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Principles of Pressure Canning

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Why Choose Pressure Canning to Preserve Food?

Pressure canning is a safe and economical method of preserving low acid foods which has been used for decades—especially by home gardeners and others interested in providing food storage for their families where quality control of the food is in ones' own hands. Home food preservation also promotes a sense of personal satisfaction and accomplishment. Further, the guess-work is taken out of being able to provide a safe food supply at home when guidelines for operating a pressure canner are followed exactly, scientifically tested/approved recipes are utilized, and high quality equipment, supplies and produce are used.

What Foods Are Typically Processed/Preserved Using a Pressure Canner—and Why?

Low acid foods require a higher temperature when processing than can be reached by placing them in jars immersed by boiling water. To kill harmful bacteria (such as those associated with botulism) use of pressure canning ensures the safety of the preserved produce. Foods such as red meats, sea food, poultry, milk, and all fresh vegetables, with the exception of most tomatoes, fit into the low acid group since they have an acidity, or pH level, of 4.6 or higher. The temperature which must be reached and maintained (for a specified amount of time) to kill the bacteria is 240EF. This temperature can be reached only by creating steam under pressure.

Becoming Familiar with the Parts of a Pressure Canner

(See illustration, last page)

Older model pressure canners (made before 1970) were heavy-walled kettles with clamp-on or turn-on lids fitted with dial-type gauges. A vent port, in the form of a petcock or counterweight, and a safety fuse were also present. Modern pressure canners are lightweight, thin-walled kettles and most have turn-on lids. They usually have a perforated metal rack or basket with handles, rubber gasket, a dial or weighted gauge, an automatic vent/cover lock, a vent port (steam vent) to be closed with a counterweight or weighted gauge, and a safety fuse.

Note: When purchasing a used pressure canner, make certain all parts are accounted for and in good condition. It is nearly impossible to find replacement parts for older models.

Selecting the Correct Processing Time and Pressure

To ensure the safety of food processed in the pressure canner, use processing times listed for scientifically-tested recipes (dated 1988 or later) and adjust for altitude using the chart below. Keep in mind that failing to follow proper processing times and pressure recommendations may result in spoiled food (mold, bacteria, and other microorganisms) and possibly fatal food poisoning.

Pressure Canner and Altitude

The steam-pressure method is used for low-acid foods. Normally, the pressure given for low acid foods in canning guides is for weighted-gauge canners at altitudes at or below 1,000 feet above sea level. At altitudes of 1,001 feet of above, adjust the processing pressure according to the STEAM-PRESSURE CANNER chart for the type of steam-pressure canner being used.

Table 1. Pressure Required for Home Canning at Different Altitudes

Altitude (ft)	Pressure Required (lbs)	
	Weighted Gauge	Dial Gauge
0-1000	10	11
1001-2000	15	11
2001-4000	15	12
4001-6000	15	13
6001-8000	15	14
8001-10,000	15	15

Basic Steps in Pressure Canning

1. Center the canner over the burner. When you have your jars of food ready for canning, put the rack and hot water into the canner. If the amount of water is not specified with a given food, use 2 to 3 inches of water. Longer processes required more water. Some specific products (for example, smoked fish) require that you start with even more water in the canner. Always follow the directions with USDA processes for specific foods if they require more water be added to the canner.

   For hot packed foods, you can bring the water to 180°F. ahead of time, but be careful not to boil the water or heat it long enough for the depth to decrease. For raw packed foods, the water should only be brought to 140°F.

2. Place filled jars, fitted with lids, on the jar rack in the canner, using a jar lifter. When moving jars with a jar lifter, make sure the jar lifter is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing area of the lid.

3. Fasten the canner lid securely. Leave the weight off the vent port or open the petcock.

4. 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 port or petcock. While maintaining the high heat setting, let the steam flow (exhaust) continuously for 10 minutes.

Photo: Green beans, chicken soup and carrots pressure canned at USU.

5. After this venting, or exhausting, of the canner, place the counterweight or weighted gauge on the vent port, or close the petcock. The canner will pressurize during the next 3 to 10 minutes.

6. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or, for canners without dial gauges, when the weighted gauge begins to jiggle or rock as the manufacturer describes.

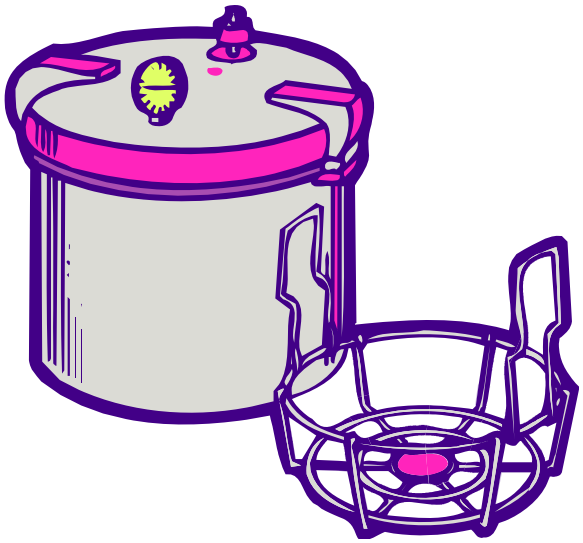
7. Regulate the heat under the canner to maintain a steady pressure at, or slightly above, the correct gauge pressure. One type of weighted gauge should jiggle a certain number of times per minute, while another type should rock slowly throughout the process – check the manufacturer's directions.

8. Loss of pressure at any time can result in under-processing, or unsafe food.

9. Quick and large pressure variations during processing may cause unnecessary liquid losses from jars.

10. **IMPORTANT:** If at any time pressure goes below the recommended amount, bring the canner back to pressure and begin the timing of the process over, from the beginning (using the total original process time). This is important for the safety of the food.

