



CANNING AND FREEZING: TOMATOES

Stocking a cupboard or freezer with home-preserved tomatoes can be a satisfying experience, if you have the time and necessary equipment.

SAFETY CONCERNS

Improperly canned tomatoes have caused some cases of botulism poisoning in recent years. Botulism comes from dangerous toxins that are produced when *Clostridium botulinum* spores grow in low acid foods. The factors below affect the acidity and therefore the safety of tomatoes for home canning:

Tomato selection. Tomatoes vary in acidity based on type, growing conditions, climate, and location. Overripe and infected tomatoes may be low enough in acid to support *Clostridium botulinum*. Use only firm, ripe tomatoes that have no spoiled parts or mold. Tomatoes harvested from dead vines are low in acid. They can be eaten fresh or frozen, but do not can tomatoes from dead vines.

Processing method. Use only the times and methods indicated in this bulletin or other publications based on the 2009 USDA guidelines. The “open-kettle” method is unsafe because undesirable organisms could grow and lower the acidity enough to allow production of botulism toxin.

Altitude. As altitude increases, water boils at a lower temperature (less than 212° F). Because lower temperatures are less effective for killing bacteria, either the processing time or the pressure must be increased as altitude increases. Follow the altitude adjustments in Tables 1 and 2. Refer to the map on page 4 to check your county altitude.

Added ingredients. Do not add any ingredients beyond those given in the directions. Adding other vegetables can lower the acidity and change the processing time.

To can spaghetti sauce or other tomato mixtures, use tested recipes such as those found in USDA Complete Guide to Home Canning at nchfp.uga.edu/publications/publications_usda.html or call ISU Extension's AnswerLine (see page 4).

Follow instructions. Read through all directions before beginning to can or freeze foods. If using a pressure canner, make sure it is in good working order; have the dial gauge checked for accuracy annually.

HOW TO CAN TOMATOES

Choose standard jars and lids.

Check jars and lids for cracks, chips, dents, and rust; these defects cause sealing failures. Commercial jars such as those used for mayonnaise are not recommended for home canning because they are not designed for use with two-piece lids and because the glass is more likely to break during processing. Wash jars in hot, soapy water; rinse well. Prepare lids and bands according to manufacturer's directions. Mineral deposits or hard water film on jars can be removed by soaking the empty jars for several hours in a solution of 1 cup vinegar per gallon of water. To avoid mineral deposits on jars during processing, add ¼ cup vinegar per gallon of water used in the boiling water bath canner or the pressure canner.

Select tomatoes.

Always use fresh, firm, ripe tomatoes, allowing 2½ to 3½ pounds of fresh tomatoes for one quart of canned tomatoes. Wash tomatoes. Dip in boiling water for 30 to 60 seconds or until skins split, then dip quickly in cold water. Cut out stem end and all blemishes to reduce the bacterial load and allow for uniform heat penetration. Leave tomatoes whole or cut in half.

Acidify tomatoes.

To ensure safe acidity in whole, crushed, or juiced tomatoes, you must add bottled lemon juice or food grade citric acid to each jar before processing. For quarts, use 2 tablespoons lemon juice or ½ teaspoon citric acid per quart. For pints, use 1 tablespoon bottled lemon juice or ¼ teaspoon citric acid. Food grade citric acid is available at some food stores or drug stores. *Do not* substitute ascorbic acid for citric acid. If the canned tomatoes are too tart for your taste, add a little sugar or sweetener before serving. Four tablespoons vinegar (5% acidity) per quart can be used instead of lemon juice or citric acid but may cause undesirable changes in flavor.

Salt tomatoes, if desired.

Salt is not necessary for preservation in canned products but can be added for flavor. Use ½ teaspoon per pint or 1 teaspoon per quart.

Pack tomatoes.

