

## Can It Safely

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### Introduction

Home canning can be an economical and safe way of preserving favorite foods. Only up-to-date methods based on **current research should be used in home canning**. Methods, including recipes, found in old cookbooks or home canning leaflets should not be used. Reliable sources of up-to-date methods are Virginia Cooperative Extension, United States Department of Agriculture (USDA), and major manufacturers of home canning equipment. The following information will help you can foods safely and prevent home canning problems.

### Food Spoilage

Microorganisms, physical damage, water loss, and enzymes can spoil home-canned foods.

Microorganisms that cause spoilage include molds, yeasts, and bacteria. They are found in the air and soil and on people and animals. Molds grow well on high-acid foods, such as those listed in Table 1 below, but they are destroyed by heating foods to temperatures between 140 and 190 degrees F. Yeasts also grow on high-acid foods but are destroyed at temperatures between 140 and 180 degrees F.

Bacteria can grow at cold, warm, or hot temperatures, depending on the particular type of bacteria. Some need air (oxygen) to grow, and others do not. Most grow well on low-acid foods,

such as those listed in Table 1 below. Although most are destroyed by heat, a few can form spores that are destroyed only by temperatures above boiling (212 degrees F).

In home canning, foods are heated in jars to temperatures that destroy microorganisms that cause spoilage and foodborne illness. There are two safe methods of canning: **the boiling water bath method** and **the pressure canner method**. The method to use depends on the type of food being canned.

The boiling water bath method is used to can high-acid foods (see Table 1 below). In this method, jars of food are completely covered with boiling water and heated for a specific period of time. The time depends on the food. Reliable sources of canning methods will indicate the time needed to heat the food.

The pressure canner method is used to can low-acid foods (see Table 1 below). In this method, jars of food are heated under pressure to 240°F, a temperature above boiling. This temperature is needed to destroy the spores of *Clostridium botulinum*, the bacterium that causes botulism. These spores grow well in low-acid foods and in the absence of air. When they grow they produce the deadly botulism toxins (poisons). Even a taste of food containing these toxins can be fatal. Because the spores survive at 212°F, low-acid foods must be heated under pressure to achieve a temperature high enough (240°F) to destroy the spores.

**Table 1. High-acid and low-acid foods.\***

High-acid foods		Low-acid foods	
Apples	Peaches	Asparagus	Mushrooms
Applesauce	Pears	Beans, shelled	Okra
Apricots	Pickled beets	Beans, snap	Peas
Berries	Plums	Beets	Potatoes
Cherries	Rhubarb	Carrots	Pumpkin
Cucumbers	Tomatoes	Corn	Spinach and greens
Fruit juices	Tomato juice	Hominy	Squash

\* Process high-acid foods in a boiling water bath canner and low-acid foods in a pressure canner according to up-to-date methods.

Most high-acid foods can be canned with the boiling water method because they contain enough acid to prevent the growth of *Clostridium botulinum*. Although tomatoes are usually considered a high-acid food, some varieties are lower in acid than others. Therefore, tomatoes must be acidified with lemon juice when they are canned with the boiling water bath method. Two tablespoons of bottled lemon juice should be added to each quart, and one tablespoon should be added to each pint of tomatoes.

Salt, sugar, and vinegar are frequently used in home canning because these ingredients inhibit the growth of microorganisms that cause spoilage and illness. Therefore, **it is important not to alter recipes for home-canned foods**. Only recipes from reliable sources of canning methods should be used. It is possible, however, to can foods at home for people who are watching their sugar and salt intakes. Recipes and methods have been developed for people on special diets.

## Processing in a Boiling Water Bath Canner

Most large metal containers can be used as a boiling water bath canner if deep enough. Water must cover the top of jars by 1 to 2 inches, and there must be another 1 to 2 inches of space to allow for brisk boiling of water. The canner must have a rack and a tight-fitting lid. The rack keeps jars from touching the bottom of the canner and

allows for water to circulate under jars. If it has dividers, jars will not touch each other or bump against sides of the canner during processing. A deep pressure canner can be used as a water bath canner. The lid of the canner should not be sealed, and the safety valve must be left open to allow steam to escape, preventing buildup of pressure in the canner.