11. When the timed process is completed, turn off the heat, remove the canner from the heat (electric burner) if possible, and let the canner cool down naturally. (It is okay to leave the canner in place after you have turned off the burner.) While it is cooling, it is also de-pressurizing. Do not force cool the canner. Forced cooling may result in food spoilage. Cooling the canner with cold running water or opening the vent port before the canner is fully depressurized are types of forced cooling. They will also cause loss of liquid from jars and seal failures. Force cooling may also warp the canner lid.



Even after a dial gauge canner has cooled until the dial reads zero pounds pressure, be cautious in removing the weight from the vent port. Tilt the weight slightly to make sure no steam escapes before pulling it all the way off. Newer canners will also have a cover lock in the lid or handle that must release after cooling before the lids are twisted off. Do not force the lid open if the cover locks are not released. Manufacturers will provide more detailed instructions for particular models.

12. Depressurization of older canner models without dial gauges should be timed. Standard size heavy-walled canners require about 30 minutes when loaded with pints and 45 minutes when loaded with quarts. Newer thin-walled canners cool more rapidly and are equipped with vent locks that are designed to open when the pressure is gone. These canners are depressurized when the piston in the vent lock drops to a normal position. Some of these locks are hidden in handles and cannot be seen; however, the lid will not turn open until the lock is released.

13. After the canner is completely depressurized, remove the weight from the vent port or open the petcock. Wait 10 minutes; then unfasten the lid and remove it carefully. Lift the lid with the underside away from you so that the steam coming out of the canner does not burn your face.

14. Using a jar lifter, remove the jars one at a time, being careful not to tilt the jars. Carefully place them directly onto a towel or cake cooling rack, leaving at least one inch of space between the jars during cooling. Avoid placing the jars on a cold surface or in a cold draft.

15. Let the jars sit undisturbed while they cool, from 12 to 24 hours. Do *not* tighten ring bands on the lids or push down on the center of the flat metal lid until the jar is completely cooled.

16. Remove ring bands from sealed jars. Ring bands can be washed and dried and put away for using another time. Put any unsealed jars in the refrigerator and use first.

17. Wash jars and lids to remove all residues.

18. Label jars and store in a cool, dry place out of direct light.

19. Dry the canner, lid and gasket. Take off removable petcocks and safety valves; wash and dry thoroughly.

Additional Safety/Operating Tips

Gauges: Check dial gauges for accuracy before use each year and replace if they read high by more than 1-2 pound pressure. Gauges may be checked at most county Cooperative Extension offices. Replacement gauges and other parts for canners are often available at stores offering canning equipment or from canner manufacturers. When ordering parts, it will be helpful to know the model number of your canner.

Gaskets: Handle canner lid gaskets carefully and clean them according to the manufacturer's directions. Nicked or dried gaskets will allow steam leaks during pressurization of canners and should be replaced. Keep gaskets clean between uses. A lid which is difficult to remove after cooling may indicate a gummy, or dry gasket and is reason to replace it.

Photo: Getting ready to Pressure Can at the USU Home Food Preservation Workshop May 2008.

Source

USDA Complete Guide to Canning 1994
Preserving Food: Using Pressure Canners (National Center for Home Food Preservation)

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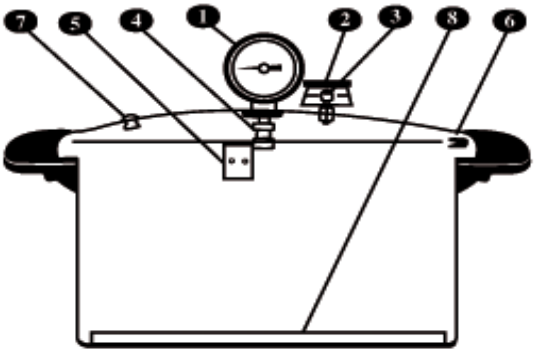
Parts of a Pressure Canner



1. PRESSURE DIAL GAUGE

The pressure dial gauge registers pressure in both pounds (outer scale) and metric measure (inner scale). The pointer moves around the dial indicating the pressure within the unit. Pressure can be controlled and maintained by adjusting heat setting.

2. PRESSURE REGULATOR

The pressure regulator acts as a safety device to prevent pressure in excess of 15 pounds from building in the canner. Pressure readings on the pressure canner are registered only on the pressure dial gauge.

3. VENT PIPE

The pressure regulator fits over the vent pipe and allows excess pressure to be released.

4. AIR VENT/COVER LOCK

The air vent/cover lock automatically "vents" or exhausts air from the canner and acts as a visual indication of pressure in the canner. The small gasket must be in place for the air vent/cover lock to seal completely.

5. LOCKING BRACKET

The locking bracket on the inside of the canner body engages with the air vent/cover lock to prevent the cover from being opened when there is pressure in the unit.

6. SEALING RING

The sealing ring fits into the canner cover and forms a pressure-tight seal between the cover and body during canning and cooking.

7. OVERPRESSURE PLUG

The overpressure plug is located in the canner cover. It will automatically pop out and release steam in case the vent pipe becomes blocked and/or clogged and pressure cannot be released normally through the vent pipe.

8. CANNING-COOKING RACK

The canning-cooking rack is placed in the bottom of the canner to hold jars off the bottom of the unit while canning. When cooking, the rack is used for steaming foods. It can also be used to hold foods such as vegetables out of the cooking liquid which allows several foods to be cooked at the same time without an intermingling of flavors. When it is desirable to blend flavors, do not use the canning-cooking rack. The canning-cooking rack must always be used when canning.