Virginia Cooperative Extension

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Food Preservation
Lesson 2

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CANNING

Canning is one of the most popular ways of preserving foods. Canned foods can be stored at room temperature and, because they are cooked in the canning process, can be prepared quickly. Energy is used only during the canning process so the energy cost is less than for frozen foods where there is a continuing need for energy. The negatives are that more time is required for canning than for freezing, some specialized equipment is needed, and foods have a cooked rather than a fresh flavor.

There are two methods of canning foods--the boiling water bath method and the pressure canner method. The two methods are not interchangeable. Higher temperatures can be achieved in a pressure canner than in a water bath canner. You must choose the method which is appropriate for the food being canned. The boiling water bath method is appropriate for fruits, tomatoes, and pickled and jellied products. The pressure canner method must be used for all vegetables with the exception of tomatoes and pickled vegetables. It is possible to process fruits in a pressure canner rather than a water bath but it is not possible to safely process vegetables in a water bath.

In the boiling water bath, jars of food are immersed in boiling water and heat from the water is transferred to the food. Food in jars never gets hotter than the boiling point of water--212°F--even if the food is processed for several hours. Molds, yeasts, enzymes, and some bacteria are killed by this processing method but not the spores of *clostridium botulinum*. Foods that can be safely processed in the boiling water bath contain acid -- either naturally occurring as in fruits and tomatoes, or produced by fermentation as in sauerkraut, or added as vinegar to pickles and relishes.

In the pressure canner, a small amount of water is heated to produce steam. As a full head of steam is formed, air is driven from the canner (the exhaust period). The canner vent or petcock is then closed, trapping steam inside the canner. The gauge on the canner reflects the temperature inside the canner--the higher the pressure reading, the higher the temperature. Five pounds pressure is equal to 220°F, 10 pounds to 240°F, and 15 pounds pressure to 250°F. It is possible to get food in jars to temperatures above the boiling point of water and thus kill any botulism spores which might be present.

Processing time is important, too, as well as temperature. Processing times have been arrived at by actually measuring the time required for all the food in the jar to reach the desired temperature. The food itself, the temperature of the food at the start of processing time, and the jar size are all factors which affect the processing time. Timetables for processing foods are found in Preserving Foods (Publication 348-027) which is available from the Virginia Cooperative Extension Service.

TIME AND ENERGY SAVINGS

Ten (10) pounds pressure (240°F) is the usual temperature for processing. In recent years, there has been interest in processing at 15 pounds pressure on the assumption that less time and energy would be required because of the higher temperature. Studies have shown that the actual savings of time and energy are not great. The processing time is shorter but it takes longer, and more energy, to get the canner to 15 pounds pressure than to 10 pounds.

Another time and energy question has to do with processing fruits and other acid foods in a pressure canner instead of a water bath. The processing time is shorter in the pressure canner but because of the time required to bring the canner up to pressure and to cool it off before removing jars, more total time may be needed.

Foods in the acid group:

Apples	Fruit Juices
Applesauce	Peaches
Apricots	Pears
Beets, Pickled	Plums
Berries	Rhubarb
Cherries	Tomatoes*
Cucumbers, Pickled	Tomato Juice*

*Tomatoes are near the dividing line between acid and low-acid foods. It is recommended that acid--either citric acid or bottled lemon juice--be added to jars of tomatoes and tomato juice before processing.

Foods low in acid:

Asparagus	Okra
Beans, shelled	Peas
Beans, snap	Potatoes
Beets	Pumpkin
Carrots	Spinach and other Greens
Corn	Squash
Hominy	Sweetpotatoes
Mushrooms	

NOT RECOMMENDED

You will often see warnings against canning by the Open Kettle method, a method in which food is heated, packed into hot jars, and the lid is put in place. The jars of food are not processed but there may be enough heat in the food to get a seal. **OPEN KETTLE CANNING IS NOT RECOMMENDED** as spoilage organisms may get into the food

while it is being transferred to jars. Some air will be trapped in the top of the jar which will allow for activity of these spoilage organisms. Light colored fruits may turn dark in the top of jars. There may be mold growth as well.