Tomatoes can be packed hot or raw, in different forms (whole, halved, or crushed) and in different mediums (water, tomato juice, or without added liquid). The more solids in the mixture, the longer the processing time. For instance, tomatoes in juice or without added liquid require 85 minutes in a boiling water canner because the mixture has more solids and is more dense than if packed in water. Always follow the instructions of the tested recipe you are using. Below are some general guidelines.

Whole or halved tomatoes in liquid: hot pack.

Place prepared whole or halved tomatoes in stock pot; add enough water to prevent scorching. Heat to boiling; boil gently for 5 minutes, stirring to prevent sticking. Measure bottled lemon juice or citric acid into the jars; add salt if desired. Fill jars with hot tomatoes and hot liquid (water or tomato juice), leaving ½-inch headspace. Wipe jar rims and adjust lids.

Whole or halved tomatoes in liquid: raw pack.

Measure bottled lemon juice or citric acid into the jars; add salt if desired. Fill jars with prepared whole or halved tomatoes. Add boiling liquid (water or tomato juice), leaving ½-inch headspace. Wipe jar rims and adjust lids.

Whole or halved tomatoes without added liquid: raw pack.

Measure bottled lemon juice or citric acid into jars; add salt if desired. Fill jars with raw, peeled whole or halved tomatoes. Press tomatoes in jars until spaces fill with juice, leaving ½-inch headspace. Wipe jar rims and adjust lids.

Crushed tomatoes without added liquid: hot pack.

Peel and quarter tomatoes. Heat quickly, stirring to prevent sticking. Boil 5 minutes. Measure bottled lemon juice or citric acid into the jars; add salt if desired. Fill jars with hot tomatoes leaving ½ inch headspace. Wipe jar rims and adjust lids.

Tomato juice. Use ripe, juicy tomatoes. Wash, remove stem ends, cut tomatoes. Simmer until softened, stirring often. Put through strainer. Reheat at once just to boiling. Measure bottled lemon juice or citric acid into the jars; add salt if desired. Fill jars with boiling hot juice, leaving ½-inch headspace. Wipe jar rims and adjust lids.

Process tomatoes.

To process in a boiling water canner: Fill canner halfway with water and preheat to 180°F for hot pack or 140°F for raw pack. Load jars with "finger-tight" lids. Be sure water can circulate freely around each jar. Add boiling water

to a level of one to two inches above the jars. Bring water in canner to a vigorous boil; adjust heat to maintain a gentle boil and cover. Process for the time recommended in Table 1 or according to the tested recipe you are following. Do not reduce the processing time. Keep water boiling (212°F) during the entire processing period. If water evaporates, add boiling water to keep it at least one inch over the top of jars. Leave the lid on the canner. When processed for the recommended time, turn off the heat and remove the canner lid. Wait five minutes before removing the jars. This is a new recommendation and part of the heating time. Remove jars safely, taking care not to tilt them. Let cool for 12-24 hours undisturbed (including not wiping off the water on the lid).

To process in a pressure canner:

Place jar rack, 2 inches of water, and jars with "finger-tight" lids in canner. Fasten the canner lid. Heat on high. After steam exhausts for 10 minutes, add weighted gauge or close petcock. Allow canner to reach designated pressure. Start timing when designated pressure is reached. Regulate heat to maintain a uniform pressure. If the pressure is lost, you will need to bring it back to where it needs to be and begin the timing over. Process for the time recommended in Table 2. Do not reduce the processing time. When processing is complete, remove canner from the burner (if you are able to do so safely). Let canner cool at room temperature until it is fully depressurized. Allow 30 to 60 minutes depending on canner size. Do not rush the cooling by setting canner in water or by running cold water over canner. Never attempt to hasten pressure reduction by lifting the weight or opening the vent. Wait an additional 10 minutes once the pressure is at zero. Carefully open the petcock or remove the weighted gauge. Wait 2 minutes, then slowly release and remove the canner lid.

Final steps.

