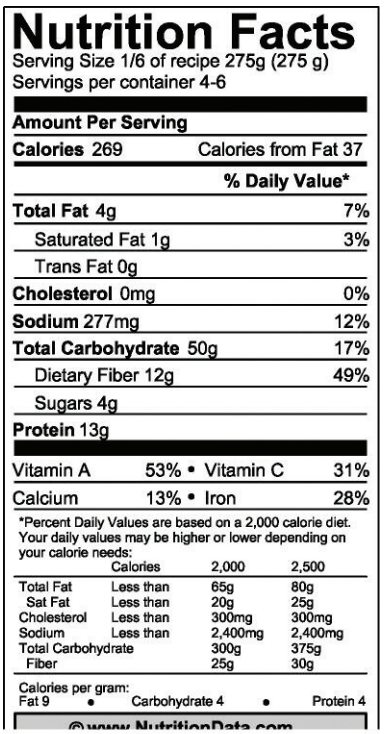
My activity goal for tomorrow is: _____

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.

Pressure canning basics

Project objectives

- Learn how to safely preserve tomato products, vegetables, meats, and combinations of meats and vegetables.
- Learn how to use your home-canned foods in healthy recipes.
- Show others how to preserve foods by pressure canning.

Why can foods?

Canning food at home can be safe and economical. We can foods to prevent food spoilage and to have an abundant supply of a variety of foods when fresh produce isn't available. When you can at home, you can control the quality of the food you're preserving.

Canning destroys the microorganisms that may be present in the food by exposing them to heat in either a pressure canner or boiling water canner. Canning methods NOT recommended are these:

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

Canning low-acid vs. high-acid foods

Foods are processed either in a pressure canner or boiling water canner to control bacteria that can be present in foods. The most dangerous and difficult bacteria to destroy are those that cause botulism (these are not the only pathogens we are concerned about, just the most dangerous). Whether food should be processed in a pressure canner or boiling water canner depends on the acidity or pH of the food. The term "pH" is a measure of acidity; the lower its value, the more acid in the food.

Low-acid foods are not acidic enough to prevent the growth of these bacteria. Low-acid foods have a pH of higher than 4.6. These foods include:

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

High-acid foods contain enough acid to block the growth of bacteria or to destroy them more rapidly when they are heated. Acid foods have a pH of 4.6 or lower. These foods include:

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

All low-acid foods must be canned at a temperature of 240°F to 250°F to destroy botulism spores. These temperatures are attainable only in pressure canners. The exact time needed in the pressure canner depends on the type of food being canned, the way it is packed into the jars, and the size of the jars. Use only USDA-approved recipes for canning.

Making altitude adjustments

To destroy microorganisms in low-acid foods in a pressure canner, you must process jars at the correct pounds of pressure, cool the jars at room temperature, and adjust for altitudes above 1,000 feet. To adjust for altitudes above 1,000 feet, you need to increase the pounds of pressure. Foods may spoil if you fail to add to the processing pressure for elevations above 1,000 feet, process for fewer minutes than specified, or cool jars in cold water.

The table below indicates the pounds of pressure to use when processing jars at different altitudes.

Pressure canner altitude adjustments

Altitude (feet)	Weighted gauge	Dial gauge
0 to 1,000	10	11
1,001 to 2,000	15	11
2,001 to 4,000	15	12
4,001 to 6,000	15	13
6,001 to 8,000	15	14
8,001 to 10,000	15	15

Hot packing vs. raw (cold) packing

Hot packing is the practice of heating prepared food to boiling, simmering it for 2 to 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 those 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 to 3 months. Raw packing is more suitable for vegetables processed in a pressure canner.

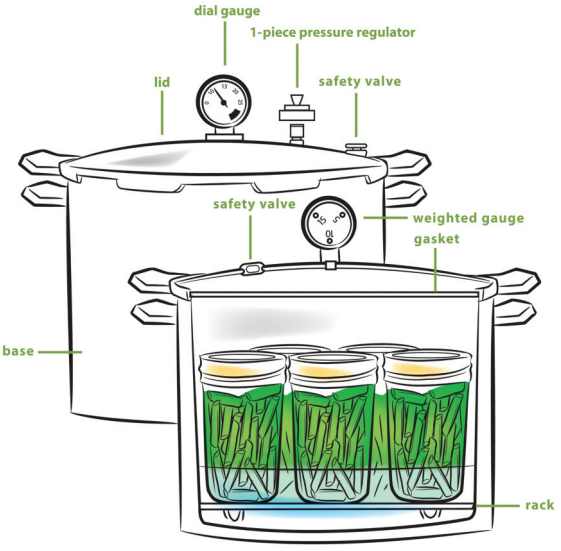
With both practices the food is covered with boiling juice, syrup, or water. This helps to remove air in the food. This practice will help shrink the food, keep food from floating, increase the vacuum seal, and prolong shelf life of the canned foods.

