

# Canning Vegetables Safely

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Lunch & Learn  
12 noon to 1 pm  
July 14, 2014

What vegetables do you like to can??

# Per Capita Consumption of Canned Vegetables

Pounds per person per year in the U.S.

Vegetable	1970	2005	1970-2005 % Change	% of 2005 Total
Tomatoes	21.5	25.5	18	59
Sweet corn	8.8	5.3	-40	12
Chile peppers	NA	3.7	NA	9
Snap beans	2.4	2.0	-14	5
Other canned vegetables	1.3	1.9	49	4

# Resources for Canning Vegetables

- How Do I...Can Vegetables and Vegetable Products  
(National Center for Home Food Preservation) [www.uga.edu/nchfp](http://www.uga.edu/nchfp)

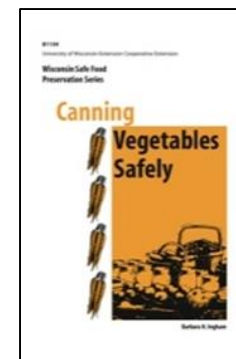
– Asparagus .... to Winter Squash



- So Easy to Preserve book & video
- Safe & Healthy: Preserving Food at Home  
<http://fyi.uwex.edu/safepreserving/>

Canning Vegetables Safely (B1159) – **Recipes** tab

– Safe recommendations for all parts of WI



Canning videos – **Videos** tab (canning green beans)

Mini-module – Pressure Canning 101 (also under the **Video** tab)

Because of the risks involved and the difficulty in establishing new recipes, there are few sources of research-tested recipes for canning vegetables safely. Use only up-to-date, research-tested recipes!

# Canning Vegetables



- Acids naturally found in foods help control microbial growth
- Vegetables are **low in acid** and **must** be canned in a pressure canner
- Higher temperatures obtained in a pressure canner destroy the **spores** of *Clostridium botulinum*
- If not destroyed, the spores could germinate and grow, producing the deadly **botulinum** toxin

# A Global Look at Home Canning: Canning Vegetables

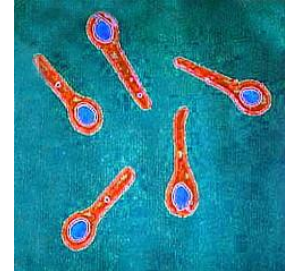
*A nationwide telephone survey was conducted ~10 years ago; over 5,000 homes were phoned and 501 surveys were completed with consumers processing food at home.*

USDA recommends using a pressure canner for processing low-acid vegetables. Of respondents:

- 30% used a pressure canner for vegetables
- 29% used a pressure cooker
- 39% used a boiling water canner
- 15% used the 'open-kettle' method (no processing)
- 3% used the oven for 'canning' vegetables

# Know Your Pathogen: *C. botulinum*

- Some bacteria produce **spores**, a dormant stage of life that can survive harsh conditions.
- Spores of *C. botulinum* can survive 4-6 hours in boiling water! Spores of other bacteria can survive up to 18 hours of boiling!
- Spores will **germinate, grow, and produce toxin** when the conditions are right:
  - Packaged in an air-tight sealed container
  - Product pH greater than 4.6
  - Storage at room temperature
- Toxin is a **neurotoxin**. Ingestion can result in **death**.



Cells and spores of *C. botulinum*

# Botulism Food Poisoning

- Botulism toxin is one of the **deadliest toxins** known.
  - Food may contain the toxin **without looking spoiled**.
  - The symptoms of botulism poisoning are blurred, double vision; difficulty swallowing, speaking and breathing; paralysis. Eventually death from asphyxiation results.
- Prevention requires that foods be properly prepared and processed.

# 'Recipe' for Danger



- 1 Food, pH above 4.6
- 1 Air-tight canning jar
- 1 Room @ standard temperature

ADD: *C. botulinum* spores

**WAIT! The spores, they are everywhere – in soil, in the air – you don't need to add them.**

Dangerous recipes are those that are not research-tested, or that use equipment not approved for canning.



Canned summer squash  
**NO** safe recipes for this.



