



PRESERVING FOODS

by

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WHY PRESERVE FOOD?

Many reasons are given for preserving food at home. Some families see it as a way of saving money while others like to have control over the quality of food used. Some persons get a great deal of satisfaction from producing and preserving food. And then there are those who can't bear to see food go to waste.

Check your motivation for preserving food. Do you feel that your family eats a greater variety of foods as a result of having home-preserved foods? Do you get satisfaction from looking into a full freezer or pantry? Or are you one who cans or freezes food just because it is available without considering ultimate usage?

Principles of Food Preservation

There are two major goals in preserving and storing foods. They are

- 1) to maintain high quality
- 2) to prevent the growth of organisms which can cause illness.

Food must be of high quality to start with if the first goal is to be achieved. No method of food preservation improves the quality of food. In fact, there is usually some loss of quality.

The nature of the food, the storage period, and the storage conditions must be considered when choosing a preservation method.

Enzymes, yeasts, molds, and bacteria are responsible for changes in foods. Yeasts and enzymes cause changes in food quality but rarely affect the safety of a food.

One bacteria of particular concern to the home canner is *Clostridium botulinum*. Botulism is the deadliest and rarest kind of food borne illness. The organism lives on dead and decaying organic matter and is found almost everywhere in nature—in soil, dust, on fruits, vegetables, and other foods. In its dormant or resting phase as a spore, it can survive for years. The spores themselves are not harmful but they are capable of producing a deadly toxin (poison).

Most microorganisms require moisture, a food source, and air (oxygen). Activity is greatest at temperatures between 60 degrees and 120 degrees F. Activity may refer to changes in color, flavor, or texture; to an increase in numbers of microorganisms; or to the production of a toxin (poison) by the microorganism. Lowering the

temperature slows activity but it does not destroy the microorganisms.

Raising the temperature also slows or stops activity. Yeasts, molds, and enzymes are killed at temperatures between 160 degrees and 212 degrees F. but botulinum spores have a greater tolerance for heat.

The acidity of food also influences processing. Foods are grouped as "acid" and "low-acid" for purposes of selecting the appropriate processing method. Acid protects against the growth of spoilage organisms, particularly *Clostridium botulinum*. Thus, the heat treatment need not be as severe for foods in the "acid" group as for foods in the "low-acid" group.

The degree of acidity or alkalinity is expressed as pH using a scale from 0 to 14. The center of the scale—7—is neutral, neither acid nor alkaline. As the pH moves away from 7, the foods become increasingly acid or alkaline. Pumpkin has a pH of 5.3; red cherries have a pH of 3.4, thus cherries are more acid than pumpkin.

Foods with a pH below 4.6 are classified as "acid," while foods with a pH between 4.6 and 7.0 are classified as "low-acid." It might be more appropriate to describe the latter group as "low-in-acid."

Foods in the "acid" group can be processed by the boiling water bath method. In this method, jars of food are immersed in boiling water. Heat is transferred from the water to the food. Food in jars never gets hotter than the boiling point of water—212 degrees F.—regardless of how many hours the food is processed.

Foods which can be processed in a boiling water bath are fruits, tomatoes, pickles, and jams, including:

Apples	Peaches
Applesauce	Pears
Apricots	Plums
Beets, Pickled	Rhubarb
Berries	Tomatoes
Cherries	Tomato Juice
Cucumbers, Pickled	
Fruit Juices	

The following foods are "low-acid" and must be processed in a pressure canner where temperatures above 212 degrees F. can be achieved. At 5 pounds pressure, the temperature inside the canner is 228

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degrees F.; at 10 pounds pressure 240 degrees F.; at 15 pounds pressure 250 degrees F.

Asparagus	Okra
Beans, shelled	Peas
Beans, snap	Potatoes
Beets	Pumpkin
Carrots	Spinach and other
Corn	Greens
Hominy	Squash
Mushrooms	Sweetpotatoes

It's not enough to use a pressure canner. Recommended processing methods and times must be used also to insure that all food in the jar reaches the desired end-point temperature. This may not happen if processing time is cut short or if the food is processed at 9 pounds pressure rather than 10.