Getting ready to pressure can

Selecting a pressure canner

Make sure to use a pressure canner that has a jar rack, dial or weighted gauge, automatic vent/cover lock, vent port (steam vent) to be closed with a counterweight or weighted gauge, a petcock on certain models, and a safety fuse. Vent ports control the escape of air or steam and petcocks release steam and air when open and hold steam in when closed. *If using a dial-gauge canner, be sure to have the gauge and gasket checked each year before using*. Check with the local Extension office for testing locations.

A weighted-gauge canner exhausts tiny amounts of air or steam each time the gauge rocks or jiggles during processing. The sound of the weight rocking or jiggling indicates that the canner is maintaining pressure. To know how many times your gauge should rock or jiggle per minute, consult your owner's manual or contact the manufacturer.



Pressure 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.
Pressure canner	Made of heavy-gauge stainless steel or aluminum with a lid that locks onto the base, a vent pipe, and safety valve. They are fitted either with a weighted or dial gauge.
Jars and lids	Mason-type, threaded, home canning jars with 2-part lids. Recommended sizes: ½ pint, 1½ pints, 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.

Selecting produce

Produce needs to be canned at its peak of quality, within hours of harvest. Examine produce carefully for freshness and damage. 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.

Selecting meats, poultry, and fish

Can meats and poultry from healthy, disease-free animals. The meats should be chilled and canned without delay. Ice seafood after harvest, and can it within 2 days.

Washing and peeling produce

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

Preparing jars

Check all jars to make sure that they are free of cracks or chips, especially on the rim, which is the sealing surface. 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 them well. This may be done in a dishwasher. Jars should be hot when filled to prevent jar breakage.

Preparing lids

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

Headspace

The unfilled space in the 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 food to expand during processing and for the vacuum seal to form. Too little headspace may cause food to bubble from the jar during processing. Too much headspace may cause the food at the top to discolor in storage.

Filling jars

Using a funnel, fill jars with food and add liquid to cover the food. Release air bubbles using a bubble remover by moving it up and down around the edges and in the center of the jar to allow air bubbles to escape. Adjust the headspace and then clean the jar rim (sealing surface) with a dampened paper towel. Place the preheated lid onto the cleaned jar-sealing surface. 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 it and tighten it 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. Overtightening may also cause lids to buckle and jars to break, especially with raw-packed, pressure-processed food.

Checking for a seal in processed jars

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 unsealed.
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 processed jars? Screw bands are not necessary for storage. When stored properly, screw bands can be used for years. If they are left on, they can become difficult to remove, often rust, and many do not work properly. After jars have cooled, remove screw bands, wash them with warm soapy water, then dry and store them for future use.

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 pressure canner

Step 1: Put the canner rack inside the canner base. Add 2–3 inches of water. Heat water to a simmer.

Step 2: Prepare the recipe according to USDA directions.

Step 3: Fill jars to the appropriate headspace and adjust the lids and screw bands. Place jars on the canner rack immediately after filling each jar. When the canner is filled, lock the canner lid securely in place.

Step 4: Leave the weight off the vent port or open the petcock. Set heat to medium-high until steam flows evenly from the vent port or petcock.

Step 5: Vent canner for 10 minutes by leaving the vent port uncovered or by manually opening the petcock. Start timing the 10 minutes when you can see steam coming from the port. (If this is not done, air trapped in the canner will lower the temperatures obtained at 5, 10, or 15 pounds pressure and result in underprocessing.)

Once the canner is vented, place the weight on the vent port or close the petcock.

Step 6: After the gauge indicates the recommended pounds of pressure have been reached, set the timer for the USDA recommended processing time. Adjust the heat to maintain pressure for the duration of processing. If the canner drops below the recommended pressure for your altitude, bring the canner back up to pressure and start the processing time over.

