

Let's Preserve: Fermented and Pickled Foods

by Julie A. Albrecht, Extension Food Specialist

Pickles and relishes are very popular as a condiment to serve with meals. They are easy to make; however, the steps are very important to follow to ensure a safe product. Many vegetables can be pickled. Cucumbers and cabbage are the main vegetables that are pickled.

Two types of pickling methods can be used to make a variety of pickled products.

Fermented Pickles

Fermented pickles, including sauerkraut, are made from cucumbers or cabbage that are fermented for several weeks. Bacteria that are naturally present on these vegetables produce acid under the proper conditions. Then the proper amount of salt is added to inhibit spoilage and pathogenic bacteria. The amount of salt should never be altered when making pickles or sauerkraut by the fermentation process. A characteristic lactic acid flavor results when pickles are made by fermentation.

Fresh-Pack or Quick Pickles

Fresh-pack or quick process pickles are made with an acid (vinegar). Spices, salt, and sugar are added for flavor. These pickles do not require a fermentation peri-

od and they are usually made and processed within a day. The major flavor of a fresh-pack or quick pickle is due to the vinegar (acetic acid).

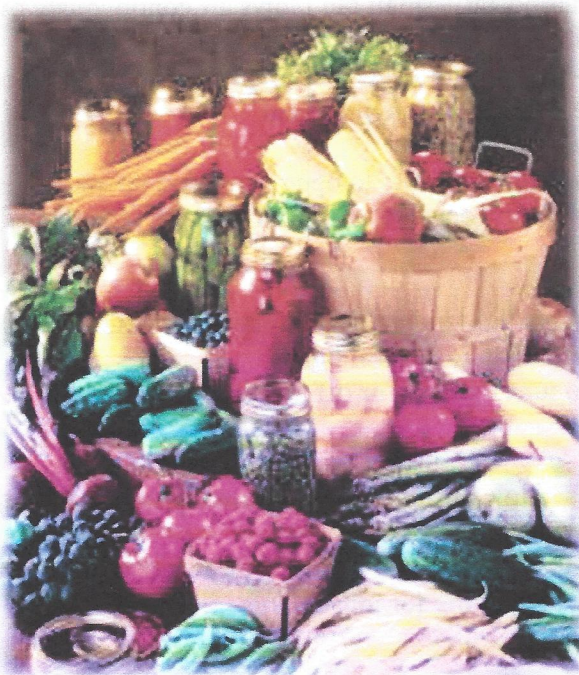


Photo courtesy of National Presto Industries, Inc.

Before you begin to pickle, consider what type of pickled product you would like to make. This publication provides procedures to safely process a variety of fermented and pickled foods. The publication *Let's Preserve: Canning Basics* (EC434) gives information on boiling-water canners, jar and lid selection, and preparation.

Cucumber Selection

Select fresh, firm cucumbers free from spoilage and of the appropriate size for the type of pickle to be made. For gherkins, select cucumbers about 1 1/2 inches in length and for dill pickles, use 4 inch cucumbers. For best results, use cucumber varieties intended for pickling.

Be sure to remove and discard a 1/16 inch slice from the blossom end of fresh cucumbers. Blossoms may contain enzymes which cause excessive softening of pickles. Wash and rinse cucumbers with cold water before use.

Approximately 14 pounds of cucumbers are needed for 7 quarts or 9 pounds of cucumbers for 9 pints. A bushel of cucumbers weighs 48 pounds and yields 16 to 24 quarts — an average of 2 pounds per quart. Measure

or weigh the amounts of food carefully because the proportion of fresh food to the other ingredients will affect flavor and safety of the final product.

Cabbage Selection

For the best sauerkraut, use firm heads of fresh cabbage. Freshly harvested cabbage is very crisp and fractures easily. Keep freshly harvested heads in a cool dry place for one to two days before shredding for kraut use.

Ingredients

Salt

Use of canning or pickling salt is recommended. Fermented and fresh-pack or quick pickles may be safely made using either iodized or noniodized table salt. However, noncaking materials added to table salt may make the brine cloudy. Flake salt varies in density and is not recommended for use.