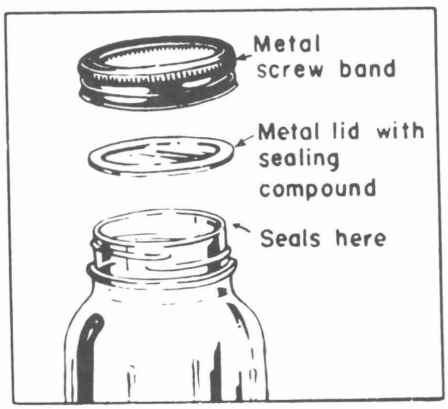
EQUIPMENT NEEDS

JARS AND LIDS. Glass jars are the usual packaging material for home canning. The Mason jar is a style of jar, not a brand name. Several companies market Mason jars for home canning. These jars, made of tempered glass, have a round-square shape with either a standard or wide mouth opening. Pint and quart sizes are the most common, but half-pint and half-gallon jars are also available.

Check jars before using for chips and cracks. A small chip on the sealing surface can prevent a seal. Even a hairline crack may lead to a broken jar during processing.

Wash jars in the dishwasher or in hot, soapy water and rinse well. There is no need to sterilize jars for food which will be processed for more than 10 minutes in a water bath or pressure canner as they will be sterilized during the processing period.

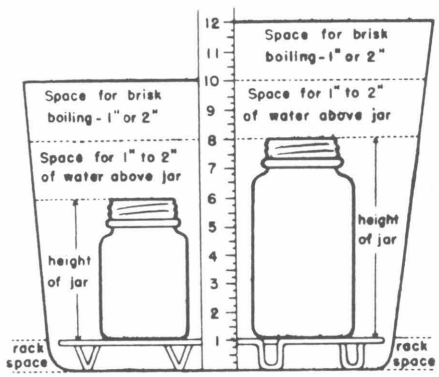
The two-piece metal lid is the closure used most frequently. One piece is the lid which is fitted with a sealing compound; the other piece is a screwband to hold the lid in place during processing. Each manufacturer uses a slightly different sealing compound so follow the instructions with the lids you have.



Reuse of Commercial Jars

USDA does not recommend the reuse of commercial jars for canning. There are several reasons for this. One, home canning jars are usually heavier and more durable than commercial jars designed for one filling. Secondly, commercial jars may or may not be tempered to withstand high temperatures. Glass containers used for cold fill items such as mayonnaise and peanut butter are not tempered. Thirdly, commercial jars have been run through high speed filling lines and may have been scarred in the filling process. In addition, some are scarred by spoons and knives in the emptying process. These scars may lead to breakage when the jar is subjected to high temperatures. The lid may also present a problem. The original lid may be unusable and it may not be possible to find another lid to fit.

WATER BATH CANNERS. The requirements for a water bath canner are that it be deep enough to allow for 1 to 2 inches of water above the jars of food to boil vigorously, and that it have a rack and a lid. A flat bottom is essential if it is to be used on an electric range. You may be able to use a pot that you already have if it satisfies these requirements.



PRESSURE CANNERS. Pressure canners are made of materials strong enough to withstand pressure. Aluminum, either cast or heavy-gage, is most common. In hard water areas, the inside of an aluminum canner will darken, but this does not impair its usefulness. Lids of pressure canners are locked in place to keep in steam. If steam were allowed to escape, the temperature inside the canner would stay near the 212°F mark. The lids on older canners are fastened on with several thumb-screw type closures or lugs. Covers on newer canners usually slide into a locked position.