Step 7: After the processing period is complete, turn off the heat. Allow the canner to cool naturally.

Step 8: When the canner has depressurized and the gauge reads zero, remove the weight or open the petcock. Wait 10 minutes, and unlock the lid and remove the lid from the canner. Be sure to lift the lid away from your face. The steam in the canner is very hot and could cause burns.

Step 9: Remove jars from the canner and place them upright on a dry towel. Make sure there is 1 inch of space around jars for air to circulate.

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

Activities

1. Let's Can Vegetables: Raw Pack vs. Hot Pack

Select a vegetable from the chart on the following two pages. Prepare the vegetable by washing, draining, peeling if necessary, and cutting into uniform pieces. Process this vegetable as a raw pack and a hot pack according to the instructions in the chart, remembering to adjust pressure for altitude.

Canning method: Vegetables must be processed in a pressure canner. Begin counting processing time after the canner has vented for 10 minutes and been brought up to pressure. The canner must maintain pressure for the entire processing time. If the canner goes below pressure, you must bring the canner back up to pressure and begin the processing time over.

Headspace: Leave 1 inch headspace for both the vegetable and the liquid, unless stated otherwise in the chart.

Salt: If desired, add 1 teaspoon salt per quart.

Journaling

What vegetables did you choose to can?

What challenges did you have with this activity?

What other observations do you have about this activity?

Pressure-canning guidelines for low-acid vegetables

Vegetable	Preparation	Process time (minutes) at 240°F (10 pounds pressure for weighted gauge; 11 pounds pressure for dial gauge. Adjust for altitude.)	
		Pints	Quarts
Asparagus	Wash. Trim off tough scales, and break off ends. Wash again. Cut into 1-inch pieces or leave whole. **Hot pack.** Cover with boiling water; boil 2–3 minutes. Loosely pack in jars. Add salt, if desired. Cover with boiling cooking liquid. If liquid is gritty, use freshly boiled water.	30	40
	Raw pack. Pack tightly without crushing. Add salt, if desired. Cover with boiling water.	30	40
Beans, green, wax, snap	Wash, trim ends, cut into 1-inch pieces or leave whole. **Hot pack.** Cover with boiling water; boil 5 minutes. Pack loosely; add salt, if desired. Cover with boiling cooking liquid.	20	25
	Raw pack. Pack tightly; add salt, if desired. Cover with boiling water.	20	25
Beans, fresh lima	Select young, tender beans. Shell and wash. **Hot pack.** Cover with boiling water; return to boil. Loosely pack, leaving 1-inch headspace. Add salt, if desired. Cover with boiling water.	40	50
	Raw pack. Loosely pack to these headspaces: Small beans: 1 inch for pints; 1½ inch for quarts Large beans: 1 inch for pints; 1¼ inch for quarts Do not press down on beans or shake the jar. Add salt, if desired. Cover with boiling water.	40	50
Beets	Sort for size; cut off tops leaving 1 inch stem and root. Cover with boiling water; boil 15–25 minutes until skins slip. Skin, trim. Leave baby beets whole. Cut medium or large beets into ½-inch cubes or slices. Halve or quarter very large slices. Pack; add salt, if desired. Cover with boiling water.	30	35
Carrots	Wash, peel, rewash, and slice or dice. **Hot pack.** Cover with boiling water; bring to boil and simmer for 5 minutes. Pack; add salt, if desired. Cover with boiling cooking liquid.	25	30
	Raw pack. Pack tightly. Add salt, if desired, and boiling water.	25	30
Chile peppers	Wash; remove cores and seeds. Slash two or four slits in each pepper and either blanch in boiling water or blister outer skin with heat (see below). Peel peppers. Pack loosely; add salt, if desired. Cover with boiling water. Pack in half-pint or pint jars only. Process time for half-pints is the same as pints. Blister green chiles in a hot oven or broiler (400°F) for 6–8 minutes, over a gas or electric burner covered with a heavy wire mesh, or on an outdoor charcoal grill (place chiles 5–6 inch above coals). Be sure heat source is very hot. Turn chiles often to prevent scorching and to allow even blistering. Cool before peeling. For easier peeling, place chiles in a pan and cover with a damp towel for a few minutes. Handling chiles can burn hands. Wear rubber gloves and keep hands away from eyes.	35	Do not can in quart jars

Source: Hillers, Val. 2011. *Canning Vegetables*. PNW 172. Pullman, WA: Washington State University Extension.