Reduced-sodium salts, for example, "Lite Salt," may be used in quick pickle recipes, as indicated in this guide. The pickles may, however, have a slightly different taste than expected. Caution: Use of reduced-sodium salt in fermented pickle recipes is not recommended.

Sugar

White granulated and brown sugars are most often used. Corn syrup and honey, unless called for in tested recipes, may produce undesirable flavors.

Vinegar

White distilled and cider vinegars of 5 percent acidity (50 grain) are recommended. Vinegar with unknown acidity should not be used. White vinegar is usually preferred when a light color is desirable, as in the case with fruits and cauliflower.

The level of acidity in a pickled or fermented product is as important to its safety as it is to taste and texture. Do not alter vinegar, food, or water proportions in a recipe. Use only recipes with tested proportions of ingredients.

There must be a minimum, uniform level of acid throughout the mixed product to prevent the growth of *Clostridium botulinum* bacteria.

Water

Use soft water, if possible. Extremely hard water can discolor pickles, especially if it has a high iron content. Sediment from hard water also may be a problem when extremely hard water is used to make pickles. Some types of hard water may be softened somewhat. Boil the water for 15 minutes, skim off the scum, and let the water rest for 24 hours. When the sediment has settled to the bottom, pour off the water from the top and use.

Firming Agents

Alum

Alum (a preservative available in the spice section of your grocery store) can be safely used to firm fermented pickles. It is not necessary and is not included in the recipes in this publication. Alum does not improve the firmness of quick process pickles.

Pickling Lime

The calcium in lime definitely improves pickle firmness. Food-grade or pickling lime may be used as a lime-water solution for soaking fresh cucumbers 12 to 24 hours before pickling them. Excess lime absorbed by the cucumbers must be removed to make safe pickles. To remove excess lime, drain the lime-water solution, rinse, and then resoak the cucumbers in fresh water for one hour. Repeat the rinsing and soaking steps two more times.

Boiling Water Bath Processing

Pickled products may spoil from microorganisms, particularly yeasts and molds, as well as enzymes that may affect flavor, color, or texture. Processing the pickles in a boiling-water canner will prevent both of these problems. Processing times and procedures will vary with the food acidity and size of the food pieces. Follow the recommended processing procedures in this publication for successful results. Wait five minutes before removing jars from canner.

Low-temperature Pasteurization Treatment

A low-temperature pasteurization method to process pickles results in a firmer product. The treatment must be carefully managed to avoid possible spoilage.

Place jars in a canner filled halfway with warm (120° to 140°F) water. Then, add hot water to a level 1 inch above jars. Heat the water enough to maintain 180° to 185°F water temperature for 30 minutes. Check with a candy or jelly thermometer to be certain that the water temperature is at least 180°F during the entire 30 minutes. **Caution: Use the low temperature pasteurization treatment only when the recipe indicates.**

Determine Your Altitude

Water boils at 212°F at sea level. As the elevation increases, water boils at lower temperatures and foods take longer to cook. To ensure safely canned foods at altitudes above sea level, lengthen the processing time for boiling-water canning methods. *Figure 1* shows Nebraska altitudes. Find your area and check the tables for the correct processing time for your altitude.

