



# Preserve the Harvest

PRESSURE CANNING VEGETABLES AND LOW ACID FOODS

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**EXTENSION**   
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# What is Pressure Canning?

- It is canning foods at temperatures above boiling.
- This can only be accomplished under pressure.



# Pressure Canning/Acidity

- Measure of pH used to determine safety for processing a food in either a water bath or a pressure canner.





# Canning Low Acid Foods

- Temperatures of 240° F or above needed for reasonable process times.
  - 10 psi = 240° F at sea level.
  - 15 psi = 250° F at sea level.

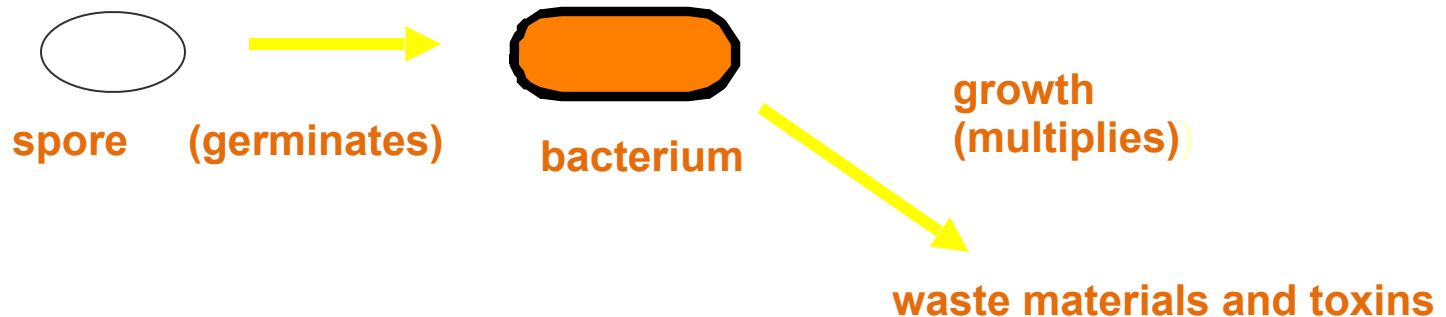
Pressure  
increases  
temperature!

# Why Use Pressure?

- *Clostridium botulinum* is the bacteria that causes Botulism toxin.
- Botulism causes paralysis and death if eaten.
- The Botulism bacteria cannot live in high acid foods- but it loves low acid, low oxygen foods.
- The Botulism bacteria creates spores (seeds) that are only killed by heat above 240°F.
- We can only reach this temperature in canning using a pressure canner.

# Botulism Food Poisoning

- To germinate and produce toxin, the spores need the following conditions:
  - Anaerobic
  - Low acid (pH > 4.6)
  - 40°F to 120°F
  - Relatively high moisture



# Altitude Adjustments

- As altitude increases, temperatures decrease at a given pressure.
- As altitude increases, increase pressure.
- **Dial Gauge**
  - 1,001-2,000 ft: 11 psi
  - 2,001-4,000 ft: 12 psi
  - 4,001-6,000 ft: 13 psi
  - 6,001-8,000 ft: 14 psi
- **Weighted Gauge**
  - Altitude adjustment requires increase of 5 psi pressure.
  - 1,001 ft and above: 15 psi

# Testing Dial Gauges

- Accuracy of gauge essential to safety of the canned food.
- Two ways:
  - Maximum thermometer
  - Comparing to master dial gauge
- 1 pound error in a 20-minute process causes over 10% decrease in sterilizing value.
  - 2 pound error a 30% decrease.



