

Chapter 1



The Processing Method

Most of my experience, with pickles, relishes, chutneys, sauces, condiments, and vinegars, has been with canned product, because Jamlady sells pickled products in warm, open-air markets, where refrigeration isn't often available or practical. Many marketers appreciate a shelf-stable product and often buy pickles and chutneys to give as gifts. **Some of the recipes in this book will not require sealing by heat processing and are quick, refrigerator, or freezer pickles. Others are hermetically sealed in jars. Various other pickles are uncooked and fermented. This chapter is about sealing product in a jar.**

There are several ways to hermetically seal a canning jar. The easiest method, and the method used in this cookbook is the rolling-water-bath method (RWB). Correctly sealing a canning jar, using the RWB method, will produce a safe, shelf-stable product. Please don't consider sealing any product with wax seals, dishwasher processing, steam environments, inversion, or other "short-cut" methods. These methods are not safe. The rolling-water-bath method is easy to use and requires just a little training or specialized equipment. You do not need to use a pressure-cooker to seal an acidified pickle, relish, or chutney. If you don't have a canner or bottom disc, construct a bottom disc out of canning rings with "twisties" (see photo on page 22). Let's keep it simple. **You need ten things, plus your wits. That's it!**

- a canning jar
- a canning lid with ring
- a ladle
- a pair of tongs
- a kitchen towel
- a knife or "bubbler"
- a heat source
- a properly acidified product to seal in the jar
- a water-filled pot deep enough for processing the jar
- a metal disc for the pot's bottom or an inner, perforated basket

The rolling-water-bath method will be explained and illustrated here, but it is always recommended a novice consult several sources when learning about a new topic. Remember what Jamlady says, "We often don't know what we don't know until we know it." There are many free, informative, agricultural websites on the Internet; consult some. Normally, the most reliable information originates from government- or university-sponsored websites, but this is not always the case. While many



Minimal canning equipment

experienced canners can spot potentially dangerous recipes, most novices cannot. So, beginners, please use only expert-tested recipes, and read this book from cover to cover.

A potentially dangerous recipe usually contains a low-acid vegetable or fruit that has insufficient acidification, salt, or sugar. The inexperienced canner should be wary of all low-acid vegetable or fruit recipes from unknown sources. **Refer to the pH of fruits and vegetables chart, in the back of this book, to see which fruits and vegetables qualify as low-acid. These are fruits and vegetables with pH numbers in excess of 4.6.**

Canners-in-training or experienced canners, armed with their trusty pH meters, will be able to test suspicious recipes and notify site webmasters or editors about dangerous canning recipes. Expert food scientists and very experienced canners should be able to spot these dangerous recipes by reading them over and analyzing their ratios of low-acid foods to acidifiers, salt, and sugar. Take the time to scrutinize each new recipe you encounter.

In order to safely seal a canning jar, an adequate

vacuum needs to exist in the air-space between the contents and the lid. **That air-space needs to be about 6 percent and never less than 5 percent of the entire jar's volume. The contents or food product in the jar will then take up about 94 percent of the jar's space.** Some books speak in terms of inches, or inches from the top of the jar rim, but this measure is not always an accurate measure, because the shape of the jar, the circumference of the rim, and the height of the jar will all impact the headspace. A tall, slender, 8-ounce canning jar filled to 94-percent capacity would not have the same fill requirements in inches (from product top to jar top) as a short, squatty, 8-ounce canning jar filled to 94-percent capacity. So, the percentage of fill in a jar is a better indicator of how far to fill a canning jar than the number of inches, or fractional inches, from the top of the canning jar to the proposed product fill line.

If consistently using one type of canning jar, determine the correct level of the fill line, and fill all identical jars in the same way each time you use them. In general, a 16-ounce, standard, upright,



Filling a canning jar, add a little more to this jar so it has six-percent headspace or about a half-inch of headspace from the rim of the jar.

canning jar should be filled to about $\frac{1}{2}$ inch from the top. An 8-ounce, upright canning jar should fill to about $\frac{3}{8}$ inch from the top, and a 4-ounce canning jar should be filled to about $\frac{1}{4}$ inch from the top. A regular-mouthed, upright quart might have a headspace of $\frac{3}{4}$ inch to 1 inch, depending on the style of jar you have and if the contents are chunky and more likely to float up. A *jardinière* that is likely to expand might be filled with a slightly larger headspace than, say, applesauce. **Be careful not to overpack a jar of *jardinière*. It is better to under pack than to overpack.** A wide-mouth, tapered quart jar, filled to 94 percent full, might measure differently in inches from the top of the jar in comparison to the 94-percent-full, regular-mouthed quart jar, as the top surface areas are different. **Both jars should be filled to 94 percent full (with 6 percent of headspace) to assure a reliable closure or seal.**

Keep in mind, new and differently shaped canning jars and imported canning jars can be found. For a good, safe seal, make sure there is sufficient

headspace and sufficient processing time and temperature. **Without enough headspace, there will be insufficient steam trapped in the headspace to create sufficient vacuum.** Additionally, and with heat processing, there will not be enough space for product expansion in the jar.