Salt and Sugar

The amounts of salt and sugar used in canning and freezing do not have a preservative effect. They are used primarily for flavor and may be omitted. However, fruits canned without sugar will be softer in texture than those canned with sugar.

Syrups for use in canning and freezing fruits:

Type of syrup	Sugar Cups	Water Cups	Yield Cups
30% (light)	2	4	5
40% (medium)	3	4	5½
50% (heavy)	4¾	4	6½

Honey and corn syrup can replace sugar in canning and freezing. Remember that honey has a distinctive flavor which will persist in the finished product. It is recommended that artificial sweeteners be added at the time the fruit is used rather than when preserved.

FREEZING

Freezing is probably the most popular method of food preservation. Its popularity is due to two factors—(1) the ease with which foods can be prepared for freezing, and (2) the fresh flavor of frozen foods. Another plus factor is the convenience of having frozen foods available. One factor on the negative side is the energy cost of freezing.

Costs

What are the costs involved in freezing? The cost of a freezer or of freezer space in a refrigerator or freezer locker is an obvious one. Some repairs are necessary over the 15-year life of a freezer—figure 2 percent of the purchase price each year. You won't spend that much each year

but you'll spend more than that when a service call is needed.

Energy is needed to operate the freezer. A small amount of the energy is used for the initial freezing of foods but the principal energy usage is for maintaining 0 degrees F. in the freezer. Total energy usage will depend on a number of factors including the size of the freezer, its efficiency, and its location.

Packaging materials are another cost of freezing.

The cost per pound of frozen food can be calculated by dividing the total costs of operating a freezer by the number of pounds of food frozen. A 12-cubic-foot freezer would hold about 420 pounds—35 pounds per cubic foot. If it used \$100 worth of energy in a year, the energy cost per pound of food would be 24¢. One way to decrease the cost per pound is to increase the quantity of food going through the freezer. If you filled the freezer one and a half times during the year (630 lbs of food) then the energy cost per pound would be 16¢.

Packaging Materials for Freezing

Frozen foods maintain high quality if all air is excluded from the package and a moisture-vapor-proof seal is achieved.

Many different packaging materials are used in the freezer. Some do a better job of keeping food at the peak of quality than others. A good packaging material should be *moisture and air tight, stand up at freezer temperatures, suit the food and be strong.*

To Blanch or Not to Blanch?

Freezing does not destroy any of the microorganisms which cause changes in food quality and food safety. Bacterial growth is very slow at freezer temperatures so food is not apt to spoil in the freezer. There may be loss of quality, however. Changes in the color, flavor, and texture of fruits and vegetables can be caused by the enzymes which are responsible for ripening.

Heating foods before freezing will destroy the enzymes. That's why blanching or steaming of vegetables is recommended. Heating does reduce the number of bacteria, yeasts, and molds present but its principal purpose is to destroy enzymes. Heating also makes vegetables easier to pack into containers.

To blanch, lower a small amount of vegetable into boiling water. The ratio of vegetable to water should be such that the water doesn't stop boiling—a pound of prepared vegetable to a gallon of water is a common proportion. The blanching time must be long enough for heat to penetrate the food. As a rule, the larger the piece,

the longer the blanching time. Thus the extremes go from 1½ minutes for green peas to 11 minutes for large ears of corn. Start counting blanching time when food is immersed in boiling water.

Enzyme action may be stopped by steaming foods rather than boiling them. The time required for heat penetration is greater for steaming than for blanching. Whether blanched, steamed, or par-cooked, it is important to cool the vegetable quickly to stop the cooking process. Plunge the vegetable into ice cold water for about the same length of time you heated it. Then drain, package, and freeze. For some foods, you may find it more satisfactory to set the containers of food in ice water for cooling.

Remember, enzymes affect food quality not food safety. If food is used in a short time or heavily seasoned, changes in quality may not be detected.