Pressure-canning guidelines for low-acid vegetables, cont.

Vegetable	Preparation	Process time (minutes) at 240°F	
		Pints	Quarts
Corn, cream style	Husk, silk, and wash ears. Blanch ears 4 minutes in boiling water. Cut corn at half-kernel depth, then scrape remaining corn from cob with table knife. **Hot pack.** Add 1 pint boiling water for each quart of corn; heat to boiling. Pack in pint jars only (larger jars cannot be used because heat penetrates this thick food very slowly). Add salt, if desired.	85	Do not can in quart jars
Corn, whole kernel	Husk, silk, and wash ears. Blanch 3 minutes in boiling water. Cut kernels from cob at three-fourths kernel depth. Caution: Do not scrape cob. **Hot pack.** Add 1 cup hot water for each quart of corn; heat to boiling and simmer 5 minutes. Pack, cover with boiling cooking liquid. Add salt, if desired.	55	85
	Raw pack. Pack without shaking the jar or pressing down on the corn. Add salt, if desired, and boiling water.	55	85
Mushrooms	Trim stems and discolored spots. Soak in cold water 10 minutes to remove clinging soil, then wash in clear water. Leave small mushrooms whole; cut large ones into halves or quarters. Cover with water in saucepan and boil 5 minutes. Pack hot; add salt, if desired. For better color, add 1/8 tsp crystalline ascorbic acid per pint. Cover mushrooms with fresh boiling water. Pack in pint or half-pint jars only. Process time for half-pints is the same as for pints. *Caution: Do not can wild mushrooms.*	45	Do not can in quart jars
Peas, green	Shell and wash. **Hot pack.** Cover with boiling water; boil 2 minutes. Pack loosely. Add salt, if desired. Cover with boiling liquid.	40	40
	Raw pack. Pack without shaking the jar or pressing down on the peas. Add salt, if desired. Cover with boiling water.	40	40
Peas, snow, sugar, snap, pod	Not recommended for canning because of poor-quality results.		
Potatoes, white	**Cubed.** Wash, peel, cut into ½-inch cubes. To prevent darkening, place in ascorbic acid solution (1 tsp ascorbic acid per gallon water). Drain. Cook 2 minutes in boiling water. Drain, then pack; add salt, if desired. Cover with fresh hot water.	35	40
	Whole. Use mature potatoes, small to medium in size. Wash, peel, boil 10 minutes, and drain. Pack; add salt, if desired. Cover with fresh hot water.	35	40
Pumpkin and winter squash, cubed	Wash, remove seeds, peel. Cut into 1-inch slices. Add just enough water to cover; boil 2 minutes. Fill hot jars with slices; add salt if desired. Cover with boiling liquid. Caution: Do not mash or puree before canning.	55	90
Spinach, other greens	Use fresh, tender greens. Wash; remove tough stem and midribs. Place about 1 lb in blancher basket or cheesecloth bag; steam 3–5 minutes, or until well wilted. Pack loosely. Add salt, if desired (¼ tsp to pints, ½ tsp to quarts). Cover with fresh boiling water.	70	90

Source: Hillers, Val. 2011. *Canning Vegetables*. PNW 172. Pullman, WA: Washington State University Extension.

2. Let's Can Vegetables: Mixed Vegetables

Vegetables may be canned individually such as in activity 1, or as a mixed vegetable. When making mixed vegetables, you may change the suggested proportions or substitute other favorite vegetables *except* leafy greens, dried beans, cream-style corn, squash, and sweet potatoes.

Procedure: Except for zucchini and tomatoes, wash and prepare vegetables as described in the chart on the previous two pages. Wash, trim, and slice or cube zucchini.

Select firm, underipe-to-ripe tomatoes. Use of decayed or overripe tomatoes may result in spoilage of canned products. To prepare tomatoes, remove skins by dipping the tomatoes in boiling water for 30–60 seconds or until the skins split. Dip them in cold water, then slip off the skins and remove the cores. Leave whole or crush.

Combine all vegetables in a large pot or kettle, and add enough water to cover the pieces. Add 1 teaspoon of salt per quart to the jar, if desired. Boil 5 minutes.