A gauge is essential to indicate pressure (temperature) inside the canner. Two types of gauges are used--dial and weight. The dial gauge gives a visual picture of the temperature; a weighted gauge gives an audio picture. The user must watch the dial gauge and make necessary adjustments in heat to keep the reading constant. When pressure inside a canner with a weighted gauge exceeds the preset level (usually 10 or 15 pounds pressure), the steam lifts the gauge allowing excess steam to escape. There is noise associated with the movement of the weight--either a jiggle or a hiss. If the noise is very insistent, then the pressure is above the desired level. If the noise is infrequent, then the canner is not hot enough.

Which is best? Both types of gauges have loyal supporters. There's not much that can go wrong with a weighted gauge, but the noise is annoying to some persons. A dial gauge does need to be checked periodically. (Most Virginia Cooperative Extension Service offices offer this service.) It's also important to keep water out of the dial gauge which means extra care when cleaning up.

Most canners have a gasket of rubber or a rubberlike material that prevents steam from leaking out around the cover. (Canners which close with lugs have a very deep overlap to give a tight seal.) The gasket deteriorates with use and age and is the part which needs to be replaced most often.

Vents are provided to allow air to be exhausted from the canner and to permit the release of steam as needed. A petcock or weight is used to control the escape of air or steam.

In addition, all pressure utensils have a safety plug of some type which goes into action when the pressure inside the canner gets too high. A metal alloy safety plug

will melt, allowing excess steam to escape; a composition-type safety plug will be blown out. The most usual reason for this is a dry canner.

A pressure saucepan can be used for canning but is practical only when a small amount of food is to be canned.

STEAM CANNER. A steam canner is not a pressure canner. Jars of food sit on a rack in the shallow bottom of the steam canner. A domed top covers the jars. A small amount of water is heated in the bottom of the container to form steam which surrounds the jars of food. The steam is not confined so the temperature is less than is achieved in a pressure canner. Tests of the temperatures reached in a steam canner indicate that it is not even a good substitute for a water bath canner much less for a pressure canner.

MICROWAVE CANNER. One company has marketed a pressure canner to be used in the microwave. The canner only processes one jar of food at a time so it is not very efficient. There have also been some problems with liquid loss.

CANNING HOW TO'S

Fruits and vegetables should be of optimum quality for canning. Canning will not improve the quality of fruits and vegetables; in fact, there will be some loss of quality.

Foods can be packed into jars with or without heating. The *RAW* pack is one step shorter than the *HOT* pack and this saving of time is its advantage. However, this "saved" time may be eaten up by a longer processing time. Hot packed foods are easier to fit into jars, the pieces are less apt to float or juices to separate, and the processing time is often shorter.

Which ever method you choose, it is important to leave headspace in the jars. Food expands during processing forcing out air trapped in the food and jar. If there is not enough headspace, liquid is likely to boil out during processing. If there is too much headspace, air may be left in the jars. The publication Preserving Foods has information about headspace for each food.

Wipe the jar rim clean after produce is packed. Put lid on with sealing compound next to glass. Screw metal band on firmly.

Heat water in the canner as you are filling jars--2 or 3 inches in the pressure canner; 6 to 8 inches in the water bath canner. Set filled jars on the rack in the canner. If the filled jars do not raise the water level in the water bath enough to cover the jars, add hot water.

Cover the *WATER BATH CANNER* and bring water to a full boil. *Start counting processing time when the water comes to a boil.* Keep the water boiling all during the processing period. Add boiling water, if needed, to keep level 2 inches above jars. Remove jars as soon as the processing time is up. You'll need tongs or a jar lifter to get the jars out of the boiling water.

Fasten the lid on the *PRESSURE CANNER.* Leave the petcock or vent open to allow air to escape. Heat canner rapidly. Exhaust the canner--allow steam to escape--for 10 minutes. This expels the air in the

canner and assures that pressure obtained will be true steam pressure.