Move jars from canner. Do not tighten lids. Allow jars to cool undisturbed for 12 to 24 hours, then check for sealing failures. To test jar, press center of lid. If lid is down and will not move, jar is sealed. Remove screw bands carefully. Wash, dry, label, and store jars in a cool, dark place. If any jars have not sealed, place in refrigerator and use within 2 days. Or, repeat the entire canning procedure with clean jars and new lids; quality will be affected. Tomato products are safe as long as lids remain sealed. Never use tomatoes or tomato juice that shows evidence of mold. Mold raises the pH of the contents so that the deadly botulism toxin could develop.

HOW TO FREEZE TOMATOES

Whole or cut up tomatoes

Wash and peel tomatoes. Leave whole or cut in halves or pieces. Pack into freezer containers leaving 1-inch headspace. Seal, label, and freeze.

Tomato juice

Wash, sort, and trim firm, vine-ripened tomatoes. Cut in quarters or eighths. Simmer 5 minutes. Press through a sieve. If desired, add 1 teaspoon salt to

each quart of juice; salt does not affect keeping quality. Pour into freezer containers leaving headspace. Seal, label, and freeze.

Stewed tomatoes

Remove stem ends, peel, and quarter ripe tomatoes. Cover and cook until tender, 10 to 20 minutes. Cool by placing pan containing tomatoes in cold water. Put into freezer containers, leaving headspace. Seal, label, and freeze.

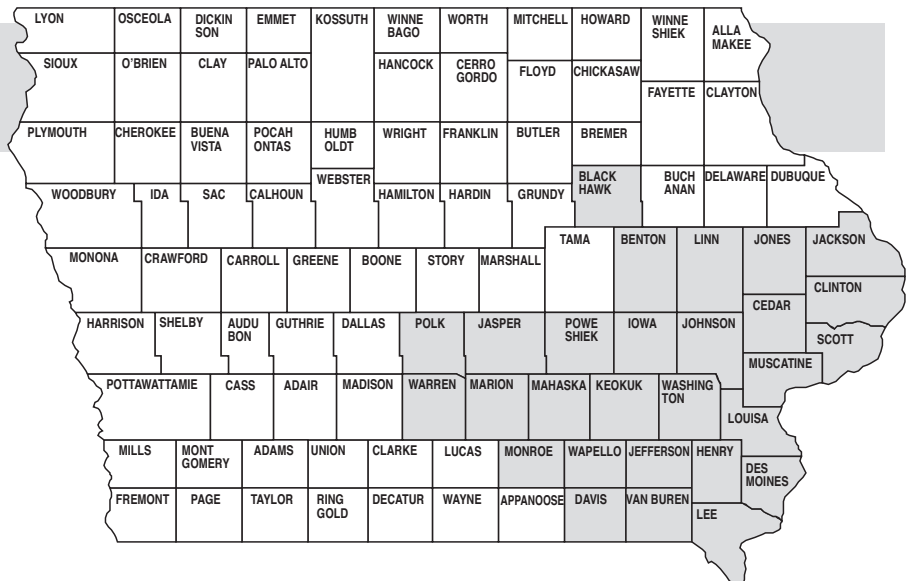
Table 1. Recommended Processing Times in a Boiling Water Canner

PRODUCT	STYLE PACK	JAR SIZE	Minutes of processing at altitudes of	
			0-1,000 FT	1,001-3,000 FT
Whole or halved tomatoes packed in water	Hot or raw	Pints	40	45
		Quarts	45	50
Whole or halved tomatoes packed in juice	Hot or raw	Pints	85	90
		Quarts	85	90
Whole or halved tomatoes without added liquid	Raw	Pints	85	90
		Quarts	85	90
Crushed tomatoes without added liquid	Hot	Pints	35	40
		Quarts	45	50
Tomato juice	Hot	Pints	35	40
		Quarts	40	45