A canner with a flat bottom must be used on an electric range, but a canner with either a flat or ridged bottom can be used on a gas range. To insure uniform processing of all jars with an electric range, the canner should be no more than 4-inches wider in diameter than the element on which it is heated. A wash kettle that fits over two burners should not be used on either a gas or electric range because jars in the middle of the kettle will not get enough heat.

## Processing in a Pressure Canner

Low-acid foods **must** be processed in a pressure canner for the correct time and temperature to avoid the risk of botulism. Temperature must be adjusted when food is processed at altitudes of 1,000 feet above sea level or higher (see Adjusting for Altitude). Foods can spoil if processed at a lower pressure than specified or processed for a shorter time than specified. All types of pressure canners must be vented 10 minutes before they are pressurized because air trapped in a canner lowers

temperature, resulting in underprocessing. Canners must be cooled at room temperature until they are completely depressurized. Foods can spoil if canners are improperly exhausted or if canners are cooled too quickly with water.

Pressure canners have either a weight or a dial gauge that controls pressure. For weight-gauge models, the sound of the weight rocking or jiggling during processing indicates that the canner is maintaining the recommended pressure. Weight-gauge models, however, cannot correct pressure precisely at altitudes of 1,000 feet above sea level or higher.

Dial-gauge models must be checked for accuracy before use each year. Gauges can be checked at county Cooperative Extension offices. Replace the gauge if it reads high by more than 1 pound at 5, 10, or 15 pounds of pressure. A low reading indicates that the accuracy of the gauge is unpredictable.

## **Adjusting for Altitude**

Because altitude affects pressure and the boiling point of liquid, adjustments must be made when canning foods at altitudes of 1,000 feet above sea level or higher. When using the boiling water bath method, processing time must be increased. Add 5 minutes to processing time for altitudes between 1,000 and 6,000 feet above sea level. When using the pressure canner method, pressure must be increased. If using a dial-gauge pressure canner, process foods at 12 pounds pressure for altitudes between 2,000 and 4,000 feet and at 13 pounds pressure for altitudes between 4,000 and 6,000 feet. If using the weight-gauge pressure canner, use 15 pounds of pressure rather than 10.

## **Jars and Lids**

Only glass jars that have been tempered (strengthened) for heat and cold should be used in home canning. The Mason jar is the most common type. Mayonnaise jars and other jars from commercial foods should not be used. Jars with cracks or chips should not be used because these defects will prevent sealing. The two-piece lid, consisting of a lid and screwband combination, is used most often in canning. The lid can be used

only once but the screwband may be reused. Follow the manufacturer's instructions for use to insure formation of a good seal during processing. Examine all lids for dents, gaps, or defects in the sealing gasket. Do not use lids with defects, and buy only the quantity of lids needed for 1 year because gaskets in older, unused lids may fail to seal.

## **Reprocessing Unsealed Jars of Food**

Test the seal of jars within 12 to 24 hours after processing by pressing the center of the lid or tapping it with a spoon. The lid should stay down and give a clear, ringing sound when tapped. If it makes a dull sound, the lid is not sealed.

Foods from jars that did not seal should be reprocessed within 24 hours. Empty the food from the jar and start over as if the food were fresh. Reheat the liquid if a raw pack is used or reheat the food and liquid if a hot pack is used. Pack the food in clean jars free of nicks or cracks, adjust new lids, and process for the full time. Label jars of food that have been reprocessed and use them first. Texture of the food will be softer than that of food processed only once.

## **Pickling**

The acidity of pickled products is important because it helps prevent the growth of *Clostridium botulinum*. Only recipes with tested proportions of ingredients should be used in pickling. Proportion of ingredients should never be altered. Vinegar (cider or white) having an acidity of 4 to 6% (40 to 60 grains) should be used. This is the range of acidity for most commercial vinegars. Homemade vinegars or other vinegars with unknown acidity should not be used. Vinegar should never be diluted unless this is specified in the recipe. "Pickling" or "canning" salt and Kosher salt can be used. Iodized salt can darken pickles, and table salt contains anti-caking agents that can make the brine cloudy. Alum and pickling lime should not be used. Alum, if used in excess, can cause digestive upsets, and lime decreases the acidity of pickled products.

