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MONTANA STATE UNIVERSITY EXTENSION

MontGuide

Home-canning Using Boiling Water Canners and Pressure Canners

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Time charts and instructions to ensure safety of home-canned foods.

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Safety is the Top Priority

Safely canning foods at home requires using processing methods that not only preserve the food but also destroy bacteria and molds that cause foodborne illness, such as botulism. Botulism, caused by a toxin of the bacteria, Clostridium Botulinum, can be fatal. This bacteria can grow and reproduce in improperly processed home-canned foods. Protect yourself and others when sharing home-canned foods by learning safe preservation techniques. The safest recipes and resources are those that have been researched and rigorously tested by the United States Department of Agriculture (USDA) and Extension Services associated with land-grant universities. Many home-preserved recipes are not tested for safety, so it is critical to use the resources located below.

Recommended Research-based Food Preservation Resources

National Center for Home Food Preservation (NCHFP), USDA sponsored website is the most current source for publications, video clips, tutorials for the beginning home food preserver, frequently asked questions, and seasonal tips: http://nchfp.uga.edu/

USDA Complete Guide to Home Canning, 2015. Available on NCHFP website, above, click on 'publications'

So Easy to Preserve, 6th edition only, 2014. MSU Extension does not recommend earlier editions. http://www.soeasytopreserve.com

Free Canning Timer & Checklist app https://catalog.extension.oregonstate.edu/pnw689

The following publications are available at local stores or order online. *The All New Ball Blue Book of Canning and Preserving,* 1st ed., 2016; *The Best Ball Home Canning and Preserving Recipes: Fresh Flavors All Year Long,* 1st ed. 2016; *Ball Blue Book Guide to Preserving,* 37th ed., 2014. Earlier editions not recommended.

Two Questions of Safety

Before beginning home-canning, ask:

1. What is my altitude?

In order to decrease the risk of food-related illness and death, determine the correct home-canning processing times and pressures for your altitude. While water boils at 212°F at sea level, it boils at a much lower temperature at higher altitudes. Consequently, at higher altitudes home-canned foods must be processed for longer times or at higher pressures.

2. Is the food I am home-canning a high-acid or low-acid food?

The following information will help determine the need to use a pressure canner or boiling water canner.

Low-acid foods include vegetables (except most tomatoes), meats, poultry and fish, which have little natural acidity. Since acidity helps protect foods from poison-causing bacteria and food spoilage, they must be processed at higher temperatures and pressures that can only be reached by pressure canners. Never use a boiling water canner or an atmospheric steam canner for low-acid foods.

High-acid foods used for canning include fruits (naturally high in acid) and properly acidified tomatoes and pickled products. Process either in a boiling water canner, pressure canner or the new atmospheric steam canner (NOT cooker). Check resources on p. 4 to determine the best processing method. Each processing method requires specific directions for a safe and quality product. See Equipment for more information on processing using atmospheric steam canners.

NOTE: In recent years, the recommendations for safely canning tomatoes and salsa have changed. Because tomatoes grown today may have less acidity, they need to be acidified before canning by adding 2 tablespoons of bottled lemon juice or ½ teaspoon of citric acid per quart. When canning salsa, only use recipes based on USDA recommendations. These salsa recipes have been tested to determine a safe level of acidity. Do not use unapproved salsa recipes for canning.

Equipment and Methods Not Recommended

Processing of freshly filled jars in conventional ovens, microwave ovens, dishwashers, pressure cooker/sauce pans and open-kettles are not recommended because they will not prevent growth of deadly botulism. Jars with wire bails and glass caps, one-piece zinc, or porcelain-lined caps are not recommended.

Ensuring High-Quality Canned Foods

Use only high-quality foods which are at the proper maturity and are free of mold, diseases and major bruises. Trim small bruised spots from food. Never use overripe foods.

SAFE EQUIPMENT

❑ Jar lifters ❑ Canning funnels ❑ Non-metallic spatulas ❑ Canning jars and lids

Boiling water canners are used for high-acid foods equipped with lid and bottom rack. Pot must be deep enough to hold the size of jar being processed with one inch of water covering the top of lid and an additional 2 inches of air space to prevent boil over.