Canned pesto **NO**  
safe recipes for this.



Dishwasher canning is  
**NOT** an approved method,



# Botulism Strikes Spokane Mother, Two Children February 28, 2009

*...The Associated Press reported that three people in Spokane, Washington, have become ill from botulism. The botulism apparently occurred from improper canning techniques used in home-canning of green beans vegetables from a private home garden.*

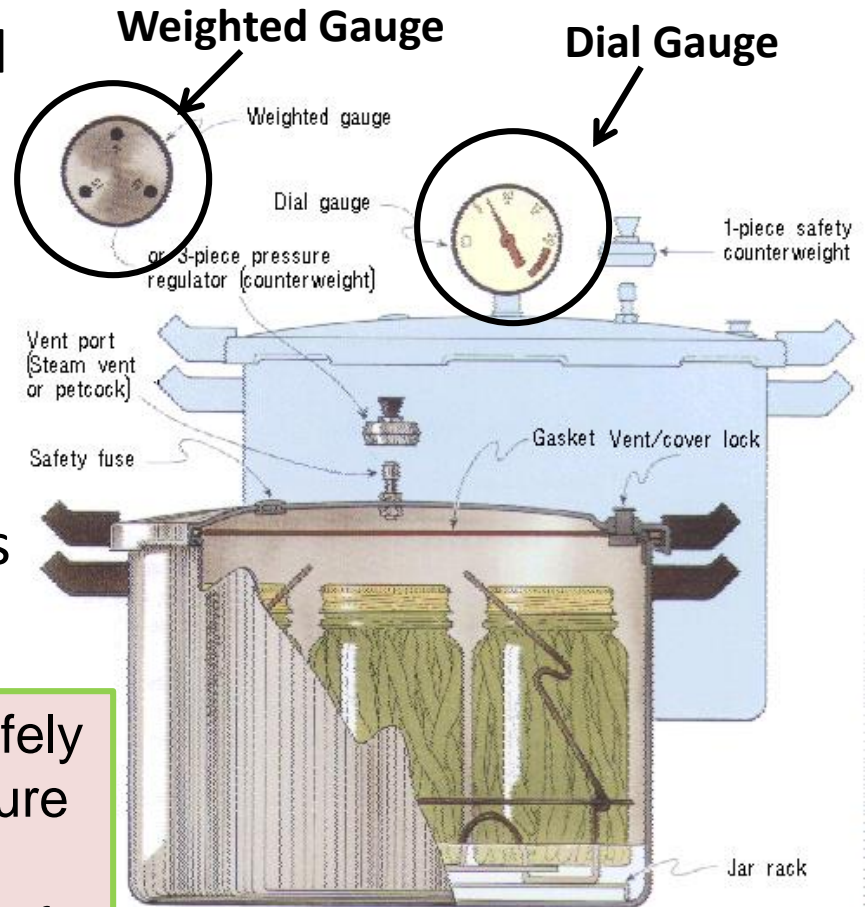
The woman was a nurse in her 30s with two children under ten. She became ill enough to be put on a ventilator; the children suffered milder symptoms. The incident was linked to difficult economic times.

Lack of knowledge will not cure someone in the hospital, but it may put them there!



# Pressure Canning

- **High temperatures, 240°F and above** are achieved
- **Dial gauge** measures incremental changes in pressure
- **Weighted gauge** measures pressure at 5, 10, or 15 pounds (psi)



A pressure canner is **required** to safely can low-acid vegetables. The pressure in these canners raises the temperature above the boiling point of water and allows safe processing of low-acid foods.

# Average pH Values of Food

Food Item	pH	Food Item	pH
Lemons	2.2	Onions, peppers	5.5
Vinegar	3.1	Beef	5.5
Grapes, rhubarb	3.2	Cucumbers	5.7
Strawberries, apples	3.4	Chicken	6.0
Grapes, Cherries	4.0	Carrots, Beans, Beets	6.2
Tomatoes	4.5	Milk, Cantaloupe	6.2
Mangoes (green/ripe)	4.8 5.8	Asparagus, mushrooms	6.5
Bananas, Figs	5.2	Corn	6.8

Many foods are mixtures of high-acid and low-acid ingredients. Low-acid foods with a pH above 4.6 **MUST** be canned in a pressure canner

# The 'Problem'



A sealed jar does **NOT** equal a safe jar.