Table 2. Recommended Processing Times in a Pressure Canner

PRODUCT	STYLE PACK	JAR SIZE	MINUTES OF PROCESSING TIME	DIAL GAUGE	WEIGHTED GAUGE	
				Canner gauge pressure at altitudes of		
				0-2,000 FT	0-1,000 FT	OVER 1,000 FT
Whole or halved tomatoes packed in water	Hot or raw	Pints or quarts	10	11	10	15
Whole or halved tomatoes packed in juice	Hot or raw	Pints or quarts	25	11	10	15
Whole or halved tomatoes without added liquid	Raw	Pints or quarts	25	11	10	15
Crushed tomatoes without added liquid	Hot	Pints or quarts	15	11	10	15
Tomato juice	Hot	Pints or quarts	15	11	10	15

Altitudes of Iowa Counties
 Shaded areas are less than 1,000 feet
 Unshaded areas are 1,000 to 2,000 feet



QUESTIONS and ANSWERS

When I opened a jar of home-canned tomatoes, I saw black spots on the underside of the metal lid; does that mean they're spoiled? Natural compounds in some foods cause a black or brown deposit on the underside of the lid. This deposit does not mean the food is unsafe to eat. However, whenever a sealed jar comes open during storage, spoilage is likely and the product should be discarded.

My home-canned tomatoes look cloudy. Are they safe to eat? Cloudy liquids in home-canned foods can mean the product was improperly processed and has spoiled. Check for other signs of spoilage and discard if necessary. The minerals in hard water and the fillers in table salt also can produce a cloudy liquid. To prevent cloudiness, use soft water and a pure, refined canning salt.

My jars of home-canned tomatoes always have less liquid after processing. Is that okay, or how can I avoid it? Never open sealed jars to replace liquid lost during processing. To avoid the problem; pack the food loosely, be sure to leave the recommended headspace, and remove air bubbles before placing on the lid by running a rubber bottle scraper between food and jar. If using a pressure canner, keep the heat constant during processing so the pressure does not fluctuate. After processing, allow the pressure to drop naturally.

My jars seal, but the home-canned tomatoes come open before I have a chance to use them. What should I do? Spoilage has probably occurred; discard the food. Next time, use new lids, be sure to process for recommended time, wipe jar rims to help get a good seal, and do not use jars with chips or cracks.

What can I do to avoid jars breaking in the canner?

Use only standard canning jars and check them carefully for hairline cracks before starting to prepare food for canning. Handle jars carefully when transferring them in or out of the canner. Use a rack in the bottom of the canner and add the recommended amount of water. Don't overtighten the screw bands; when trapped air can't escape during processing, the jar is likely to break.

Last time I canned tomatoes, some of the jars didn't seal. What can I do to make sure all the jars seal this time? Here's how to prevent the six most common causes of sealing failure:

1. Use standard canning jars and lids; follow instructions carefully.
2. Purchase new lids each year. The sealing compound may become defective during extended storage. Never re-use lids (reusing the bands is ok).
3. Make sure you have a supply of good jars and lids before starting to can. Avoid using jars that are chipped or lids that are bent.
4. Leave the recommended head-space when filling jars so that food is not forced between the jar and lid during processing. If using a pressure canner, do not let the pressure fluctuate during processing, and allow the pressure to drop to zero naturally after processing.
5. Carefully wipe off jar rim and threads before putting on the lid and band to prevent dripped food particles from causing a sealing failure.
6. After processing, let the jars cool undisturbed. Do not tighten the screw band after removing jar from canner.

FOR MORE FOOD PRESERVATION INFORMATION

- Call AnswerLine (800) 262-3804 (voice) or (800) 735-2942 (telecommunications device for deaf)
- Download ISU Extension and Outreach fact sheets from store.extension.iastate.edu
- Access the U.S. Department of Agriculture's *Complete Guide to Home Canning* at nchfp.uga.edu

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Map prepared by Iowa Department of Natural Resources, Geological Survey Bureau

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