Air in the product is another factor to consider. There are slender tools, or “bubblers,” that may be slid down the side of a canning jar—to dislodge trapped air bubbles. Prior to lid application, check the jars for trapped air bubbles. Scoot the trapped air bubbles up to the surface of the liquid. **The air in the product and the processing temperature both affect the resulting vacuum. Vacuum is less where air trapped in the product is greater.**

Time and temperature are both important to obtain a proper seal. **Normally, the higher the product temperature at the time of sealing, the higher the final package vacuum.** The capper vacuum efficiency for any specific canning jar can be measured by a vacuum gauge.

PROCESSING STEPS

1. Sterilize the canning jars in boiling water for 10 minutes or, alternatively, boil water in the jars by heating them in a microwave. This sterilization step is a more important step if, when you seal them, you will be processing the filled jars for less than 10 minutes. Some canners wash the canning jars in a dishwasher and boil the water-filled jars in the microwave. This is an acceptable method, especially if the final product will be in the RWB for more than 10 minutes. **Actually, jars that will be boiled for 10 minutes or more need not be sterilized, but you might run them through the dishwasher.** Just remember, it is always good to have squeaky-clean jars. **Scrubbing canning jars well with soapy bleach water before you boil them is an extra-prudent step for increased safety and sanitation.** Wipe your counters with this soapy bleach water, and rinse well.

2. Sterilize canning rings, funnels, and rubberized, metal tops by boiling them for 10 minutes in a pan of water. Do not attempt to microwave metal rings or lids. Rings that will be processed for more than 10 minutes do not need to be pre-sterilized.

3. Use a canning funnel to fill canning jars to the appropriate level. Caution: Do not RWB process any product with a pH in excess of 4.2 (pH must be comfortably under 4.6).

4. Wipe off the top of the jar lip. Check for chips or cracks. Attach the canning lid and ring. Screw the ring down until it meets with some resistance; then stop. Do not screw the ring on too tightly.

5. Place the jar in a canner or similar set-up. Cover the jars totally with water of the same temperature as the jars. There should be at least one to two inches of water over the top of the jars.

6. Heat the filled canner until the water boils. Time the processing time. Start timing from the first sight of an actual rolling boil. This RWB-process does not include the small bubbles rising from the bottom of the pan. The large bubbles of a rolling-water bath will break the surface of the water and roll, assuming your range has sufficient BTUs to bring the pot to a rolling boil.

7. When the processing time is up, use canning tongs to lift hot jars out of the canner and onto a folded kitchen towel, or take out the entire rack-full of jars and set them on a folded kitchen towel. Be careful not to burn yourself with rising steam. Wear a long-sleeved garment, so steam does not make contact with your arms. As far as possible, keep your head and body away from the steam. Keep hot jars separated by at least one inch. When jars are cooling, do not attempt to check the seal or tighten or unscrew the rings. Within a short period of time, a “click” should be heard, and the centers of the metal lids should depress (go down). Congratulations! You have now made a vacuum-sealed, shelf-stable product.

Commercially, jars and cans are sealed in big pressure-cookers called retorts. **Still retorts remain stationary as they process. Agitating retorts shake or agitate thicker product, so the heat is evenly dispersed throughout the jar.** This processing occurs at a temperature of around 250 degrees F (121 degrees C), with 15 lbs./sq.-inch pressure or about 10 tons of force. **A hydrostatic retort operates at a constant process temperature, and the product to be sealed is transported through the retort on a conveyor system.**



ROLLING-WATER BATH—RWB

Any canning recipe in this book may be sealed by a process called a rolling-water bath or RWB.



Filling the jar with a canning funnel and ladle.

A tall, cylindrical stockpot, like the All-Clad stockpot listed in the information guide, is preferable to a traditional canner with its shorter height and very-wide bottom. Jamlady wishes All-Clad would market a bottom disc for it. Outfit the taller stockpot with a round, perforated bottom disc or rack to create an elevation between the bottom of the pan and the bottom of the canning jar. Using a taller pot will reduce the amount of water that ends up all over the stovetop. Further, the filled pot will heat up faster, especially for cooks using a residential range with lower BTUs. **The pan's small-bottom circumference is important, because a lot of newer stoves don't have sufficient BTUs to take a large, wide-bottomed canner up to temperature. This is disastrous for pickles, because the pickles overcook before a rolling-water temperature is achieved.**

Taller canners are especially useful when sealing quart jars. Make sure your range has sufficient BTUs to boil water in a large pot. If the BTUs are

insufficient, a different stove, one with sufficient BTU burners, may be needed. Look for a tabletop stock-pot range or some other type of range with higher BTUs at a local restaurant-supply store. Look for a minimum of 10,000 BTUs in a range burner; 12,000 or higher is better. If you try to use a 6,000- or 8,000-BTU burner, it might take too long to process the pickles, resulting in mushy pickles. Should a jar of pickles fail to seal during the first processing attempt, just refrigerate it. Remember, pickles cannot be successfully resealed by reprocessing, as they will be overcooked.