Fill hot jars with hot pieces and liquid, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

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

RECIPE: MIXED VEGETABLES

INGREDIENTS:
6 CUPS SLICED CARROTS
6 CUPS CUT WHOLE KERNEL SWEET CORN
6 CUPS CUT GREEN BEANS
6 CUPS SHELLED LIMA BEANS
4 CUPS WHOLE OR CRUSHED TOMATOES
4 CUPS DICED ZUCCHINI

YIELD: 7 QUARTS

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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Recommended process time for mixed vegetables in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	75 min	11 lb	12 lb	13 lb	14 lb
	Quarts	90 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for mixed vegetables in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	75 min	10 lb	15 lb
	Quarts	90 min	10 lb	15 lb

3. Let's Can Vegetables: Spaghetti Sauce without Meat

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

RECIPE: SPAGHETTI SAUCE W/OUT MEAT

INGREDIENTS:

- 30 LBS TOMATOES
- 1 CUP CHOPPED ONIONS
- 5 CLOVES GARLIC, MINCED
- 1 CUP CHOPPED CELERY OR GREEN PEPPERS
- 1 LB FRESH MUSHROOMS, SLICED (OPTIONAL)
- 4½ TSP SALT
- 2 TBSP OREGANO
- 4 TBSP MINCED PARSLEY
- 2 TSP BLACK PEPPER
- ¼ CUP BROWN SUGAR
- ¼ CUP VEGETABLE OIL

YIELD: ABOUT 9 PINTS

Procedure: Wash tomatoes and dip in boiling water for 30–60 seconds or until skins split. Dip in cold water and slip off skins. Remove cores and quarter tomatoes. Boil 20 minutes, uncovered, in large saucepan. Put through food mill or sieve. Saute onions, garlic, celery or peppers, and mushrooms (if desired) in vegetable oil until tender. Combine sauteed vegetables and tomatoes and add remainder of spices, salt, and sugar. Bring to a boil. Simmer, uncovered, until thick enough for serving. At this time the initial volume will have been reduced by nearly one-half. Stir frequently to avoid burning.

Fill hot jars, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

Journaling

What challenges did you have with this activity?

What other observations do you have about this activity?

Recommended process time for spaghetti sauce without meat in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	20 min	11 lb	12 lb	13 lb	14 lb
	Quarts	25 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for spaghetti sauce without meat in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	20 min	10 lb	15 lb
	Quarts	25 min	10 lb	15 lb

4. Let's Can Dry Beans

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

Quantity: On average, 5 pounds are needed per canner load of 7 quarts and 3¼ pounds are needed per canner load of 9 pints, or ¾ pound per quart.

Quality: Select mature, dry seeds. All varieties of beans or peas are suitable. Sort out and discard discolored seeds.

Procedure: Place dried beans or peas in a large pot and cover with water. Soak 12–18 hours in a cool place. Drain water. To quickly hydrate beans, you may cover sorted and washed beans with boiling water in a saucepan, boil 2 minutes, remove from heat, soak 1 hour, and drain. Cover beans soaked by either method with fresh water and boil 30 minutes. Add ½ teaspoon of salt per pint or 1 teaspoon per quart to the jar, if desired.

Fill hot jars with beans or peas and cooking water, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

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Journaling

What dried bean did you choose to can?

What challenges did you have with this activity?

What other observations do you have about this activity?

Recommended process time for dry beans in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	75 min	11 lb	12 lb	13 lb	14 lb
	Quarts	90 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for dry beans in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	75 min	10 lb	15 lb
	Quarts	90 min	10 lb	15 lb

4. Let's Can Dry Beans: continued

Dry bean variations

Beans in tomato sauce—Either mix tomato juice, sugar, salt, chopped onion, ground cloves, allspice, mace, and cayenne pepper or mix tomato ketchup with cooking liquid from beans. Heat to boiling.

Beans in molasses sauce—Mix water or cooking liquid from beans, dark molasses, vinegar, salt, and powdered dry mustard. Heat to boiling.