Microwave Blanching

Microwave blanching of vegetables would appear to be a quick, energy efficient method, but research designed to test its effectiveness has not shown it to be especially quick or effective. Some of the drawbacks—only a small amount of food can be handled at a time; the suggested blanching times are very similar to those for water blanching; the vegetable has to be stirred; and finally, tests after storage indicate that

YIELD OF HOME CANNED AND HOME FROZEN PRODUCTS FROM RAW MATERIALS

Commodity	Purchasing Unit	Approximate net weight	Yield Canned		Yield Frozen	
			Range	Approximate Number	Range	Approximate Number
		pounds	quarts	quarts	quarts	quarts
Apples	Bushel	48	16 to 25	20	16 to 20	18
	Box	44	14 to 23	18	14 to 18	16
Apricots	Bushel	48	12 to 24	16	30 to 36	33
	Crate	22	6 to 12	8	14 to 17	15
Asparagus	Bushel	40	9 to 16	10		
	Crate	28	5 to 10	6	7 to 11	10
Beans, Lima, in pod	Bushel	32	6 to 10	8	6 to 8	7
Beans, snap	Bushel	30	12 to 22	18	15 to 22	20
Beets, without tops	Bushel	52	14 to 24	18	17 to 22	20
Berries (except strawberries)	24-qt. crate	36	11 to 24	16	16 to 20	18
Broccoli	Crate	25				12
Brussels sprouts	4-qt. boxes					3
	Crate	36				18
Carrots with tops	Bushel	50	17 to 20	18	16 to 20	20
Cauliflower		20			7 to 12	10
Cherries, as picked	Bushel	56	22 to 32	28	18 to 22	18
Corn, in husks	Bushel	35	6 to 10 (unpitted) (kernels)	8	7 to 9 (kernels)	8
Grapes	Bushel	48	12 to 20	16		
	Lug box	28	7 to 8	9		
Greens	Bushel	18	3 to 8	6	6 to 9	6
Peaches	Bushel	48	16 to 24	18	16 to 24	20
Pears	Bushel	50	17 to 25	20	20 to 25	22
Peas, green, in pod	Bushel	30	5 to 10	7	6 to 8	7
Plums	Bushel	56	22 to 36	25	19 to 28	25
	Crate	20	8 to 13	9	6 to 10	8
Rhubarb		10	7 to 10	9	5 to 8	7
Squash, summer	Bushel	40	10 to 20	16	16 to 20	16
Strawberries	24-qt. crate	36	7 to 16	12	19 to 30	24
Sweet potatoes	Bushel	50	16 to 22	18		
Tomatoes	Bushel	53	14 to 22	18		

conventionally blanched vegetables are of better quality.

Enzymes in Fruits

Enzymes are active in fruits, too. One obvious example of enzyme action is the darkening of light colored fruits. Blanching fruits to inactivate the enzymes would cause them to have a cooked flavor.

There are other ways of inhibiting enzyme activity. One way is to exclude oxygen (air) which the enzyme requires for activity. Packing fruit in syrup or water will achieve this, but the fruit on top may be poorly protected. Antioxidants are chemical substances which interfere with enzyme activity. Ascorbic acid (vitamin C) combines with the oxygen sparing the fruit. Citric acid makes the food more acid; enzymes are less active in an acid medium. Ascorbic acid and citric acid are often combined in commercial products designed to keep fruits from darkening. Use according to package directions.

Older, but less efficient methods include dropping light colored fruits into water to which salt and/or vinegar was added or coating them with lemon juice.

For Best Results

Keep the time between harvesting and freezing as short as possible. Work with a small quantity of food at any one time. Follow the procedures outlined. Remember to leave headspace— $\frac{1}{2}$ inch for wide-topped containers with straight sides; $1\frac{1}{2}$ -inches for narrow topped glass jars.

Exclude as much air from the package as possible. Close the container, label, and freeze. Store at 0 degrees F. or below.