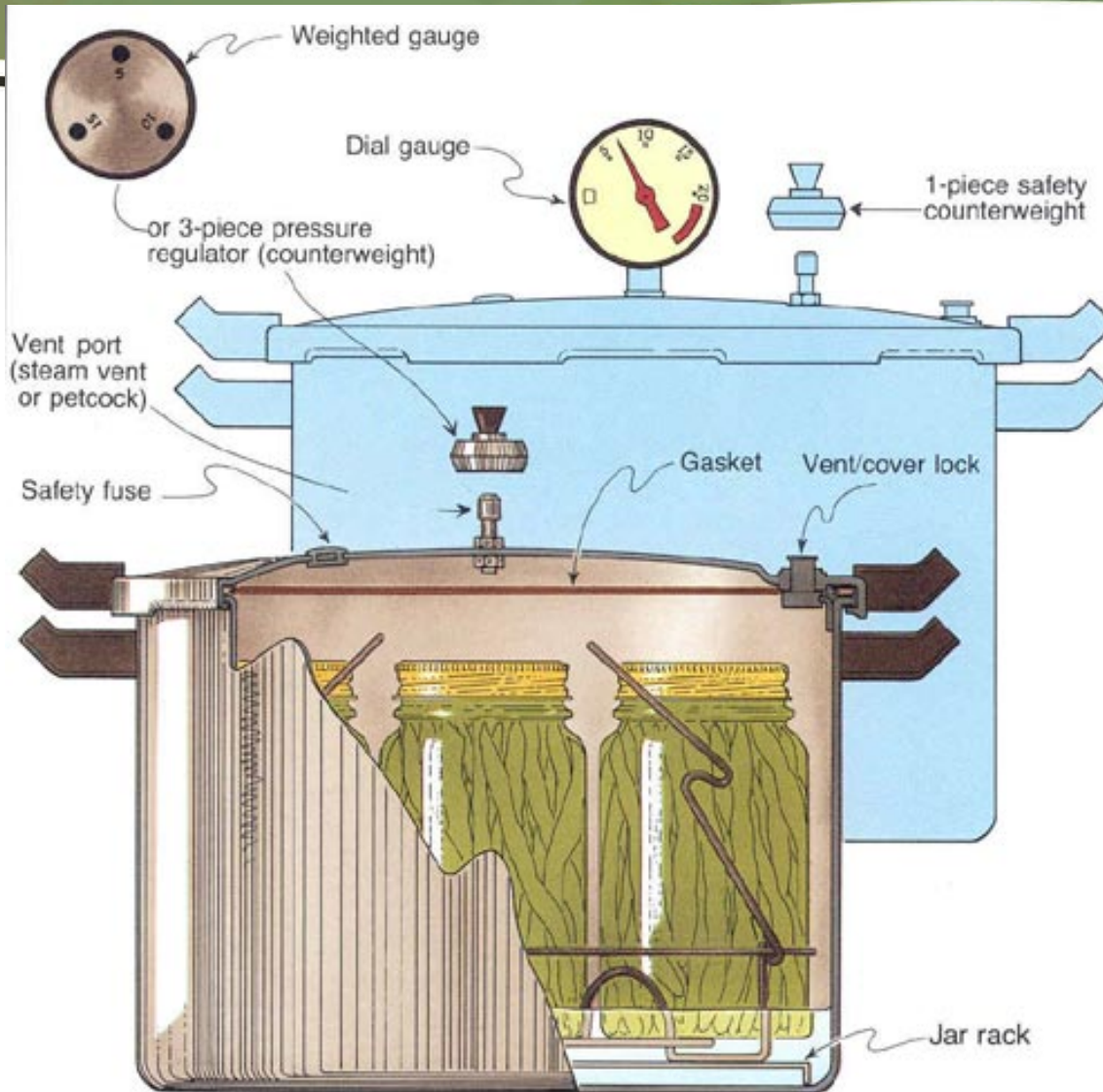


# Oops!



Nothing to see here, just a minor cooking mishap

# Parts of a Canner



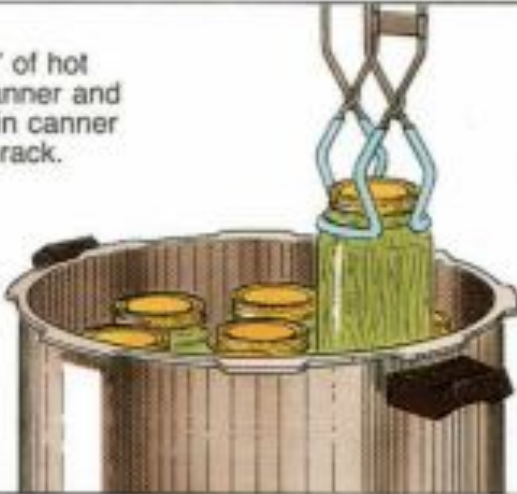
# Replacement Parts

- Dial gauges when inaccurate.
- Gaskets (sealing rings).
  - Every 2 years usually
- Rubber overpressure plugs.
  - Every 2 years
- Vent pipes if clogged.
- Air vent/cover lock from lid.
- Weighted gauges or dead weight if lost.



# Pressure Canning Basics

Place 2"-3" of hot water in canner and place jars in canner on canner rack.