Procedure for variations: Fill hot jars three-fourths full with hot beans. Add a ¾-inch cube of pork, ham, or bacon to each jar, if desired. Fill jars with heated sauce, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

RECIPE: BEANS IN TOMATO SAUCE

INGREDIENTS:

1 QT TOMATO JUICE
3 TBSP SUGAR
2 TSP SALT
1 TBSP CHOPPED ONION
¼ TSP GROUND CLOVES
¼ TSP ALLSPICE
¼ TSP MACE
¼ TSP CAYENNE

OR

1 CUP TOMATO KETCHUP
3 CUPS COOKING LIQUID FROM BEANS

RECIPE: BEANS IN MOLASSES SAUCE

INGREDIENTS:

4 CUPS WATER OR LIQUID FROM BEANS
3 TBSP DARK MOLASSES
1 TBSP VINEGAR
2 TSP SALT
¾ TSP POWDERED DRY MUSTARD

Recommended process time for dry beans with tomato or molasses sauce in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	65 min	11 lb	12 lb	13 lb	14 lb
	Quarts	75 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for dry beans with tomato or molasses sauce in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	65 min	10 lb	15 lb
	Quarts	75 min	10 lb	15 lb

5. Let's Can Meats, Poultry and Fish

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

Pick one of the meats, poultry items, or fish listed below and prepare and process it according to instructions.

Chicken

Procedure: Choose freshly killed and dressed, healthy animals. Large chickens are more flavorful than fryers. Dressed chickens should be chilled for 6 to 12 hours before canning. Remove excess fat. Cut the chicken into suitable sizes for canning. Can with or without bone.

Hot pack—Boil, steam, or bake meat until about two-thirds done. Add 1 teaspoon salt per quart to the jar, if desired. Fill hot jars with pieces and hot broth, leaving 1¼ inch headspace. Remove air bubbles and adjust headspace if needed.

Raw pack—Add 1 teaspoon salt per quart, if desired. Fill hot jars loosely with raw meat pieces, leaving 1¼ inch headspace. Do not add liquid.

Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

Ground or chopped bear, beef, lamb, pork, sausage, veal, venison

Procedure: Choose fresh, chilled meat. With venison, add one part high-quality pork fat to three or four parts venison before grinding. Use freshly made sausage, seasoned with salt and cayenne pepper (sage may cause a bitter off-flavor). Shape chopped meat into patties or balls or cut cased sausage into 3- to 4-inch links. Cook until lightly browned. Ground meat may be sauteed without shaping. Remove excess fat.

Fill hot jars with pieces. Add boiling meat broth, tomato juice, or water, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Add 1 teaspoon of salt per quart to the jars, if desired. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

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Journaling

Which meat, poultry or fish did you choose to can?

What challenges did you have with this activity?

What other observations do you have about this activity?

5. Let's Can Meats, Poultry and Fish: continued

Strips, cubes, or chunks of bear, beef, lamb, pork, veal, venison

Procedure: Choose quality chilled meat. Remove excess fat. Soak strong-flavored wild meats for 1 hour in brine water containing 1 tablespoon of salt per quart. Rinse. Remove large bones.

Hot pack—Precook meat until rare by roasting, stewing, or browning in a small amount of fat. Add 1 teaspoon of salt per quart to the jar, if desired. Fill hot jars with pieces and add boiling broth, meat drippings, water, or tomato juice (especially with wild game), leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed.

Raw pack—Add 1 teaspoon of salt per quart to the jar, if desired. Fill hot jars with raw meat pieces, leaving 1 inch headspace. Do not add liquid.

Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

Fish in pint jars: Bluefish, mackerel, salmon, steelhead, trout, and other fatty fish except tuna

Caution: Bleed and eviscerate fish immediately after catching them, never more than 2 hours after they are caught. Keep cleaned fish on ice until ready to can.

Procedure: If the fish is frozen, thaw it in the refrigerator before canning. Rinse the fish in cold water. You can add vinegar to the water (2 tablespoons per quart) to help remove slime. Remove head, tail, fins, and scales; it is not necessary to remove the skin. You can leave the bones in most fish because the bones become very soft and are a good source of calcium. For halibut, remove the head, tail, fins, skin, and bones, wash the fish, and remove all blood. Refrigerate all fish until you are ready to pack in jars.

Split fish lengthwise, if desired. Cut cleaned fish into 3½ inch lengths. If the skin has been left on the fish, pack the fish skin out for a nicer appearance or skin in for easier jar cleaning. Fill hot pint jars, leaving 1 inch headspace. Add 1 teaspoon of salt per pint, if desired. Do not add liquids. Carefully clean the jar rims with a clean, damp paper towel; wipe with a dry paper towel to remove any fish oil. Adjust lids and process. Fish in half pint or 12-ounce jars would be processed for the same amount of time as in pint jars.