Preparing Foods for Freezing

Apples, sliced

Wash, peel, and core apples. Slice into twelfths or sixteenths. Treat to prevent darkening.

SYRUP PACK: (Preferred if slices are to be used without cooking.) Slice apples into cold syrup. Package apple slices. If using rigid containers, add enough syrup to cover and put a piece of crumpled waxed paper on top to keep the apple slices down in the syrup.

SUGAR PACK: (Preferred for slices to be used in pies.) Sprinkle $\frac{1}{2}$ cup sugar over each 4 cups of apples. Turn apples gently until sugar has dissolved. Package, leaving needed headspace.

UNSWEETENED PACK: Pack treated apples in water or drain and package dry.

Applesauce

Make applesauce in usual way. Pack into containers leaving needed headspace.

Asparagus

Wash asparagus thoroughly. Cut or break off tough portions of the stalks; discard or package separately.

Leave spears in lengths to fit the package, or cut in pieces. Sort according to thickness of stalk.

Heat stalks in boiling water according to thickness of stalk; small stalks for 2 minutes, medium stalks for 3 minutes, and large stalks for 4 minutes.

Lift out of boiling water and immerse in cold water to stop cooking. Drain.

Package for the freezer leaving needed headspace. Alternate tip and stem ends for a more compact pack.

Beans, green

Wash beans and drain. Cut or break off ends; cut or break into 1- or 2-inch pieces. Slice lengthwise for french-style beans.

Heat beans in boiling water for 3 minutes. Lift out of boiling water and immerse in cold water to stop cooking. Drain thoroughly. Pack beans leaving needed headspace.

Beans, lima

Select well-filled pods. Beans should be green but not starchy or mealy. Shell and sort according to size, or leave beans in pods to be shelled after heating and cooling. Heat in boiling water; small beans or pods for 2 minutes, medium beans or pods for 3 minutes, and large beans or pods for 4 minutes.

Cool and drain.

Pack into containers leaving needed headspace.

Beans, shelled, green

Select pods that are plump, not dry or wrinkled. Shell the beans. Heat in boiling water for 1 minute. Cool and drain.

Pack into containers leaving headspace.

Beets

Wash beets and sort according to size. Trim tops, leaving $\frac{1}{2}$ -inch of stems and tap root.

Cook in boiling water until tender—20 to 30 minutes for small beets; 40 to 50 minutes for larger beets. Cool promptly in cold water. Peel. Leave baby beets whole. Cut medium or large beets in $\frac{1}{2}$ -inch cubes or slices; halve or quarter very large slices.

Pack into containers leaving needed headspace.

Berries, other than strawberries

Sort berries and remove leaves, stems, and overripe berries. Wash and drain.

SYRUP PACK: Pack berries into containers and cover with cold 40 or 50-percent syrup leaving needed headspace.

SUGAR PACK: To 1 quart berries, add $\frac{3}{4}$ cup sugar. Turn berries in sugar gently until most of the sugar is dissolved. Fill containers leaving needed headspace.

UNSWEETENED PACK: Pack berries into containers, leaving needed headspace.

Broccoli

Wash, peel stalks, and trim. If necessary to remove insects, soak for 1/2 hour in a solution made of 4 teaspoons salt to 1 gallon of cold water. Split lengthwise into pieces so that florets are not more than 1 1/2 inches across.

Heat in steam 5 minutes or boiling water 3 minutes. Cool promptly in cold water and drain. Package for freezer, leaving needed headspace.

Brussels Sprouts

Select green, firm, and compact heads. Examine heads carefully to make sure they are free from insects. Trim, removing coarse outer leaves. Wash thoroughly. Sort into small, medium, and large sizes.

Heat in boiling water; small heads for 3 minutes, medium heads for 4 minutes, and large heads for 5 minutes.

Cool promptly in cold water and drain. Package for the freezer, leaving needed headspace.

Carrots

Select tender, mild-flavored carrots. Remove tops, wash, and peel. Leave small carrots whole. Cut others into 1/4-inch cubes, thin slices or lengthwise strips.