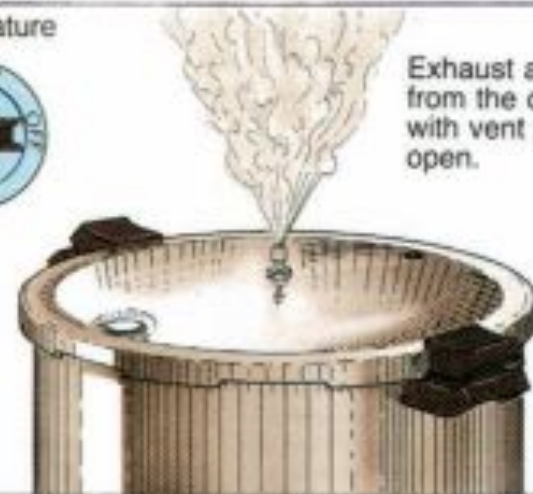


1.

Temperature



Exhaust all air from the cooker with vent port open.



2.

To pressurize the canner, place weight on vent port.



3.

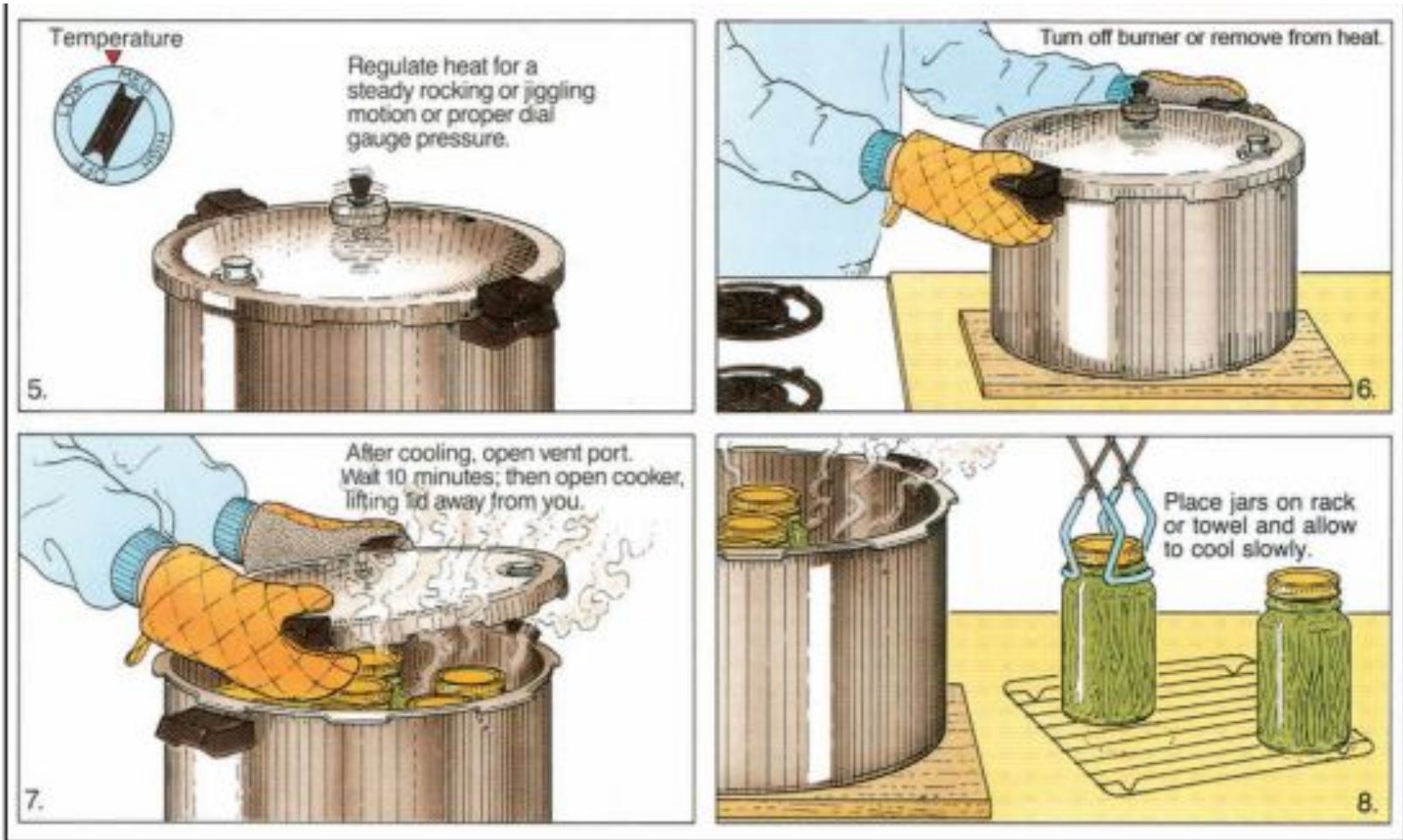
Begin timing when weight starts to rock or jiggle, or when pressure gauge reads the correct pressure.