Caution: If a previously unsealed jar of product at room temperature seals in the refrigerator, do not assume it may be taken out of the refrigerator again and stored on a shelf. More than likely, this jar will unseal at room temperature and reseal again if cooled again. Neglecting to refrigerate this transitioning jar is potentially dangerous. Store all "low-vacuum" or unsealed jars of product in the refrigerator.

ALFELD NOMENCLATURE SYSTEM

The **Alfeld Nomenclature System** is an abbreviated notation system for canners to clearly label the times and process used to seal a canning jar. The following notation **JSP/RWB10**, or **JSP/RWB10A**, means **jar, seal/close, and process in a rolling-water bath for 10 minutes, or 10 minutes plus the increase in time needed for the increased altitude.** Adjusting processing time for altitudes over 1000 feet is normally assumed, but this **“A” notation may be used as a reminder.** The number of minutes to add to the processing time is indicated on the altitude chart shown on page 27. If the canning location is below 1,000 feet, no modifications are necessary, but, obviously, there is more leeway in the times at sea level than at 950 feet. One might also write **JSP/RWB15(8OZ)A3100(20)**, which means the processing time for under 1,000 feet is 15 minutes, but the processing time for 3,100 feet is 20 minutes. An experienced canner might include the notation with the recipe when giving it away, especially to novice canners living at a higher altitude. **Instructing a cook to “seal” a jar is wholly inadequate information.** If you do not know the

appropriate processing time for a recipe, just write—not available or **NA(16OZ)R**.

If no jar size is indicated at the end of the notation in parenthesis, the jar size is assumed to be 4 or 8 ounces. The notation **JSP/RWB20(16OZ)A** would mean jar, seal, and process a 16-ounce jar for 20 minutes in a rolling-water bath at an altitude of 1,000 feet or less; adjust the processing time for higher altitudes. The notation **JSP/RWB15(16OZ)RA** means jar, seal, and process a 16-ounce jar for 15 minutes, adjust for altitude (if necessary), and keep the product refrigerated. **It is further assumed a canner would properly label this product—“refrigeration required” or “Keep Refrigerated.” JSR means jar, seal, refrigerate, and JSF means jar, seal, and freeze.** **JSP/10SPI/75A** means jar, seal, and process at 10 pounds per square inch for 75 minutes for a 4- or 8-ounce jar, and adjust for altitude. To change the jar size, add **“16OZ”**, or whatever size you will be processing, to the end of the notation but before the **“A.”** **The notation for low-temperature pasteurization is shown as JSP/180dF/30(16OZ)A. See low-temperature pasteurization.**



FILLING THE JAR

1. Inspect each jar for cracks or nicks, especially the jar lip. Discard damaged jars.
2. Make sure the jars are squeaky clean and sterilized. Boil canning jars, lids, and rings in water to sterilize them. Alternatively, run them through the dishwasher, and for extra sterility, you may microwave the water-filled jars. Lids and rings are easily boiled in a small pot on the stove. Do not microwave metal rings or lids. When hand-washing the jars, or washing them in the dishwasher, add a little capful of household bleach to the wash water; rinse well.
3. Do not overfill the jars. Fill the jars to 94 percent full, with 6-percent headspace (air-space). Check each lid's rubber seal for imperfections. Do not use rusty or bent lids or rings.
4. After filling the jar to the appropriate level, make sure the jar rim is clean. Place the rubber seal on the jar rim. Do not overfill the jars, or you will reduce the necessary vacuum.
5. Place the metal ring over the metal lid and tighten the ring. Do not screw it too tightly, but adjust it to the first bit of resistance. The jar is now ready for a rolling-water bath (RWB).

PROCESSING TIMES

Processing times vary according to the size of the jar and the thickness of the product. Today, the typical bread and butter pickle should be processed 15 minutes for a quart and 10 minutes for a pint. Historically, the times were less, 10 minutes for a quart and 5 minutes for a pint. Some people still choose to use historical processing times but then keep the pickles refrigerated, carefully labeling each jar with “Keep Refrigerated.” **The USDA and others experts are now recommending longer processing times for some products.** Chutney may be processed 10 to 25 minutes, depending on the size of the jar. **Please make sure to read the section on the Alfeld Notation System, so you will understand the recipes.** Jamlady recommends canners always consult more than one reliable source regarding processing times. Canning jars, home and commercial, American and foreign, come in all

sorts of shapes and sizes: 1-, 2-, 4-, 8-, 12-, 16-, 22-, 24-, 32-, and 64-ounce jars. **Normally, thicker product should be packed in smaller jars to assure good heat distribution during processing.** Home canners are usually told to avoid 64-ounce jars, because the heat cannot easily penetrate through the larger jars. However, it might be acceptable to use a 64-ounce jar for canning thin liquids like apple-water tea.

If the processing time is insufficient, a proper vacuum may not form to seal the jar. Then the product must be reprocessed or refrigerated. Some products like pickles shouldn't be reprocessed as they will be overcooked. **Caution: Even though a jar of product is sealed, be careful not to subject it to extreme temperature fluctuations, or anything that might disrupt the integrity of the seal. This especially includes freezing or placing the canned product in a car on a ninety-degree day.**



ALTITUDE CONVERSION

In recent years altitude-conversion charts have been updated, and processing times have been increased. For most sea-level canners, no altitude related changes are required. If you live in a place like Albuquerque, New Mexico, which is located at 5,000 feet, or in another high-altitude location (1,000 feet or higher), please pay attention.