Heat in boiling water; small, whole carrots for 5 minutes, diced or slices for 2 minutes, and lengthwise strips for 2 minutes.

Cool promptly in cold water and drain. Pack carrots into containers, leaving needed headspace.

Cauliflower

Choose firm, tender, snow white heads. Break or cut into pieces about 1 inch across. Wash well. If necessary to remove insects, soak for 30 minutes in a solution of salt and water — 4 teaspoons salt to each gallon of water. Drain.

Heat in boiling water containing 4 teaspoons salt per gallon for 3 minutes. Cool promptly in cold water and drain.

Pack cauliflower into containers, leaving no headspace.

Cherries, Sour

Select bright-red, tree-ripened cherries. Stem, sort, and wash thoroughly. Drain and pit.

SYRUP PACK: Pack cherries into containers and cover with cold 60 or 65% syrup, depending on tartness of the cherries. Leave at least 1/2-inch headspace.

SUGAR PACK: To 1 quart (1 1/3 pounds) cherries, add 3/4 cup sugar. Mix until sugar is dissolved. Pack into containers, leaving at least 1/2-inch headspace.

Corn, cream-style or whole-kernel

Heat ears in boiling water for 4 minutes. Cool quickly in ice water and drain.

For whole-kernel corn, cut kernels from cob at about two-thirds the depth of the kernels. For cream-style, cut at about center of kernels, then scrape the cob to remove the juice and heart of the kernel.

Pack corn into containers leaving necessary headspace.

Corn, on-the-cob

Sort ears according to size. Heat in boiling water; small ears (less than 1 1/4" in diameter) for 7 minutes, medium ears for 9 minutes, and large ears (over 1 1/2" in diameter) for 11 minutes.

Drop ears of corn into ice water. Drain. Package ears.

Greens

Wash greens several times. Lift greens out of water as grit settles to the bottom of the pan.

Cut or tear out tough stems and midribs and discard. Greens should be wilted before packaging for freezing. Very tender leaves of spinach will need less heating time than collards. Work with a small quantity of greens at a time. Don't overcook.

Greens may be dipped in cold water to stop cooking. A more acceptable practice is to package greens in half-pint or pint containers and freeze immediately.

Filled containers can be set in cold water to speed cooling before freezing.

Okra

Select young, tender, green pods. Wash thoroughly. Cut off stems in such a way as not to cut open seed cells.

Heat small pods in boiling water for 3 minutes, large pods for 4 minutes.

Cool quickly and drain. Leave whole or slice crosswise. Pack into containers leaving needed headspace.

Peas, green

Shell and wash peas. Drain.

Heat peas in boiling water for 1½ minutes in a blancher or in wire basket in a large kettle. Work with small quantities of peas for best results. Immerse in cold water to stop cooking. Drain thoroughly. Package, leaving needed headspace.

Peas, blackeye, crowder, and field

Shell peas, discarding those that are hard.

Heat peas in boiling water for 2 minutes. Cool in cold water and drain.

Package, leaving needed headspace.

Peaches

Wash peaches and remove skins and pits. It is better not to use a boiling water dip when peeling peaches for freezing. Treat to prevent darkening. Slice if desired.

SYRUP PACK: Drop peaches into cold syrup. Pack peaches into containers. Add syrup to cover. Place a piece of crumpled waxed paper on top of the peaches to hold them under the syrup.

SUGAR PACK: Add 2/3 cup sugar to each quart of prepared fruit. Mix well. Pack into containers leaving needed headspace.

UNSWEETENED PACK: Pack peaches into containers and cover with cold water containing an antidarkening agent. Leave needed headspace.

Potatoes

Potatoes do not freeze especially well. French fries are the most satisfactory frozen potato product. Boiled potatoes can be frozen but there will be a loss of quality.

To freeze boiled potatoes, partially cook the potatoes as for immediate eating. Heat should reach the center of potato pieces. Cool quickly. Drain and package leaving needed headspace.