Close the petcock or vent pipe. Watch a dial gauge or listen for a weighted gauge. When the pressure approaches the desired point, reduce the heat. *Start counting processing time when desired pressure is reached.* Adjust heat throughout processing period to keep the pressure as constant as possible. When processing time is up, turn off heat or set the canner off the heat. Let the canner cool naturally until dial gauge registers zero or a weighted gauge has stopped moving. Then open the petcock or remove weight to let the remainder of steam escape. Never hurry the cooling of a canner as this causes loss of liquid from jars.

Loosen the cover as soon as steam stops coming out of the vent. If you hurry this step, you may find the canner difficult to open because of the vacuum which has formed inside the canner. Always lift the canner lid away from you so that you won't get steam in the face.

Remove jars and set top side up on a rack or towel to cool. Do not adjust jar lids after processing. Sealing occurs during this cooling period. You can count the "pings." Check for seals on the day after canning. The center of the lid should be depressed and give a clear ringing sound when thumped with a finger or tapped with a spoon. If a jar has not sealed, refrigerate it and use as soon as possible or reprocess. If you choose to reprocess, you'll have to use a new lid and process for the full amount of time again.

COSTS OF CANNING

The first time canner will have to buy equipment--a pressure canner, jars and lids, and a jar lifter at minimum. All but the jar lids can be reused for a number of years. The food itself and any added ingredients such as sugar or vinegar are obvious costs. It is easier to determine the cost of purchased produce than of surplus produce from the home garden. Energy use in canning is minimal--2 to 3 kwh per canner load. One's time also has value and may be a cost to be factored in.

YOUR ASSIGNMENT

1. Check out your pressure canner if you have one. Locate the various features. Put about an inch of water in the canner and bring it up to pressure as you would if canning. Watch for steam leaks. If steam escapes around the cover, examine the sealing edges of utensil and cover; if they are rough, smooth with a fine cleansing powder. Try reversing the gasket to improve the seal. If the gasket is worn, stretched, or hardened, replace it. Have a dial gauge checked for accuracy at the Virginia Cooperative Extension Service Office nearest you.

2. If you don't have a pressure canner, you may want to shop for one. A pressure canner is essential if you are going to can vegetables or meats. Two companies currently make most of the pressure canners on the market, but you will find a

good bit of variation in price so shop around. Remember that the stated size of the canner refers to its capacity, not the number of jars it will hold. For example, you can pour 16 quarts of water into a 16-quart canner, but you can only set 7 quart jars in it for processing.

MY ASSIGNMENT

(Questions You Asked)

Q. I bought a pressure canner at a yard sale but it didn't have any directions with it. What should I do?

A. It may be just as well that the use and care booklet is missing as processing times for a number of foods have changed over the years. Identify canner parts and do a trial run before canning season. Use the processing times in Preserving Foods.

Q. Why and how is liquid lost from jars?

A. Loss of liquid may occur if there are wide fluctuations in the temperature during processing. This can happen if the surface unit used does not have a heat setting which will keep the pressure constant. The user must anticipate changes in temperature and make needed adjustments.

Another cause of liquid loss is speeding the cooling of the canner by setting it in a draft, covering it with cold towels, or pouring cold water over the canner.

Excess air left in the jars or in food can also cause a lowered liquid level after processing. Raw packed foods are especially vulnerable. If jars are underfilled, the level will drop when air is expelled from the jar during processing. On the other hand, an overfill will result in liquid boiling out of the jar during processing.

Some starchy vegetables such as corn and lima beans absorb water during processing so the liquid level is lowered.

You may wonder how liquid escapes from the jars after the lid is in place. Jar lids are designed to allow air to escape during processing. Liquid can escape in the same way. Sealing occurs after processing when the jars have cooled enough for a vacuum to develop inside the jar which pulls the lid down. A good seal has two things going for it--contact between the jar and the sealing compound of the lid and a vacuum which exerts downward pressure.

Q. What should you do about jars of food which have lost liquid?

A. Nothing. If you opened the jars to add liquid, you'd need to start with a new lid and reprocess the food. Pieces of food not covered by liquid may discolor and soften but will be safe to eat.

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