Note: Glass-like crystals of struvite, or magnesium ammonium phosphate, sometimes form in canned salmon. There is no way for the home canner to prevent these crystals from forming, but they usually dissolve when heated and are safe to eat.

Recommended process times for poultry, meat, and fish in a *dial-gauge* pressure canner

				Canner Pressure (PSI) at Altitudes of			
Type of Food	**Style of Pack**	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Chicken w/out Bones	Hot and Raw	Pints	75 min	11 lb	12 lb	13 lb	14 lb
		Quarts	90 min	11 lb	12 lb	13 lb	14 lb
Chicken with Bones	Hot and Raw	Pints	65 min	11 lb	12 lb	13 lb	14 lb
		Quarts	75 min	11 lb	12 lb	13 lb	14 lb
Ground or Chopped meat	Hot	Pints	75 min	11 lb	12 lb	13 lb	14 lb
		Quarts	90 min	11 lb	12 lb	13 lb	14 lb
Strips, Cubes, Chunks of Meat	Hot and Raw	Pints	75 min	11 lb	12 lb	13 lb	14 lb
		Quarts	90 min	11 lb	12 lb	13 lb	14 lb
Fish	Raw	Pints	100 min	11 lb	12 lb	13 lb	14 lb

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5. Let's Can Meats, Poultry and Fish: continued

Recommended process times for poultry, meat, and fish in a *weighted-gauge* pressure canner

				Canner Pressure (PSI) at Altitudes of	
Type of Food	**Style of Pack**	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Chicken w/out Bones	Hot and Raw	Pints	75 min	10 lb	15 lb
		Quarts	90 min	10 lb	15 lb
Chicken with Bones	Hot and Raw	Pints	65 min	10 lb	15 lb
		Quarts	75 min	10 lb	15 lb
Ground or Chopped meat	Hot	Pints	75 min	10 lb	15 lb
		Quarts	90 min	10 lb	15 lb
Strips, Cubes, Chunks of Meat	Hot and Raw	Pints	75 min	10 lb	15 lb
		Quarts	90 min	10 lb	15 lb
Fish	Raw	Pints	100 min	10 lb	15 lb

6. Let's Can Combinations

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

RECIPE: SPAGHETTI SAUCE WITH MEAT

INGREDIENTS:

- 30 LBS TOMATOES
- 2 1/2 LBS GROUND BEEF OR SAUSAGE
- 5 CLOVES GARLIC, MINCED
- 1 CUP CHOPPED ONIONS
- 1 CUP CHOPPED CELERY OR GREEN PEPPERS
- 1 LB FRESH MUSHROOMS, SLICED (OPTIONAL)
- 4 1/2 TSP SALT
- 2 TBSP OREGANO
- 4 TBSP MINCED PARSLEY
- 2 TSP BLACK PEPPER
- 1/4 CUP BROWN SUGAR

YIELD: ABOUT 9 PINTS

Procedure: To prepare tomatoes, follow directions for Spaghetti Sauce Without Meat (activity 3). Saute beef or sausage until brown. Add garlic, onion, celery or green pepper, and mushrooms, if desired. Cook until vegetables are tender. Combine with tomato pulp in large saucepan. Add salt, oregano, parsley, pepper, and sugar. Bring to a boil. Simmer, uncovered, until thick enough for serving. At this time initial volume will have been reduced by nearly one-half. Stir frequently to avoid burning.

Fill hot jars, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

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Recommended process time for spaghetti sauce with meat in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	60 min	11 lb	12 lb	13 lb	14 lb
	Quarts	70 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for spaghetti sauce with meat in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	60 min	10 lb	15 lb
	Quarts	70 min	10 lb	15 lb

6. Let's Can Combinations: continued

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

RECIPE: CHILI CON CARNE

INGREDIENTS:

- 3 CUPS DRIED PINTO OR RED KIDNEY BEANS
- 5½ CUPS WATER
- 5 TSP SALT (SEPARATED)
- 3 LBS GROUND BEEF
- 1½ CUPS CHOPPED ONIONS
- 1 CUP CHOPPED PEPPERS OF YOUR CHOICE (OPTIONAL)
- 1 TSP BLACK PEPPER
- 3-6 TBSP CHILI POWDER
- 2 QUARTS CRUSHED OR WHOLE TOMATOES