To freeze French-fries, select medium to large potatoes. Pare and cut lengthwise into uniform strips about 3/8 inch thick. Rinse quickly in cold water to remove surface starch. Dry thoroughly.

Fill the kettle one-third full of fat or oil, and heat to 375 degrees F., keeping the fry basket in the fat.

Raise basket and add raw potato strips to cover the bottom of basket. Don't overload the frying basket. Raw potato strips are high in moisture content and when too many are put into the hot fat, the temperature drops excessively. This slows cooking and allows the strips to absorb more fat.

Lower basket gently into fat. Fry for about 4 minutes or until strips are cooked but not brown.

Remove basket from fat and drain. Turn parfries onto paper towels or other absorbent

paper. Cool to room temperature. Pack cooled strips in cartons or plastic bags.

To use, thaw and brown in hot fat or leave frozen and brown in oven or broiler.

Squash, summer

Select young squash with small seeds and tender rind. Wash, cut in ½-inch slices. Heat in boiling water for 3 minutes. Cool squash in cold water and drain.

Package, leaving needed headspace.

Strawberries

Wash berries and remove cap stems. Slice berries into a large measuring cup or bowl. A quart of fresh berries will yield about 1½ pints frozen berries.

Sprinkle sugar over berries—¾ cup sugar to each quart of sliced berries. Turn berries over and over until sugar is dissolved and some juice is formed.

Package berries leaving needed headspace.

Tomatoes

It's still not possible to freeze fresh whole tomatoes for fresh use. Freezing and subsequent thawing cause loss of the characteristic texture of the fresh tomato. Stewed tomatoes and tomato juice can be frozen satisfactorily.

To freeze stewed tomatoes, wash, remove stem scar and core, and halve or quarter. Cover and cook until tender, about 10 to 20 minutes. Set pan containing tomatoes in cold water to cool or pack tomatoes into containers and set the filled containers in cold water.

To freeze tomato juice, prepare juice as for canning. Add 1 teaspoon salt for each quart juice. Pour into containers leaving needed headspace.

CANNING

The processing equipment needed will depend on the food to be canned. A pressure canner is a necessity for canning low acid foods such as beans, peas, corn, and greens. A water bath canner will suffice if only fruits and tomatoes are to be canned.

Pressure Canners

Pressure canners and pressure saucepans can both be used for home canning. However, the pressure saucepan is practical only when the amount of food to be processed is small.

A gauge, whether a dial or a weight, is essential to control pressure. A dial gauge or a weight with sliding core shows the pressure within the utensil; you must adjust heat to keep the pressure steady. The weight type permits pressure to rise to a definite

point and then releases excess steam to keep pressure from going higher.

Gaskets of rubber or a rubberlike material keep steam from leaking out around cover. Most gaskets are removable for replacement.

Safety plugs go into action only if pressure becomes dangerously high. Metal alloy plugs melt when pressure gets too high or the canner boils dry. Composition-type plugs are blown out by excessive pressure. Both types are replaceable.

Vents are provided to allow air to be exhausted from the canner and to permit the release of steam as needed. A petcock, safety valve, or weight on the vent is used to control the escape of air or steam.

Boiling Water Bath Canner

Boiling water bath canners are available on the market but any large container may be used if it is deep enough. There should be 2 to 4 inches above the tops of jars to allow water to boil freely. The water bath canner must have a rack and a lid. A pressure canner can be used as a water bath canner if it is deep enough. Put the lid on the pressure canner but do not seal. Leave petcock or safety valve open to allow steam to escape and to prevent the buildup of pressure in the canner.

Jars and Lids

Glass jars are made in different shapes and sizes and are tempered (strengthened) for heat and cold. The Mason jar is the most widely used type. It is generally made in a round-square shape, and with standard or wide mouth. Mason jars are available in half-pint, pint, quart, and half-gallon sizes. They have a screw-thread neck and a sloping shoulder. Jars with standard mouths seal on the top or on a sealing shoulder, depending upon the type of lid used. The wide mouth jars seal on top.