Pressure canners are used for low- and high-acid foods. There are two types of pressure canners: dial gauge and weighted pressure gauge. Of the two pressure canners, a dial-gauge pressure canner allows more flexibility in pressure settings needed for altitude adjustments, therefore the quality of product may be higher than when using a weighted-gauge canner where pressure is not as precise. Dial gauge canners must be tested yearly to ensure accurate readings. Contact a local county Extension agent, hardware store, or the Presto Company for free gauge testing. Contact Presto at 1-800-877-0441 or https://www.gopresto.com/ for instructions.

PREPARING AND PACKING

Preparing: Preparation procedures vary. Follow recipe directions.

Style of pack: Many fresh foods contain 10-30 percent air. Hot packed foods will remove more air from the foods, prevent floating of food, and yield a higher quantity than raw packing.

Raw Pack: Foods are not cooked or heated in any way prior to packing. In a raw pack, raw food is placed directly in the jars. Then hot, boiling liquid is poured over the contents. Pack firmly, but do not crush. Free the bubbles or trapped air between the pieces of food.
Hot pack: Heating the food to boiling or cooking the food for a specified amount of time and then packing the hot food into the jar and adding boiling liquid to cover the food. Since shrinkage will already have occurred, the food should be packed loosely.

Jar size: Follow directions for packing in either ½ pint, pint or quart jars.

Head space: Follow recipe directions.

Lids: Follow manufacturer's directions for lids.

PROCESSING

Follow manufacturer's directions for pressure canners, except ALWAYS vent your pressure canner even if manufacturer does not recommend or include directions. Important: if processing is interrupted, start again using the same method, timing and pressure as in the original directions.

❑ Determine pressure and times for altitude. See Tables 1, 2 and 3.

❑ Fasten the canner lid securely. Leave the weight off the vent pipe. To vent your canner, turn the heat setting to its highest position. Heat until the water boils and steam flows freely in a funnel-shape from the open vent pipe. While maintaining the high heat setting, continue to vent for a full 10 minutes. Place gauge on vent pipe. The canner should pressurize within 5 minutes. After gauge reaches recommended pressure, adjust heat to maintain the pressure for the entire processing period. Set the timer for the length stated in the recipe. Frequently check to make sure the correct pressure is maintained.

Use a boiling water canner for high-acid foods only (fruits, properly acidified tomatoes, properly acidified pickled products)

❑ Determine processing times for altitude. See Tables 1, 2 and 3.

❑ Place jars on a ½ inch bottom rack.

❑ Start processing time as soon as water returns to boil and be sure jars are covered with at least one inch of boiling water.

COOLING AND SEALING

Cooling pressure canner: Remove pressure canner from stove, cool at room temperature until pressure returns to zero. Do not force cool the canner by opening vent, removing weight, or running under cold water. After canner is completely depressurized, remove the weight or open the vent. Wait 10 minutes, then unfasten the pressure canner lid and remove carefully.

Cooling boiling water canner: Turn off heat after required processing time. Remove lid and wait 5 minutes before removing jars.

Removing jars from canner: Place jars on rack or towel so air can circulate. Never tip a jar to remove water from lid. Do not cover with towels or expose to drafts. Do not touch or tighten lids. Jars will cool within 12 hours. NOTE: If lids do not seal, jars should be reprocessed with new lids using the original processing method and time within 24 hours. If not reprocessed, refrigerate or freeze food quickly and use these foods first.

STORING

After jars are sealed and cool, remove rings. Wash and label jars. Store in cool, dry, dark place. Best quality if used within one year. If seals fail while in storage, food should be discarded. Do not taste.

CONSUMING

❑ If you are uncertain about the safety of home-canned foods, follow the advice **"When in doubt, throw it out."**

❑ Botulism and other deadly foodborne illness causes are not detected in food by sight, smell and taste. Foods may show no sign of spoilage! If a canned food looks spoiled, foams or even has an "off" odor, dispose of it.

TABLE 1. Dial guage and weighted gauge pressure canner processing times for select low-acid vegetables, meats and poultry.

IMPORTANT: For processing pressures refer to step 4 in the chart to the right.