Brined pickles can be fermented in stone crocks, glass jars and bowls, and food-grade plastic containers. Non-food-grade plastic containers can be used only if they are lined with a food-grade plastic bag. **Garbage bags or trash liners should never be used.** Products should not be fermented in aluminum, copper, brass, galvanized or iron containers.

## Jelly Making

A proper ratio of fruit, pectin, acid, and sugar is needed to make jams and jellies. Sugar prevents the growth of microorganisms and enables gel formation. The amount of sugar called for in a recipe should never be decreased, and artificial sweeteners cannot be substituted for sugar in a recipe. However, recipes developed for reduced-sugar fruit spreads can be used.

Even though sugar helps preserve jams and jellies, molds can grow on the surface of these products. These molds are not always harmless. Some can produce mycotoxins (poisons). Because of possible mold growth, paraffin or wax seals should not be used when making jams and jellies. They should be sealed with self-sealing lids and processed in a boiling water bath canner.

Only one jam or jelly recipe should be made at a time because double batches do not always gel properly. Although most jams and jellies can be stored safely for at least a year, they lose their flavor and color during storage. Therefore, prepare only the quantity that can be eaten within a few months.

## Storing Canned Food

Home canned foods can be stored safely for up to 1 year. Do not eat foods stored longer than 1 year. To store home-canned foods, label and date jars and store them in a clean, cool, dry place. Do not store them above 95°F or near pipes, a range, a furnace, in an insulated attic, or in direct sunlight because these conditions can cause spoilage. Do not store them in a damp place because dampness can corrode metal lids, break seals, and cause spoilage.

## Handling Spoiled Canned Food

Look closely at all jars of food before opening them. A bulging lid or leaking jar are signs of spoilage. When you open the jar, look for spurting liquid, mold, or an off odor. **Do not taste foods that show signs of spoilage or foods from a jar with unsealed lids.** All suspect jars of spoiled low-acid foods, including tomatoes, should be treated as containing botulism toxin. Handle spoiled foods in one of two ways:

1. Place sealed jars in a heavy garbage bag, close the bag, and place it in a regular trash container or bury it in a nearby landfill.
2. Detoxify unsealed, open, or leaking jars of food before disposal to prevent the spread of toxin.

**Detoxification process:** Place suspect jars of food, including lids, on their sides in an 8-quart volume (or larger) stock pot. Wash your hands thoroughly. Add water to the pot to cover to a minimum of 1 inch above the containers. Do not splash the water. Place a lid on the pot, heat to boiling, and boil for at least 30 minutes to insure detoxification. Cool and discard the containers of food, including lids, in the trash or bury them in the soil. Scrub all counters, pots, and other equipment or utensils used in the process. Wash clothing and hands. Place sponges or wash cloths that were used in clean-up in a plastic bag and discard them in the trash.

## Unsafe Canning Methods

Open-kettle canning and processing of freshly filled jars in conventional ovens, microwave ovens, and dishwashers should not be used in canning because they do not prevent all risks of spoilage. Pressure saucepans with small volume capacity should not be used. Steam canners should not be used as boiling water bath canners because they do not heat foods in the same manner. Pressure processing in excess of 15 pounds should not be applied when using new pressure canning equipment. Canning powders should not be used to replace the proper heat processing of foods during canning. Jars with wire bails, glass caps, or one-piece zinc porcelain-lined caps should not be

used because they have flat rubber rings that do not form a proper seal.

## **Insuring Safe Canned Foods**

Answer the following questions before canning foods.

- Is the food a high- or low-acid food?
- Should a boiling water bath canner or a pressure canner be used?
- Is the canning method up-to-date and from a reliable source?
- Should the processing time or temperature be adjusted for altitude?
- Is the gauge of the pressure canner accurate?
- Have the jars been designed for use in home canning, and are they free of cracks and chips?
- Are the lids the self-sealing type, and how old are they?

**More information on home canning can be  
obtained from your county  
Virginia Cooperative Extension office.**

## **References**

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*Publication Number 348-078, July 1996*