4.

Source: USDA Complete Guide to Home Canning

# Pressure Canning Basics

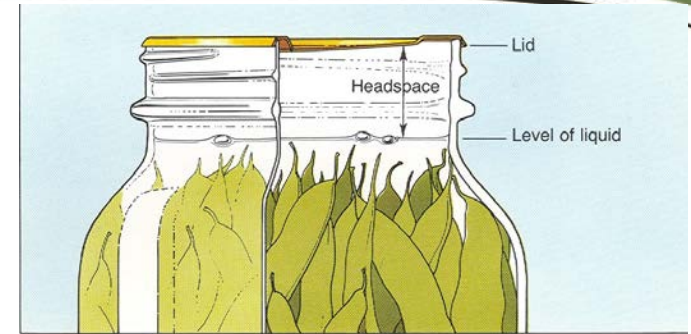


Source: USDA Complete Guide to Home Canning



# Pressure Canner Processing

- Allow 1-inch headspace in jars.
  - A few products use 1-1/4”
- Have 2 to 3 inches of water simmering or hot in canner.-
  - Hot packed jars – simmering water, 180 F
  - Raw packed jars – warm to hot water, 140 F
- Place jars on rack in canner.
- Put lid on canner with weight off or petcock open.



# Venting the Canner



- Also called “exhausting” the canner.
- As the water boils in the canner, the “empty” space becomes a mixture of steam and air.
- The temperature of a steam/air mixture is lower than the temperature of pure steam.
- Venting eliminates (“exhausts”) the air so processing takes place in a pure steam environment.
  - Process times are intended only for a pure steam environment.

# Venting the Canner, cont.

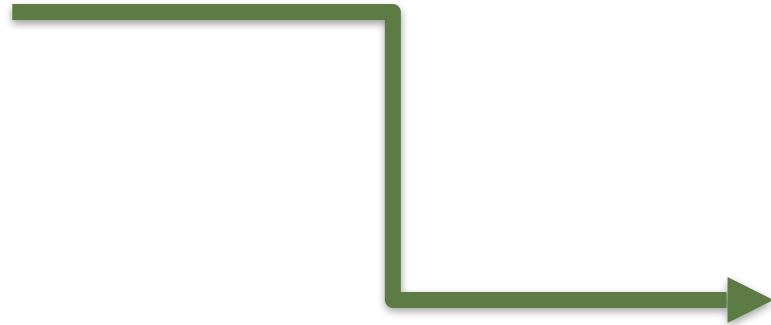
- Steam must flow freely from the open vent port in the lid for 10 minutes prior to pressurizing.
  - After putting filled jars—in the pressure canner, fasten the lid in place.
  - Leave the vent port open.
- Pipe where weighted gauge or dead weight will go.
  - Turn the heat on high.
  - When water boils, steam will start to come out of open vent.
  - Wait until there is a constant, strong funnel of steam, then start timing 10 minutes.
  - At the end of the 10 minutes, place weight in place to start pressurizing the canner.

# Pressure Canning, Cont.

- Wait 1 to 2 minutes after pressure drops to 0 psi to make sure all pressure is gone.  
(For some canners, check that locks in handles are released.)
- Remove weight or open petcock. Wait 10 minutes.
- Open canner. (Be careful of steam!)
- Remove jars to padded surface or rack.
- Cool jars 12 to 24 hours, undisturbed.
- Check that jars have sealed.

# Loss or Fluctuating Pressure

- Drop in pressure during processing means the sterilizing value of the process will be decreased
  - Food spoilage
  - Foodborne illness
  - Loss of liquid from jars
  - Seal failures
  - Siphoning
  - Warping of canner lid
- If pressure drops below target anytime during the process time, bring the canner back up to pressure and start timing the process over from the beginning.





# Opening the Canner

- In pressure canning, turn heat off at end of process and let jars cool in canner until pressure is gone. Do not remove from burner.
- When the canner lid is opened, tilt it so the steam is pushed away from your face.
- The steam, water and jars in the canner will still be very hot, even bubbling or boiling.

# Opening the Canner

## Dial Gauge

- Watch the needle on dial.
- After it reads 0 psi, carefully remove the weight.
  - If there are piston locks in the lid or handle, see that they have also opened.
- Wait 10 minutes, then open lid.
- Remove jars from canner onto a towel-covered counter.