Vegetables See MT200906HR for processing times for fruits, tomatoes and mixtures	**Pint**	**Quart**
Asparagus, spears or pieces, raw or hot pack	30	40
Beans or peas, shelled, dried, hot pack only	75	90
Beans, baked (see Beans, dry)		
Beans, dry, with tomato or molasses sauce, hot pack only	75	90
Beans, fresh lima – shelled, raw or hot pack	40	50
Beans, snap and Italian – pieces, raw or hot pack	20	25
Beets, whole, cubed, or sliced, hot pack only	30	35
Carrots, sliced or diced, raw or hot pack	25	30
Corn, cream style, hot pack only	85	NA*
Corn, whole kernel, raw or hot pack	55	85
Mixed vegetables, hot pack only	75	90
Mushrooms, whole or sliced, hot pack (½ pint same as pint) NOTE: Wild mushrooms cannot be canned safely.	45	NA*
Peas, green or english, shelled, raw or hot pack	40	40
Peppers, hot pack only (½ pint same as pint)	35	NA*
Potatoes, sweet, pieces or whole, hot pack only	65	90
Potatoes, white, cubed or whole, hot pack only	35	40
Pumpkin and winter squash, cubed, hot pack only	55	90
Spinach and other greens, hot pack only	70	90
Squash, winter, cubed (see Pumpkin)		
Meats and Poultry See MT200903HR for more information on canning meat, poultry and fish.	**Pint**	**Quart**
Chicken or rabbit, cut up, without bones, raw or hot pack	75	90
Chicken or rabbit, cut up, with bones, raw or hot pack	65	75
Ground or chopped meat, hot pack only	75	90
Strips, cubes or chunks of meat, raw or hot pack	75	90
Meat stock (broth), hot pack only	20	25
Fish, raw pack only	100	NA**
Smoked fish	110***	NA*

Processing times in this table are only for foods prepared according to the recommendations found in the Recommended Resources listed on page 1.

Steps for processing in pressure canners

1. Follow directions for hot pack or raw pack.
2. Follow directions for head space. (NOTE: Head space is 1 inch for vegetables and all meats except chicken and rabbit, which is 1½ inches.)
3. Determine processing time.
4. Determine pressure based on altitude for either dial or weighted-gauge pressure canner.

   a. Dial Gauge Canner:

Altitude	Pressure
0000-2000 feet	11 lbs.
2001-4000 feet	12 lbs.
4001-6000 feet	13 lbs.
6001-8000 feet	14 lbs.

   For example, use 13 lbs. of pressure (PSI) when processing in Red Lodge at an altitude of 5562 feet.

   b. Weighted-gauge canner: Use 15 pounds. (Note: 15 pounds required for all altitudes above 1,000 feet.)

TABLE 2. Altitudes* of County Seats in Montana

County Seat	Altitude	County Seat	Altitude	County Seat	Altitude	County Seat	Altitude
Anaconda	5239	Cut Bank	3793	Hysham	2618	Ryegate	3775
Baker	2968	Deer Lodge	4609	Jordan	2640	Scobey	2461
Big Timber	4199	Dillon	5118	Kalispell	2984	Shelby	3300
Billings	3153	Ekalaka	3494	Lewistown	3936	Sidney	1967
Boulder	4938	Forsyth	2510	Libby	2198	Stanford	4288
Bozeman	4806	Fort Benton	2698	Livingston	4557	Superior	2813
Broadus	3091	Glasgow	2088	Malta	2275	Terry	2228
Butte	5539	Glendive	2053	Miles City	2362	Thompson Falls	2519
Chester	3162	Great Falls	3398	Missoula	3232	Townsend	3869
Chinook	2411	Hamilton	3625	Phillipsburg	5357	Virginia City	5804
Choteau	3799	Hardin	2903	Plentywood	2068	W. Sulphur Sp.	5091
Circle	2500	Harlowton	4185	Polson	2930	Wibaux	2650
Columbus	3599	Havre	2493	Red Lodge	5562	Winnett	2975
Conrad	3523	Helena	4068	Roundup	3198	Wolf Point	2043

*accessed March 2017 http://geoinfo.msl.mt.gov/geography/geography_facts/elevation_of_montana_cities

TABLE 3. Boiling water canners processing time for select fruits, acidified vegetables and pickled products.