Altitude

Feet

1,001-3,000

3,001-6,000

6,001-8,000

8,001-10,000

Meters

306-915

916-1,830

1,831-2,440

2,441-3,050

Increased Processing Time

Increase by

5 minutes

10 minutes

15 minutes

20 minutes

Even these numbers are not totally accurate, because the boiling point of water varies according to the current barometric-pressure reading, and that value also fluctuates. For more information on

Water-bath processing times need to be increased as altitude increases. The old, pre-1994 chart for RWB-processing suggested approximately one additional minute of processing time for every 1,000 feet in altitude. These recommended processing times have been increased to:

high-altitude cooking and canning, please consult other sources such as Anderson and Hamilton's *The New High Altitude Cookbook*.

Processing times need to increase as altitudes

increase, because water boils at a lower temperature at higher altitudes. At sea level, water boils at 212.0 degrees Fahrenheit or 100.0 degrees Centigrade at sea level. As altitude increases, the temperature at which water boils decreases.

Altitude		Boiling Temperature in Degrees	
Feet	Meters	Fahrenheit	Centigrade
2,000	609.6	208.2	97.9
4,000	1,219.2	204.4	95.8
6,000	1,828.8	200.7	93.7
8,000	2,438.4	196.9	91.6
10,000	3,048.0	194.0	90.0
14,000	4,267.2	187.3	86.3

* The above temperatures are approximate.

These different boiling points of water also change with variations in barometric pressure. To find the actual boiling point of water, take the standard barometric pressure (29.92 millibars) and subtract the local barometric pressure. Multiply the answer by 1.8518, add 212 to that, and you will have the current boiling point of water at that place and time.

Lower temperatures are less effective for killing bacteria, so the processing times must be increased for the RWB method, and the canner pressure must be increased for pressure-cooker canning.

High-altitude canners, bakers, and cooks should consult their local agricultural extension office for recommendations on extended cooking times for that specific area. If you live at 940 feet, consider adjusting the processing times for over 1000 feet, depending on what you are processing (thickness of product, pH, size of pieces, etc.).



REACTIVE METALS

Reactive metal should be avoided in canning. These metals include iron, aluminum, brass, copper, or zinc (galvanized). Select metals, pots, and utensils that do not react chemically with acids and salts. Use vessels or pots of enamelware, stainless steel, ceramic, or glass. Check with a reputable restaurant-supply store to purchase a tall, quality, stainless-steel pot—with a wire basket, built-in strainer, or bottom rack. The elevated rack from a regular pressure canner will usually fit in a tall, large, All-Clad stockpot and can work with the pot as a canner. Alternately, just look around, and buy a rack that fits your pan, or construct a make-shift rack by connecting canning rings with “twisties” or string. **Jamlady does**

not recommend the too-short, standard canner for canning quart jars, as water ends up all over the stove. Besides that, many larger canners are too large in diameter for the BTUs on many home ranges. A taller and smaller-diameter pot is recommended.

Buy the best quality of cookware you can afford. Spend the extra money to get a thick-metal core in the bottom of the pot. Many would-be cooks have given up on cooking because “things always burn or stick.” Perhaps the pan is at fault, not the cook. A quality stockpot and Dutch oven represent money well spent. Check discount stores like Marshalls and TJ Maxx. Sometimes there are real deals there on large, good-quality stockpots.

SPECIAL TECHNIQUES AND AVOIDING PROBLEMS

The best way to deal with any problem is to avoid it. Here are some suggestions for avoiding canning problems and some techniques to use.

1. **Do not use homemade vinegar for canning.** Use only 5- or 6-percent acidity vinegar.
2. **Do not use hard water, especially not for pickles.**
3. **Do not store canned goods in warm or light locations.** Store jars in a cool, dark place.
4. **Get your processing times right.** Cook on a range with adequate BTUs.
5. **Use fresh and chemical-free ingredients.** Don't use old or powdered spices. Use whole spices or fresh herbs for pickles. Don't use hollow cucumbers to make pickles. Discard any slimy pickles.
6. **Don't panic over pink, pickled cauliflower or**

green/blue garlic. It isn't spoilage, but a non-harmful chemical change. Pickled cauliflower may be naturally colored with beets to eliminate the possibility of unwanted discoloration. **Immature and insufficiently dried garlic may turn blue or green in the presence of an acid because of the anthocyanin in the garlic. The green or blue color may also be due to sulfur compounds reacting with trace amounts of copper in the water.** If the enzymes in the garlic are not inactivated by heat, blue sulfate can form. Prior to use, some experts recommend temperature controlling the garlic to eliminate the problem. Don't use immature garlic heads. Prior to using, store garlic at room temperature for three weeks. Brown vegetables were either



Beets may be used to color cauliflower—the more beets, the darker the color. For photographic reasons, we made the beet color lighter than normal.

overcooked, overripe, or made with iodized salt.