- 2-piece lid
    - ring holds the lid in place during canning, lid has a sealing compound
  - As the food heats, it expands into the headspace and pushes air out
  - Once the jar begins to cool, the food contracts and a vacuum forms, sealing the lid
- ➔ Relatively little heat treatment is required to get a jar to seal!

# Canning Vegetables Safely



- Select high quality vegetables.
- Wash all vegetables, and peel and/or blanch if **required**.
- Choose **hot pack** for a higher quality product.
  - Use liquid from blanching for a more flavorful pack
- Pack into prepared **hot** jars; use 2-piece lids
- Adjust seasoning as desired.
  - You may **safely** reduce or eliminate salt from canned vegetables!
  - You may **safely** add a small amount of herbs or garlic to pressure canned vegetables!
- Adjust for headspace.
- **NEW! Ball lid preparation instructions do NOT require preheating of lids.**

# (More) Hints for Canning Vegetables Safely



- Place filled jars on a **rack** in 2-3 inches of **HOT** water in canner.\*
- Apply lid and allow canner to **vent** for **10 minutes**.
- Seal vent port with weight or seal.
- Bring canner to pressure with high heat.
  - Once pressure is reached, start timing.
  - Weighted gauges jiggle 2-3 times per minute, or rock gently the entire time. A dial gauge registers pressure.\*
- Canner must remain at, or above, pressure for the entire time stated in the recipe.
- At the end of the process, turn off the heat and allow to cool.



**\*Refer to Pressure Canner booklet for instructions.**

# Caution!

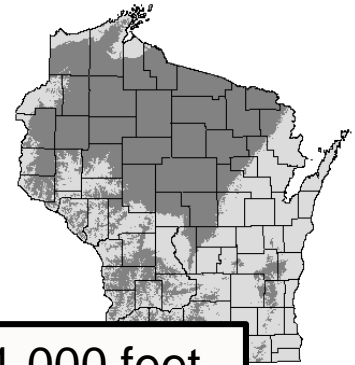
- **Never** force cool a canner.
- Use only the jar sizes listed in research-tested recipes.
- Do **not** thicken product with flour or cornstarch, or add pasta or rice prior to canning.
- Do **not** add extra fat.
- Cut food pieces to the size required.
- Choose mixtures carefully.
  - A mixture of vegetables, or meat and vegetables, is processed for the time listed for the food with the **longest** processing time— generally corn, tomatoes, or meat.



# Don't Forget

- Process at the correct pressure.
  - As elevation increases above 1,000 feet (dark gray areas on the map), pressure increases from 10 psi to 15 psi
  - Pressure remains at 11 psi (dial) up to 2,000 feet
- If at **any** time during the process the pressure falls below target, bring the pressure back up and start timing from the **beginning**.
- Find your elevation:

<http://fyi.uwex.edu/safepreserving/recipes/>



\*Note: darker areas on the state map have an elevation above 1,000 feet. Increase time when boiling water canning; increase pressure when pressure canning.



# A word about canners and cookers

Pressure canners and pressure cooker are NOT necessarily the same thing.

- The heat in the canning process is divided into the come-up time, the process time, and the cool down time. A cooker often heats and cools too quickly, shortening the total heat process.
  - Pressure canners must hold at least 4 Quart jars and be able to regulate pressure at 5, 10, **and** 15 pounds (psi).
- ➔ Use of a pressure cooker is not recommended for home canning.

Not an approved canner ➔



# What if....

- **Jars fail to seal:** reprocess or refrigerate or freeze within 24 hours.
- **To reprocess jars:** empty the jars, heat the contents (hot-pack) and add back to jars leaving sufficient headspace, apply **new lids**, vent and process for the full time indicated.
- **More than half the liquid is lost in the jar:** excess liquid loss often indicates excessive temperature (pressure) fluctuation. Losing more than half the liquid that you added may indicate under-processing. Store these jars refrigerated.
- **You leave the canner filled with jars to cool overnight:** the canner may become sealed and jars of food may spoil.