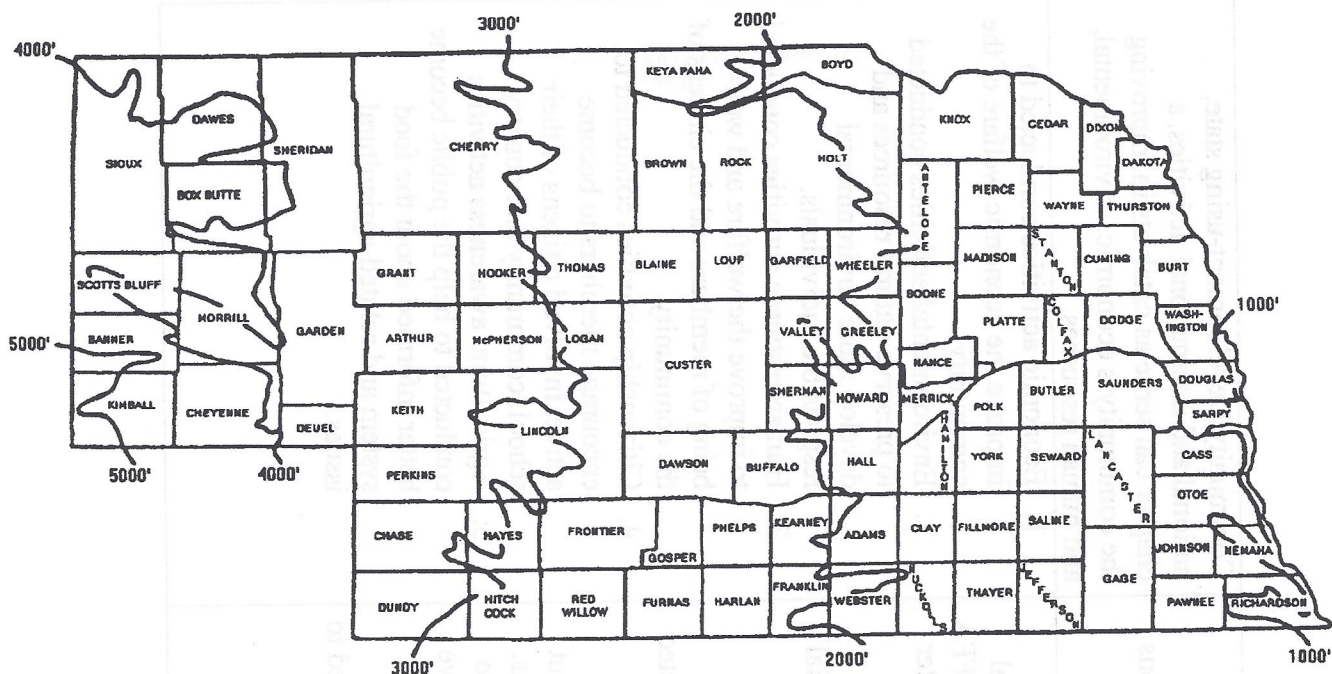


Figure 1. Altitude ranges in Nebraska.

Map was prepared by Les Howard, cartographer, UNL School of Natural Resources

Suitable Containers, Covers, and Weights for Fermenting Food

A 1-gallon container is needed for each 5 pounds of fresh vegetables. Therefore, a 5-gallon stone crock is of ideal size for fermenting about 25 pounds of fresh cabbage or cucumbers. Food-grade plastic and glass containers are excellent substitutes for stone crocks. Other 1- to 3-gallon nonfood grade plastic containers may be used if lined inside with a clean food-grade plastic bag. **Caution: Be certain that foods contact only food-grade plastics. Do not use garbage bags or trash liners.** Fermenting sauerkraut in quart and half-gallon Mason jars is an acceptable practice, but may result in more spoilage losses.

Cabbage and cucumbers must be kept 1 to 2 inches under brine while fermenting. After adding prepared vegetables and brine, insert a suitably sized dinner plate

or glass pie plate inside the fermentation container. The plate must be slightly smaller than the container opening, yet large enough to cover most of the shredded cabbage or cucumbers. To keep the plate under the brine, weight it down with 2 to 3 sealed quart jars filled with water. Covering the container opening with a clean, heavy bath towel helps to prevent contamination from insects and molds while the vegetables are fermenting. Fine quality fermented vegetables also are obtained when the plate is weighted down with a very large clean, plastic bag filled with 3 quarts of water containing 4 1/2 tablespoons of salt. Be sure to seal the plastic bag. Freezer bags sold for packaging turkeys are suitable for use with 5-gallon containers.

The fermentation container, plate and jars must be washed in hot sudsy water and rinsed well with very hot water before use.