Always use canning (pickling) salt for canning.

7. Don't overpack vegetables in a pickle jar, and don't pack a jar in such a way that vegetable pieces might migrate or block the neck of the jar.

A tightly packed jar cannot expand without forcing some of the juice out of the jar. If the water level in the pickle jar is greatly diminished, refrigerate it horizontally and use it first. Food trapped in a seal may ruin the seal; refrigerate it, and use it soon. Sometimes this problem is unavoidable.

8. Discolored pickles are often traced to iron utensils, inappropriate cookware, metal-lid corrosion, iodized salt (use only pickling salt), too many or poor spices, and/or hard water.

9. Shriveled and tough pickles are often traceable to overcooking, an excessively heavy syrup, an overly strong brine, old or diseased fruits, or to fruits that have been cooked too harshly in a brine or sugar syrup.

10. Cloudy jelly may be caused by insufficiently strained juice, use of overly greenfruit, or because the jelly was allowed to sit for too long prior to being packed into jars.

11. Crystals in jelly or juice may be from using too much sugar, cooking too little and too slowly, or because it was cooked too long. Crystals in grape jelly can be **tartrate crystals** and can be avoided by letting the extracted juice sit overnight in a cool place. Then strain the juice through two thicknesses of damp cheesecloth to remove the crystals.

12. Don't touch the screw bands while the jars are still hot. You might unseal an otherwise fine jar of pickles or relish.

13. Do you can by the open-kettle method? If so, stop. With the open-kettle method, the food is not heated sufficiently to kill harmful bacteria and yeasts.

14. Do not use an oven, dishwasher, steam-canner, microwave, crockpot, or regular pressure-cooker to can foods. Air does not conduct heat as well as water, so the foods processed with these methods can be under processed. Jars can also blow up when an oven door is opened. Steam-processing, according to some authoritative websites (for home canners), has not been sufficiently studied to be

considered safe. Cold-water canning is also out, although you may read about this old technique in *The Jamlady Cookbook* (32).

15. Do not use clamp-on style lids, old-fashioned rubber seals, wire bails and glass caps, or old zinc lids for canning in a RWB. Use a metal, canning lid with a clean, metal ring. Old-fashioned jars may be used for refrigerator pickles or other fresh pickles. They look cute and charming, but don't expect them to be as reliable and safe as the two-piece lid and ring. Some one-trip, one-piece lids with attached "rubber seal" are also acceptable, but they are not often available to the home canner.

16. Are you adding extra starch to recipes? While starch usually does not change product pH that much, it can affect the rate of heat penetration into a product, and may necessitate longer processing times and/or rack agitation. If you are set on adding starch to a recipe, keep the product refrigerated after processing and use smaller jars. Consider adding starch to pie fillings when opening them, thereby, retaining the option to eat the fruit as canned fruit or pie filling.

17. Don't add additional low-acid ingredients to a canning recipe or reduce the acidifiers. Don't reduce the sugar or salt. Certain harmful bacteria cannot grow in very salty, sweet, or acidic environments, but if the recipe is changed, the environment may become hospitable for these harmful bacteria.

18. Mold on jelly, or other products, indicates an improper seal. Discard products with mold. Some toxins produced by molds may pose a health threat to some people.

19. A faded pickle, relish, or jelly can be caused by improper storage or storage for too long.

20. Bulging jars should not be opened in the kitchen or sink area because harmful bacteria might come into contact with uncooked foods. Reusing contaminated jars is not recommended. Seal these jars in double plastic bags, and dispose of responsibly as bio-hazardous material.

21. Cracks in jars may occur when containers of product come into contact with something cooler or hotter. Any filled jar of product needs to be placed in a water bath of the same temperature

as the jar. When removing a jar from a RWB, place it on a folded towel and not on a cold counter.

22. Fermented product usually indicates a break or leak in the seal somewhere, even though it cannot easily be seen.

23. Why don't my sauces, preserves, or fruit relishes thicken? Most fruits have some pectin. Apples, blackberries, crab apples, currants, gooseberries, and cranberries have a lot of natural pectin. Sauces, relishes, and preserves made with these fruits and sugars will usually thicken easily if they have or are combined with sufficient acid and sugar to allow the natural pectin to work. **Pectin is a fibrous carbohydrate containing entrapped water molecules.** When a fruit containing high pectin is cooked in the presence of an acid, the pectin changes its molecular structure and physical properties, so it is less possessive of its water and more attracted to the other pectin molecules. **Sufficient acid is essential for fruits to gel, or thicken.** When sugar is heated in the presence of an acid, it breaks down into simple sugars, glucose and fructose. These sugars accept the water molecules from the pectin chains. The pectin molecules then bind to one another, forming a web of pectin, and a jelly is formed. **If there is insufficient pectin, sugar, or acid, the pectin chain does not form, and the thickening or jelling does not occur as expected.**

24. Don't can bread in a jar. The pH of any safely canned product has to be comfortably under 4.6, and the combined ingredients in most bread recipes aren't under 4.6 in pH.