# Testing Canners

Dial-gauge canners should be tested **at least once** each year to ensure the dial is functioning properly

- Calibrate the canner gauge against the master gauge
- Canner can be off by  $\pm 2$  pounds
- Even brand new dials should be tested!
- Tester can be used to test dial gauges for National, MagicSeal, Maid of Honor and Presto canners

**Video: Using the Presto Tester Unit (Univ of KY)**  
<http://www.youtube.com/watch?v=euIFtIURpdU>

Master Gauge



# Frequently Asked Canning Questions

- How long do I process quart jars of cream-style corn?
- How long do I process my soup mix that contains tomatoes, corn, black beans, and onion?
- Do I have to peel potatoes before canning?
- Can I use jars and lids that I purchased last year? What about non-Ball jars/lids?
- How long can I store my home canned items?
- Do I purchase a dial or weighted gauge canner?

# FAQ- Answers

- How long do I process quart jars of cream-style corn? **You don't. There are no tested recipes!**
- How long do I process my soup mix that contains tomatoes, corn, black beans and onion (qt jars, hot pack)? **Process mixtures based on the ingredient with the longest process time – 85 min for corn.**
- Do I have to peel potatoes before canning? **Yes, the skins carry a higher botulinal spore load; potatoes must be peeled before canning. Other crops such as carrots don't require this step.**

# FAQ - Answers

- Can I use jars and lids that I purchased last year? What about non-Ball jars/lids? **You can use jars and lids from last year – just be sure to store in a cool, dry location. Jars must stand up to the high pressure, use only jars designed for canning. Use only 2-piece lids.**
- How long can I store my home canned items? **Properly canned foods are safe indefinitely, but will begin to lose quality after 3 years on the shelf (assuming a cool, dry location); 1 year is recommended.**
- Do I purchase a dial or weighted gauge canner? **It's up to you! A dial gauge canner you can 'read', a weighted gauge canner you can 'hear.'**

# More Tips for Pressure Canning



**Problem:** Smooth-top ranges require a smooth-bottomed pan or kettle. The canner can not extend over the burner by more than 1-inch, or you risk cracking the range surface (an expensive mistake!).

**Solution:** Call the stove manufacturer to see what is suggested. If canning is allowed, use a canner with an 'outset' bottom. The small area of the canner base that is outset will more likely fit the larger burner on a stove and allow for processing without risk of cracking the stove top.

# Keeping Your Canner in Good Working Order

- At the end of processing, wash and dry the canner base. Dry the canner lid and check the vent port. **Remove** the gasket from the lid, dry, and store in the base. Do not oil the gasket.
- Check dial gauges every year for accuracy.
- Replace gasket and overpressure plug ~ every 2 years. Contact manufacturer for parts.



# What's new? Cannery

- The All-American Canner.
  - Metal-to-metal seal (tightened with wing-nuts)
  - A weighted gauge canner with a reference dial gauge
  - ➔ These should **not be/do not need to be** tested with our dial testers.
- Larger capacity tall canners allow for double-stacking.
  - Canners such as the Presto 23-qt. model can hold 2 layers of **pint** jars.
  - Be sure to **place a rack** on the bottom of the canner **and between layers**.



# Dietary Salt (Na) and Canned Vegetables

March 2013 – Bon Appetit magazine

*Salt is often used by the food industry for the primary purpose of enhancing flavor. Consumers wishing to limit salt (sodium) intake may struggle with food selection while trying to maintain health.*

Test: Sodium (Na) in canned beans with and without rinsing

Product ½ cup	No rinsing mg Na	Rinsed and drained mg Na
Black Beans	424 mg	232 mg
Red Kidney Beans	260 mg	148 mg

Rinsing and draining lowered sodium by more than 40%. This is similar to, or lower than, 'low sodium' brands.