Be sure all jars are perfect. Discard any with cracks or chips as these defects can prevent sealing.

Glass jars and lids need not be sterilized before use if food is to be processed in a boiling water bath or pressure canner. Jars for jellies and jams which will not be processed, should be sterile.

The two-piece metal lid is a lid and screw band combination. The lid is fitted with a sealing compound, and no other rubber is needed. The lid is used only once but the band may be reused. Follow the manufacturers' recommendations for lid preparation.

To use, wipe jar rim clean after produce is packed. Put lid on with sealing compound next to glass. Screw metal band tight by hand. This lid has enough give to allow air to escape during

processing. There is no need to tighten the screwband after taking jars from canner.

Test the seal on the day after canning by pressing the center of lid, or tap with a spoon. The lid should stay down and give a clear, ringing sound when tapped.

The one-piece zinc lid is lined with porcelain. It is used with a rubber ring.

To use, fit wet rubber ring down on jar shoulder but do not stretch unnecessarily. Fill jar; wipe rubber ring and jar rim clean. Screw cap down firmly and then turn it back ¼-inch. Tighten the lid as soon as you take jar from canner.

Test the seal on the day after canning by tilting the jar. Look for leakage around the rubber ring.

Operating the Pressure Canner

Put jars on rack in canner containing 2 to 3 inches of hot water. More water may be needed for long processing times. Fasten canner cover on securely. Heat the canner rapidly.

Leave petcock open or weight gauge off until steam is coming out in a steady stream—about 10 minutes after the first steam appears. This permits air to be expelled and thus insures that pressure obtained will be true steam pressure.

Close the vent. Watch the gauge closely. When it nears the desired pressure, reduce heat. Start timing when desired pressure is reached. Adjust heat throughout processing period to keep the pressure constant. When processing time is up, turn off heat or remove canner from heat. Let canner cool until pressure reaches zero. Open petcock or remove weight to let remainder of steam escape. Never hurry the cooling of a canner. This is a frequent cause of loss of liquid from jars.

Let canner stand a few minutes before loosening the cover. Loosening the cover too soon can cause damage to jars and injury to the user. It is sometimes difficult to loosen the cover because of the vacuum which forms in the utensil. Let the canner cool for a few more minutes and try again. Always lift the back edge of the lid first so that escaping steam will be directed away from the face.

Set jars top-side-up on a rack or folded cloth to cool. Allow space for air to circulate around jars.

Check the seal on the day after canning. If you find a jar which has not sealed, use unspoiled food right away or process it again. Check the jar and lid for defects which may have prevented sealing. If using a two-piece metal lid, use a new lid.

Using the Boiling Water Bath Canner

Fill the water bath canner half full of water and start to heat while filling jars. Place the jars of food on a rack in the canner allowing sufficient space for free circulation of water. Add boiling water to bring water level one inch above tops of jars. Cover and bring to a boil. Start counting processing time when the water returns to a full rolling boil. Adjust heat to keep water boiling during the processing period.

Using a jar lifter, remove jars from the canner as soon as the processing time is up. Set jars top-side-up on a rack or folded cloth to cool. Allow space for air to circulate around jars.

Altitude

Altitude affects processing. The times given in this publication are for use at altitudes of less than 2,000 feet. If the altitude is greater than 2,000 feet, you'll need to increase processing time if using a boiling water bath canner or increase pounds pressure if using a pressure canner. In the boiling water bath canner, add 1 minute to processing time of less than 20 minutes; 2 minutes if processing time is more than 20 minutes for each 1,000 foot increase in altitude. In the pressure canner, process at 11½ lbs. pressure at altitudes of 2,000 to 3,000 feet, at 12 lbs. if altitude is 3,000 to 4,000 feet, and at 12½ lbs. pressure at altitudes between 4,000 and 5,000 feet.

Oven Canning

Oven canning is not recommended. There may be a buildup of pressure in the jar which breaks the seal or even, at times, causes the jar to explode.