25. If you are processing in a RWB, **respect the 4.6-pH line.** Make sure the product's pH is less than 4.3 or 4.2. **Always acidify plain tomatoes by adding 1 teaspoon of citric acid per quart.**

26. Cut recipes in quarter or in half. There is no problem with cutting most pickle, relish, and chutney recipes in half or in quarters. Just calculate the recipe correctly.

27. Drain cucumbers and chopped vegetables well, usually squeezing out some of the excess water. Avoid diluting the liquid portion of the recipe, as it may cause insufficient acidity. **Equate these instructions with "drain well" or "drain/squeeze."**

28. Hot pack versus raw pack—Pour hot brine into a jar of raw-packed vegetables to reduce the air in the vegetables. Raw-packed vegetables usually make crunchier pickles and keep their shape better than hot packed, but hot-packed vegetables float up less, have less air in the tissues, and tend to shrink more. Shrinkage allows for more vegetables to fit in a jar, but this might not be a good thing, especially if there is insufficient vinegar to acidify that quantity of low-acid vegetables. Hot-packed product may have a longer shelf life than cold-packed product, but all products should ideally be eaten in a year, as the nutritional value lessens with age.

29. Low-Temperature Pasteurization Treatment is a method used to reduce the incidence of soft pickles. Water baths are begun at 120 to 140 degrees F. Jars are inserted and covered with more warm to hot water. The temperature is raised to 180 to 185 degrees F and maintained there for 30 minutes. This method requires careful watching with a thermometer. Many canners opt to process for less time and keep the pickle refrigerated. A second refrigerator comes in handy for this purpose. Use small, fresh, and firm Kirby cucumbers for canned pickles, and this low-temperature pasteurization method may not be necessary. This method is often used for canning larger fermented pickles (crock pickles such as half-sours and sours), which normally can be refrigerated and eaten (without canning). **The Alfeld Nomenclature notation for this method would be JSP/180-185dF/30(16OZ) or JSP/83-85dC/30(16OZ). The 180dF stands for 180 degrees F. The 83dC stands for 83 degrees Centigrade.**

30. Keep a process notebook. Avoid problems and remember those you made before. Always write down a recipe or work from a photocopy of the cookbook page. Small, portable copiers are inexpensive and are a great way to save your cookbooks from damage. **Write or attach the recipe in a notebook, date the page, and check off each ingredient as you add it.** Make notations about any observations or problems. Label all jars with the contents, date, and recipe by keeping computerized files of these labels, or by cutting the recipe from a photocopied page of the cookbook. **Canning is not like regular cooking. Errors really must be avoided. Develop**

a system, and avoid distractions during critical measuring and timing operations.

31. If you love canning and wish to modify recipes, buy yourself a **pH meter**. Look for the new meters with all-metal probes. Talk to a technician at a good scientific-supply house. Tell him Jamlady sent you!

32. **Please don't confuse the use of apples/pears to mean only one-half of each.** The use of the forward slash in the ingredient listings for each recipe means either/or. In most cases, half of each ingredient could also be used.

33. **Refrigerate all RWB-sealed products after opening.**

34. **Peel the gingerroot for all recipes in this cookbook.**

35. **Not all recipes for canned pickles and relishes must be canned.** Many may be made in smaller batches of one-quarter or one-tenth the original batch and simply stored in the refrigerator. **A bread and butter pickle or a chow-chow relish, for example, may be cooked in a pan on the stove for the time equal to some or all of the processing time.** Then refrigerate the product. In many cases,

pickles will be crunchier if you don't cook them as long as the regular recipe, as the length of the regular recipe's processing time was predicated by the need for sterility and vacuum. **In short, there's a whole book here you may easily and quickly convert from a canning recipe to a "quickle" or quick pickle or quick relish.** The main reason for making large, canned batches is to preserve a glut of some vegetable or fruit. **If you are purchasing small quantities of vegetables or fruits whenever you like, then just make your relishes and pickles and refrigerate them.** Take a look at the recipe for red pepper relish, pepper hash, or beet and cabbage relish with horseradish. You should be able to make a couple of jars of either one of those in less than a half-hour. Label as "Refrigerate Only" and give some as gifts. **Come on city, suburban, and country cooks, you can do this!**

35. **Seek instruction from cooks who have successfully made a product, and don't give out instructions for canned products you have never made and tested.**



CLOSTRIDIUM BOTULINUM

Around 1817, a German poet and medical officer, Justinus Kerner (1786-1862), first published an accurate description of the symptoms of botulism in food. Kerner did not identify the poison, but he called it "sausage poison" because of its association with sausages, not because of its rodlike shape. In 1895, Emile Pierre van Ermengem, a professor at the University of Ghent, discovered the actual pathogen. **After food-borne botulism was discovered, four other types were identified: wound, infant, hidden, and inadvertent botulism.** Because botulism is so deadly, some of our enemies have prepared to use this bacterium, and others like anthrax, in bombs and other weapons. As a response, scientists are now seeking to create

vaccines to protect soldiers and others under biological attack.