## Weighted Gauge

- Time the cooling process:
  - Heavy-walled older canners:
    - 30 minutes full of pint jars, 45 minutes full of quarts.
  - Thinner wall, newer canners:
    - 20 to 30 minutes.
- If there are piston locks in the lid or handle, see that they have also opened.
- Carefully remove the weight.
- Wait 10 minutes, then open lid.
- Remove jars from canner.

# DO NOT Force Cool Canners

- Either by cooling the canner with running cold water or opening the vent port before canner air cools to 0 psi.
  - Do not cover with wet towels; do not put in cold air drafts.
- May result in:
  - Food spoilage.
  - Foodborne illness.
    - Underprocessing.
  - Loss of liquid from jars.
  - Seal failures.
  - Warping of canner lid.



# Storing the Canner

- Thoroughly dry canner, lid and gasket. Do not put lid in water.
- Older canners: Take off removable petcocks or safety valves. Wash and dry. Reassemble carefully.
- Clean openings by running clean pipe cleaner or a thin strip of cloth through them.
- Store canner with crumpled clean paper or paper towels in it; do not fasten the cover.
- Wrap cover in paper and turn upside down on the canner bottom.

# Canning Vegetables

- Choose fresh, ripe and firm vegetables that are free from disease and bruises. Avoid wilted, moldy or blemished vegetables. For best quality, can vegetables the day of harvesting.
- Sort vegetables by size and ripeness.
- Thoroughly wash vegetables under running water. Be sure to remove all dirt (as it contains bacteria).
- Do not allow vegetables to soak in water as this removes flavor and nutrients.
- Prepare each vegetable as directed for its specific recipe, and either raw or hot pack.
- Salt is used only for flavor in canning vegetables.



# Soups and Veggie Mixtures

- Soups containing vegetables and meat are low-acid food and must be processed in a pressure canner.
- Follow the USDA guidelines for desired soup.
- Combine and cook vegetable and meat products. Boil for 5 minutes. Fill jars  $\frac{1}{2}$  full with solids and continue filling jar with liquid. Remove air bubbles and leave headspace.
- Liquids may be water, broth and tomato juice .

# Pressure Canning Meat

- Beef, pork, chicken chunks, game meats, ground or in chunks, meatballs, and sausage patties
  - Choose high quality, chilled meat. Remove excess fat.
  - Strong flavored game meat should be soaked for 1 hour in a brine made from 1 TBS salt/quart of water.
- Boneless skinless poultry
- Most seafood...except smoked fish.
- Dried beans and dry bean mixtures can also be canned.
  - Beans must be soaked first.

# Pressure Canning Meats

## Raw Pack

- Use meat in cubes or ground
- No liquid is added



# Pressure Canning Meats

## Hot Pack

- Pre-cook the meat
- Prepare broth



# Pressure Canning Meats

## Raw pack vs Hot pack





# Hot Pack Chicken



# Question...

- Which of the following can NOT be safely canned in your home pressure canner?  
(select all that apply)
  - Chicken Noodle Soup
  - Pumpkin Puree
  - Spinach
  - Green peanuts
  - Crab Meat
  - Butter

# Preventing Botulism

- Pressure canner used for all low-acid foods.
- Food must be properly prepared and processed correct time and pressure for the altitude.
- Canner must be accurate and operated correctly.
- Follow recipe exactly. (The following slow down heat penetration:
  - Extra sugar or fat
  - Oversize food pieces
  - Added thickeners
- Use recommended canners, and don't rush the time for cool down.

# We Have a Fact Sheet on our Website

Food and  
Nutrition



extension.usu.edu

Updated July 2017

FN/Food Preservation/2008-04

## Principles of Pressure Canning

*Kathleen Riggs*, Family and Consumer Sciences Professor, Iron County  
*Brian A. Nummer*, Ph.D., Food Safety Specialist

### 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

### 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

[www.Extension.usu.edu/preservetheharvest](http://www.Extension.usu.edu/preservetheharvest)



# Review Steps

- Exhaust canner 10 minutes.
  - All pressure canners, according to USDA.
  - The one difference in “following manufacturer’s directions” if not included there.
  - Without proper venting, up to 30% of the sterilizing value of a 20-minute process may be lost.
- Close vent or petcock.
- Start counting process time when correct pressure is reached.
- Adjust pressure for altitude, if needed.
- Turn off heat at end of processing.
- Let pressure drop to 0 psi naturally before opening vent/ removing weight)



# Other Troubleshooting Tips

- Salt is for flavor only...you may leave it out
- Spices and herbs may be added in small quantities.
- Do not add butter or fats unless specifically allowed in tested recipe.
- No grains or pastas.
- Use hard water.
- Mixing veggies should have similar processing time.

# Questions????

# References

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