YIELD: 9 PINTS

Procedure: Wash beans thoroughly and place them in a 2-quart saucepan. Add cold water to a level 2–3 inches above the beans and soak 12–18 hours. Drain, and discard water. Combine beans with 5½ cups of fresh water and 2 teaspoons salt. Bring to a boil. Reduce heat and simmer 30 minutes. Drain, and discard water. Brown ground beef, chopped onions, and peppers (if desired) in a skillet. Drain off fat and add 3 teaspoons salt, pepper, chili powder, tomatoes, and drained cooked beans. Simmer 5 minutes. Caution: Do not thicken.

Fill hot jars, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

continued on page 31

Recommended process time for chili con carne in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	75 min	11 lb	12 lb	13 lb	14 lb

Recommended process time for chili con carne in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	60 min	10 lb	15 lb

6. Let's Can Combinations: continued

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

Soup

Caution: Do not add noodles or other pasta, rice, flour, cream, milk, or other thickening agents to home-canned soups. If dried beans or peas are used, they must be fully rehydrated first.

Procedure for soup: Select, wash, and prepare your choice of vegetables, meat, and seafood as described for the specific foods. Cover meat with water and cook until tender. Cool meat and remove bones. Cook vegetables. For each cup of dried beans or peas, add 3 cups of water, boil 2 minutes, remove from heat, soak 1 hour, and heat to boiling.

Drain all foods and combine with meat broth, tomatoes, or water to cover. Boil 5 minutes. DO NOT THICKEN. Salt to taste, if desired.

Fill hot jars only halfway with the mixture of solids (vegetables, meat, and beans). Cover with remaining liquid, leaving 1 inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process.

Journaling

What combination did you choose to can?

What challenges did you have with this activity?

What other observations do you have about this activity?

Recommended process time for soup in a *dial-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of			
Style of Pack	**Jar Size**	**Process Time**	**0-2,000 ft**	**2,001-4,000 ft**	**4,001-6,000 ft**	**6,001-8,000 ft**
Hot	Pints	60* min	11 lb	12 lb	13 lb	14 lb
	Quarts	75* min	11 lb	12 lb	13 lb	14 lb

Recommended process time for soup in a *weighted-gauge* pressure canner

			Canner Pressure (PSI) at Altitudes of	
Style of Pack	**Jar Size**	**Process Time**	**0-1,000 ft**	**Above 1,000 ft**
Hot	Pints	60* min	10 lb	15 lb
	Quarts	75* min	10 lb	15 lb

***Caution: process 100 minutes if soup contains seafood.**

7. Conduct a Taste Test

Select a vegetable or dry bean and process it using two different methods. Some suggestions:

- Can a vegetable using raw pack and hot pack.
- Can a dry bean in tomato sauce and in water.
- Can a dry bean in molasses sauce and in water.
- Compare a home-canned product with a commercially canned product.

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 panelists the preservation method you used.
- Ask each panel member to write down comments about each of the samples they are comparing.
- Ask the panelists to indicate which sample they prefer.
- Share the results with the panel.
- Record the results of your taste test.

Journaling

What type of vegetable or dry bean did you choose to 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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8. Label Your Product

Determine what type of canned product you need to label. Decide if you can write on the lid or if you need to attach the label to the jar. Here are some important things to include on the label:

- Name of product
- Date canned
- Ingredients
- Processing information (raw or hot pack, processing time, altitude adjustment)
- Source of recipe (for example, Ball's *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

Journaling

What canned food 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 about this activity?

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9. 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?

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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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10. Make a Menu Plan

Using the menu planning information in the front of this manual, develop a menu plan for 1 day for your friends and family. Include some foods that you have pressure canned.

Menu:

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 pressure canning them. 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 pressure canning.
- Demonstrate the parts of a pressure canner and the proper process for using one.
- Demonstrate how to prepare vegetables and pack them into jars.
- Explain the difference between raw pack and hot pack.
- Explain why you need to adjust for altitude and how to make the adjustment for pressure canning.
- Demonstrate how to prepare meat and pack it into jars.

Reflections on pressure canning

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

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

Q. Why do produce and meat need to be at their peak of quality for canning?

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

Q. How do you test for a seal in home-canned food?

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