The **symptoms of botulism** are: dizziness, double vision, blurred vision, dysphagia (difficulty swallowing), dry mouth, dysarthria (difficulty speaking), sore throat, dyspnea (difficulty breathing), constipation, nausea, vomiting, abdominal cramps, arm weakness, leg weakness, and paresthesia (sensations of the skin like burning, prickling, itching, or tingling). **The treatment for botulism is the administration of an antitoxin. To prevent botulinum spores from growing in canned product, make sure jars are sterile and products are acidified to well under 4.6 or keep the product refrigerated to 39 degrees F (4 degrees C) or below.**

Botulinum spores usually grow in conditions with less than 2-percent oxygen, in low-acid, moist food, and at temperatures between 40 and 120 degrees F. These spores, when conditions are right, produce vegetative cells that produce the deadly toxin. These spores can only be effectively killed at temperatures above boiling point (pressure canner required), but they can be controlled in high acid or high salt. If you have canned something low-acid and are unsure of its final acidity, do not eat it. Throw it out unless it is boiled for over 10 minutes to kill any possible toxins.

This botulism issue usually comes up when

canners tell me they can non-acidified tomatoes and have been doing so for years. **Canning non-acidified tomatoes is not smart and could be deadly.** These canners probably boil their tomato products while making spaghetti sauce or soups, but the outcome could turn deadly if they were to use them for a cold Bloody Mary. The next question they usually ask me is, **“Would the drink taste different if there were active vegetative cells making botulinum toxin in the Bloody Mary?”** Probably not. **Caution: To avoid botulism, do not can low-acid food in a rolling-water bath.**



PH AND PH METERS

Acidity or pH refers to the potential of hydrogen. **The pH number is lowest for an acid (high-acid product) and highest for a base (low-acid product).** The pH chart may be confusing to some people, because they incorrectly assume a high number means there is more acid. This is not the case. **A low number means the product is acidic.** The pH of a lemon is usually between 2.2 and 2.8. The pH of a date is around 6.2 to 6.4. The lemon is acidic, and the date is barely in the acid range.

For the purposes of canning, and using the rolling-water-bath method (RWB) of sealing a jar, all products must measure well under 4.6 (4.3 or lower). **Products with a pH over 4.3 should be refrigerated or processed in a pressure canner (unless the product’s water activity is less than 0.6).** Please note: **A pH of 2 (lemons) is actually the same thing as 0.01 (hydrogen ion concentration, gram mols per liter) or 10^{-2} , and 6.0 (dates) is actually the same thing as 0.000,001 or 10^{-6} .** Notice the exponent is used to show how many times the symbol or quantity is to be used as a factor. That number of times is equal to the single number used to express pH. **Numbers like 0.000,001 are just too unwieldy to use, so the**

single digit pH number is used to express the relatively small, fractional number. The pH chart runs from high acid at 0.0 to high alkaline at 13.0 with neutral at 7.0.

To measure pH, obtain a pH meter that meets your needs. If you will test hot, thick, and viscous products, like hot jams, obtain an electrode and temperature probe that can handle that situation. Be sure to relate what you will test and under what conditions you will test to your scientific-instrument salesperson. Most scientific-instrument companies, such as Cole-Parmer Instrument Company, will personally assist customers regarding appropriate meter procurement and provide free consultation and trouble-shooting with a qualified meter technician. Be sure to ask about stainless-steel probes with ISFET (Ion Specific Field Effect Transistor) silicon chip pH sensors.

When testing any product with a pH meter, be sure to standardize the meter first. Purchase in-date buffer solutions, and don’t use old and expired solutions. Prior to testing, pulverize and blend the product well. When testing, use a temperature probe, as temperature change greatly affects pH measurements. Don’t eat product tested with a glass



pH meter with temperature probe.

Relationship of pH, Hydrogen Ion Concentration, and Foods Commonly Used in Food Processing

	pH	Food or Other Substance (pH)	Hydrogen Ion Concentration, Gram Mols Per Liter	
Acid Range (0-6.9)	0	Hydrochloric N Acid (0.1)	1.0	10^0
	1	Sulfuric 0.1N] Acid (1.2)	0.1	10^{-1}
Process pH 4.6 or lower at 212 degrees F in boiling water bath	2	Lemons (2.2-2.8)	0.01	10^{-2}
	3	Grapefruit (3.0-3.7)	0.001	10^{-3}
Process pH 4.6 or higher at 240 degrees F in steam pressure canner	4	Bananas (4.5-5.0), Tomatoes (4.42-4.65)	0.000,1	10^{-4}
	5	Beans (5.60-6.50), Figs (5.0-6.0)	0.000,01	10^{-5}
	6	Dates (6.2-6.4)	0.000,001	10^{-6}
Neutral (7.0)	7	Fresh White Eggs (7.6-8.0)	0.000,000,1	10^{-7}
	8	Hominy (Lye) (6.8-8.0)	0.000,000,01	10^{-8}
	9	Borax (9.2)	0.000,000,001	10^{-9}
Alkaline Range (8.0-14.0)	10	Ammonia 0.01N (10.6)	0.000,000,000,1	10^{-10}
	11	Ammonia N (11.6)	0.000,000,000,01	10^{-11}
	12	Trisodium Phosphate, 0.1N (12.0)	0.000,000,000,001	10^{-12}
	13	Sodium Hydroxide, 0.1N (13.0)	0.000,000,000,000,1	10^{-13}

electrode as chemicals may have leached into the product from the electrode.