RECIPES

Dill Pickles

For each gallon capacity of your container use:

- 4 lb of 4-inch pickling cucumbers
- 2 tbsp dill seed or 4 to 5 heads fresh or dry dill weed
- 1/2 cup (canning or pickling) salt
- 1/4 cup vinegar (5%)
- 8 cups water and one or more of the following:

- 2 cloves garlic (optional)
- 2 dried red peppers (optional)
- 2 tsp whole mixed pickling spices (optional)

Wash cucumbers. Cut 1/16 inch slice off blossom end and discard. Leave 1/4 inch of stem attached. Place half of dill and spices on bottom of a clean, suitable container (see Page 2). Add cucumbers, remaining dill, and spices. Dissolve salt in vinegar and water and pour over cucumbers. Add suitable cover and weight.

Store where temperature is between 70° and 75°F for about three to four weeks while fermenting. Temperatures of 55° to 65°F are acceptable, but the fermentation will take five to six weeks. Avoid temperatures above 80°F or pickles will become too soft during fermentation. Fermenting pickles cure slowly. Check the container several times a week and promptly remove surface scum or mold. Caution: If the pickles become soft, slimy or develop a disagreeable odor, discard them.

Fully fermented pickles may be stored in the original container for about four to six months, provided they are refrigerated and surface scum and molds are removed regularly. Canning fully fermented pickles is a better way to store them. To can them, pour the brine into a pan, heat slowly to a boil, and simmer five minutes. Filter brine through a paper coffee filter to reduce cloudiness, if desired. Fill jar with pickles and hot brine, leaving 1/2 inch headspace. Adjust lids and process as below or use the low-temperature pasteurization treatment described on Page 2. Wait five minutes before removing jars from canner.

Recommended Process Time for Dill Pickles in a Boiling-water Canner				
Style of Pack	Jar Size	Process Time at Altitudes of		
		0- 1,000 ft	1,001- 6,000 ft	Above 6,000 ft
Raw	Pints	10 min	15 min	20 min
	Quarts	15 min	20 min	25 min

Sauerkraut

- 25 lb cabbage
- 3/4 cup canning or pickling salt

Yield: About 9 quarts

Work with about 5 pounds of cabbage at a time. Discard outer leaves. Rinse heads under cold running water and drain. Cut heads in quarters and remove cores. Shred or slice to the thickness of a quarter. Put cabbage in a suitable fermentation container (see Page 2), and add 3 tbsp of salt. Mix thoroughly, using clean hands or use gloves. Pack firmly until salt draws juices from cabbage. Repeat shredding, salting, and packing until all cabbage is in the container. Be sure it is deep enough so that its rim is at least 4 or 5 inches above the cabbage. If juice does not cover cabbage, add boiled and cooled brine (1 1/2 tbsp of salt per quart of water). Add plate and weights; cover container with a clean bath towel. Store at 70° to 75°F while fermenting. At temperatures between 70° and 75°F, kraut will be fully fermented in about three to four weeks; at 60° to 65°F, fermentation may take five to six weeks. At temperatures below 60°F, kraut may not ferment. Above 75°F, kraut may become soft.

If you weigh the cabbage down with a brine-filled bag, do not disturb the crock until normal fermentation is completed (when bubbling ceases). If you use jars as weight, you will have to check the kraut two to three times each week and remove scum if it forms. Fully fermented kraut may be kept tightly covered in the refrigerator for several months or it may be canned as follows:

Hot pack — Bring kraut and liquid slowly to a boil in a large kettle, stirring frequently. Remove from heat and fill jars rather firmly with kraut and juices, leaving 1/2-inch headspace.

Raw pack — Fill jars with kraut and cover with juices, leaving 1/2-inch headspace.