	Food and Kind of Pack	Size	Minutes to Process, at Altitudes (in feet) of: 1000-2000	2001-3000	3001-4000	4001-5000	5001-6000	6001-7000	7001-7999
FRUITS	Apple butter, hot pack*	½ pint	10	10	10	10	10	15	15
		pint	15	15	15	15	15	20	20
	Apple juice, hot pack*	pint & quart	10	10	10	10	10	15	15
	Apples, hot pack	pint & quart	25	25	30	30	30	35	35
	Applesauce, hot pack	pint	20	20	20	20	20	25	25
		quart	25	25	30	30	30	35	35
	Spiced apple rings, hot pack	½ pint, pint	15	15	15	15	15	20	20
	Spiced crab apples, hot pack	pint	25	25	30	30	30	35	35
	Apricots, halved or sliced	Follow directions for peaches							
	Berries, hot pack	pint & quart	20	20	20	20	20	25	25
	Berries, raw pack	pint	20	20	20	20	20	25	25
		quart	25	25	30	30	30	35	35
	Berry or fruit syrup, hot pack	½ pint, pint	15	15	15	15	15	20	20
	Cherries, hot pack	pint	20	20	20	20	20	25	25
		quart	25	25	30	30	30	35	35
	Cherries, raw pack	pint & quart	30	30	35	35	35	40	40
	Fruit puree, hot pack*	pint & quart	20	20	20	20	20	25	25
	Grape juice, hot pack*	pint & quart	10	10	10	10	10	15	15
	Peaches, hot pack	pint	25	25	30	30	30	35	35
		quart	30	30	35	35	35	40	40
	Peaches, raw pack	pint	30	30	35	35	35	40	40
		quart	35	35	40	40	40	45	45
	Pears, halved, hot pack	pint	25	25	30	30	30	35	35
		quart	30	30	35	35	35	40	40
	Plums, halved or whole, raw or hot pack	pint	25	25	30	30	30	35	35
		quart	30	30	35	35	35	40	40
	Rhubarb, stewed, hot pack	pint & quart	20	20	20	20	20	25	25
TOMATOES	Tomatoes, raw, pressed in, no added liquid**	pint & quart	90	90	95	95	95	100	100
	Tomato juice, hot pack**	pint	40	40	45	45	45	50	50
		quart	45	45	50	50	50	55	55
PICKLED PRODUCTS	Sauerkraut, hot pack	pint	15	15	15	15	15	20	20
		quart	20	20	20	20	20	25	25
	Sauerkraut, raw pack	pint	25	25	30	30	30	35	35
		quart	30	30	35	35	35	40	40
	Sweet Gherkins, raw pack	pint	10	10	10	10	10	15	15
	Dilled green or yellow beans, raw pack	pint	10	10	10	10	10	15	15
	Pickled beets, hot pack	pint & quart	35	35	40	40	40	45	45
	Piccalilli or chow chow, hot pack	½ pint, pint	10	10	10	10	10	15	15
	Corn relish or 3-bean, hot pack	½ pint, pint	20	20	20	20	20	25	25
	Dill pickles, raw pack	pint	15	15	15	15	15	20	20
		quart	20	20	20	20	20	25	25
	Bread & butter pickles, hot pack	pint & quart	15	15	15	15	15	20	20
	Pickle relish, hot pack	½ pint, pint	15	15	15	15	15	20	20
	Pickled mixed vegetables, hot pack	pint	10	10	10	10	10	15	15
		quart	15	15	15	15	15	20	20

* ¼ inch head space; all others are ½ inch.

** Add 1 tablespoon lemon juice or ¼ teaspoon citric acid per pint. Double amount per quart.

Processing times in this table are only for foods prepared according to the recommendations found in the Recommended Resources listed on page 1.

STEPS FOR PROCESSING IN A BOILING WATER CANNER

1. Determine hot pack or raw pack.
2. Determine headspace. (Note: All foods on this list are ½ inch except for those marked with *.)
3. Determine processing time based on altitude. (Altitude chart on page 3.)

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