Not every recipe in this book is a canning recipe, but every canning recipe in this book is a “high-acid” recipe and may be canned in a rolling-water bath. If the overall pH of any canning recipe in this book was above 4.6, it has been acidified, so the resulting formulation is comfortably

below 4.6. For this reason, no pressure canner is needed for recipes in this cookbook. Some recipes provide the average pH, as a guide for further understanding of pH and processing terminology. For “low-acid canning,” please consult another source. **Ideally, beginners should start with rolling-water bath canning before advancing to pressure canning.**



ALTERNATIVE SWEETENERS

Natural sweeteners are: barley malt syrup, brown rice syrup, corn syrup, date sugar, dehydrated cane juice, fructooligosaccharides (FOS), fructose, fruit juice concentrates, glucose, high fructose corn syrup, honey, lactose, maltodextrin, maltose, maple syrup, molasses, moscovado sugar, sorghum molasses, stevia, and sucrose. **Artificial sweeteners** are: acesulfame K, aspartame, saccharin, and other sweeteners that are trying to get approved by the FDA. **Jamlady recommends readers digest the literature on each of these sweeteners before digesting them.** Reduced calorie sweeteners such as “sugar alcohols,” maltitol, mannitol, sorbitol, and xylitol are also of interest.

Sugar alcohols are found widely in nature and don’t promote cavities. While sugar alcohols are used in chewing gums and other foods, they may cause stomach upset and diarrhea if consumed in excess of 45 grams. Stevia and other sweeteners such as aspartame may chemically change with high heat or impart a “metallic taste.” Some of these sweeteners

may be incorporated into “quickles” or canned pickles, but issues such as undesirable tastes and high cost (xylitol is three times the cost of sugar) often leave formulators in a quandary. In Jamlady products, we have successfully used corn syrup, honey, fruit-juice concentrates, agave, molasses, maple syrup, sorghum, brown rice syrup, aspartame, saccharin, and date sugar. In recent years, I have refrained from using almost all artificial sweeteners and some natural alternatives because of health concerns or prohibitive cost.

Infusions of licorice tea have been used successfully, but the flavor imparted is that of licorice (see *The Jamlady Cookbook*—blueberry jam with licorice tea). Test the pH of products sweetened with any of these “new” sweeteners before you hermetically seal the jar, and research the possible and negative impact of high heat on that sweetener. For up-to-date articles on sweeteners by different researchers see **PubMed.com**.

CANNING SPICES AND HERBS

Allspice	Cinnamon	Juniper Berries	Pickling Spice (a spice blend)
Almond Extract	Cloves	Lemon Verbena	Pink Peppercorns
Bay Leaves	Coriander	Lovage Seeds	Rosemary
Brown Mustard	Cumin	Mint Leaves	Saffron
Capsicum	Dill Seed	Mace	Sage
Cardamom	Dill Weed	Mustard Seeds	Savory
Chili Peppers (dried)	Fennel	(Yellow)	Sweet Cicely Seeds
Chrysanthemum	Fenugreek	Nutmeg	Tarragon
Flowers	Garlic Cloves	Oil of Cinnamon	Thyme
Caraway Seed	Geranium Leaves	Oil of Clove	Turmeric
Capers Bush Buds	Ginger	Oil of Spearmint	White Peppercorns.
Cassia Buds	Horseradish Root,	Black Peppercorns	
Celery Seed	Hyssop Leaves and	Parsley	
Chervil	Flowers		



GINGER

Candied or Crystallized Ginger—May be made by boiling 1 pound sugar to 1 cup water with $\frac{1}{2}$ teaspoon cream of tartar. When the sugar syrup is thick, drop in thin, dry, peeled, fresh ginger slices

and cook. When candied, drop the ginger pieces on wax paper to cool, and then roll them in granulated sugar. Store candied ginger in a closed container. The pH of fresh ginger is 5.60 to 5.90.



Ginger or gingerroot may be (left) fresh, dried/ground, or (right) candied.



Common spices used for making dill pickles. Far back (left): dill weed; back row (left to right): dill seed, peppercorns, yellow mustard seeds, pickling spice, celery seed, and coriander. Front row (left to right): dried hot peppers and bay leaves.

FURTHER COMMENT

If you have problems or question not answered by this chapter, please e-mail Jamlady@Jamlady.com to ask your question or to receive a free subscription to the *Jamlady Newsletter*. I recommend canners attend the various pickling festivals around the country; support local and state farmers by shopping at

farmers' markets; question the inadequate labeling of genetically altered food and cloned meats; and, at the same time, resist excessive governmental regulations that unnecessarily impede the local production and sale of fruits, vegetables, herbs, honey, jams, pickles, baked goods, and maple syrup.



Okra and Chrysanthemum Pickle from Japan. First Place Winner, 2005 International Pickle Festival in Rosendale, New York.