Recommended Process Time for Sauerkraut in a Boiling-water Canner				
Style of Pack	Jar Size	Process Time at Altitudes of		
		0- 1,000 ft	1,001- 6,000 ft	Above 6,000 ft
Hot	Pints	10 min	15 min	15 min
	Quarts	15 min	20 min	20 min
Raw	Pints	20 min	25 min	30 min
	Quarts	25	30	35 min

RECIPES

Fresh-Pack or Quick Pickled Foods

Pickled Asparagus

For six wide-mouth pint jars	For seven 12-ounce jars
10 pounds asparagus	7 pounds asparagus
6 large garlic cloves	7 large garlic cloves
4 1/2 cups water	3 cups water
1/2 cup white distilled vinegar (5%)	3 cups white distilled vinegar (5%)
6 small hot peppers (optional)	7 small hot peppers (optional)
1/2 cup canning salt	1/3 cup canning salt
3 tsp dill seed	2 tsp dill seed

Wash asparagus well, but gently, under running water. Cut stems from the bottom to leave spears with tips that fit into the canning jar with a little less than 1/2-inch headspace. Peel and wash garlic cloves. Place a garlic clove at the bottom of each jar, and tightly pack asparagus into jars with the blunt ends down.

In an 8-quart Dutch oven or saucepot, combine water, vinegar, hot peppers (optional), salt, and dill seed. Bring to a boil. Place one hot pepper (if used) in each jar over asparagus spears. Pour boiling hot pickling brine over spears, leaving 1/2-inch headspace.

Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened, clean paper towel; apply two-piece metal canning lids.

Process in a boiling water canner according to the recommendations on Page 11. Wait five minutes before removing jars from canner. Let cool, undisturbed, for 12 to 24 hours and check for seals.

Allow pickled asparagus to sit in processed jars for three to five days before consumption for best flavor development.

Pickled Baby Carrots

- 8 1/2 cups peeled baby carrots
- 5 1/2 cups white distilled vinegar (5%)
- 1 cup water
- 2 cups sugar
- 2 tsp canning salt
- 8 tsp mustard seed
- 4 tsp celery seed

Yield: About 4 pint jars

Wash carrots well and peel, if necessary. Wash again after peeling.

Combine vinegar, water, sugar, and canning salt in an 8-quart Dutch oven or stockpot. Bring to a boil and

boil gently three minutes. Add carrots and bring back to a boil. Then reduce heat to a simmer and heat until the carrots are half-cooked (about 10 minutes).

Meanwhile, place 2 tsp mustard seed and 1 tsp celery seed in the bottom of each clean, hot pint jar.

Fill hot jars with the hot carrots, leaving 1-inch headspace. Cover with hot pickling liquid, leaving 1/2-inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened, clean paper towel; adjust two-piece metal canning lids.

Process in a boiling-water canner, as recommended on Page 11. Wait five minutes before removing jars from canner. Let cool, undisturbed, 12 to 24 hours and check for seals.

Allow carrots to sit in processed jars for three to five days before consuming for best flavor development.

Pickled Dilled Beans

- 4 lb fresh tender green or yellow beans (5 to 6 inches long)
- 8 to 16 heads fresh dill
- 8 cloves garlic (optional)
- 1/2 cup canning or pickling salt
- 4 cups white vinegar (5%)
- 4 cups water
- 1 tsp hot red pepper flakes (optional)

Yield: About 8 pints

Wash and trim end from beans and cut to 4-inch lengths. In each sterile pint jar, place one to two dill heads and, if desired, one clove of garlic. Place whole beans upright in jars, leaving 1/2-inch headspace. Trim beans to ensure proper fit, if necessary. Combine salt, vinegar, water, and pepper flakes (if desired). Bring to a boil. Add hot solution to beans, leaving 1/2 inch headspace. Process according to table on Page 11. Wait five minutes before removing jars from canner.

Pickled Three-Bean Salad

- 1 1/2 cups cut and blanched green or yellow beans (prepared as below)
- 1 1/2 cups canned, drained, red kidney beans
- 1 cup canned, drained garbanzo beans
- 1/2 cup peeled and thinly sliced onion (about 1 medium onion)
- 1/2 cup trimmed and thinly sliced celery (1 1/2 medium stalks)
- 1/2 cup sliced green peppers (1/2 medium pepper)
- 1/2 cup white vinegar (5%)