Open Kettle Canning

Open kettle canning, in which the food is cooked and then poured into sterile jars and sealed without further processing, *is not recommended.* Food may be recontaminated in the packing process. Some air is trapped in the tops of the jars which may hasten changes in quality. Botulinum spores survive and could produce a toxin in low-acid foods.

Processing Temperature

Ten (10) pounds pressure (240°F) is the usual temperature for processing. In recent years, there has been interest in processing at 15 pounds pressure on the assumption that processing at a higher temperature would cut down on the time and energy used for processing. One manufacturer of pressure canners has published timetables for processing at 15 pounds pressure based on research conducted in one laboratory. USDA has not as yet endorsed these recommendations.

Actually the time and energy savings reported are not great since it takes longer (using time and energy) to get the canner to 15 pounds pressure than to 10.

For Best Results

Keep the time between harvesting and canning as short as possible. Follow the procedures outlined. The processing times are for canning in glass jars in a large pressure canner. If you are using a pressure saucepan, add 20 minutes to the processing time.

Store canned foods in a cool, dry place. Ideally, the temperature should be below 70 degrees F. Warmer storage temperatures allow microorganism activity, bringing about discoloration, flavor changes, and even bacterial spoilage. Freezing does not make canned food unsafe unless the jar or seal is broken. The texture of canned food may be softer after freezing and thawing.

Preparation of Food

Apples, sliced

Wash, peel, and core apples. Quarter or slice. Treat apples to prevent darkening.

Boil apple slices in a thin syrup (2 cups sugar to 4 cups water) for 5 minutes. Pack hot fruit into jars. Cover with hot syrup leaving ½-inch headspace. Remove air bubbles by running knife or spatula between food and jar. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 15 minutes, quart jars for 20 minutes.

Applesauce

Make applesauce in usual way. Pack hot applesauce into jars leaving ¼-inch headspace. Remove air bubbles by running knife or spatula between jar and food. Adjust jar lids. Process in boiling water bath canner (212 degrees F.); pint jars for 20 minutes, quart jars for 20 minutes.

Asparagus

Wash asparagus thoroughly. Cut or break off tough portions of the stalks. Cut asparagus into 1-inch pieces.

RAW PACK: Pack raw asparagus pieces in jars as tightly as possible without crushing. Leave ½-inch space at top of jars. add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving ½-inch headspace. Remove air bubbles by running spatula between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 25 minutes, quart jars for 30 minutes.

HOT PACK: Cover pieces of asparagus with boiling water. Bring to a boil and boil 2 or 3 minutes.

Pack hot asparagus loosely to ½-inch of top of jars. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling-hot cooking liquid or boiling water. Leave ½-inch headspace. Remove air bubbles by running spatula between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 25 minutes, quart jars for 30 minutes.

Beans, green

Wash beans and drain. Cut or break off ends; cut or break into 1 or 2-inch pieces. Slice lengthwise for french-style beans.

RAW PACK: Pack raw beans tightly to ½-inch below top. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 20 minutes, quart jars for 25 minutes.

HOT PACK: Cover cut beans with boiling water and cook for 5 minutes. Pack hot beans loosely to ½-inch of top of jar. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling-hot liquid, leaving ½-inch headspace. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 20 minutes, quart jars for 25 minutes.

Beans, lima

Shell young, tender beans and wash.

RAW PACK: Pack raw beans into jars. Fill to 1 inch of top of jars for pints; 1¼-inches for quarts. Do not press or shake beans. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Fill jar to ½-inch of top with boiling water. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 40 minutes, quart jars for 50 minutes.

HOT PACK: Cover beans with boiling water and bring to boil. Pack hot beans loosely to 1-inch of top. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving 1-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 40 minutes, quart jars for 50 minutes.

Beets

Wash beets and sort according to size. Trim tops, leaving ½-inch of stems and tap root.

Cook in boiling water until tender—20 to 30 minutes for small beets; 40 to 50 minutes for larger beets. Cool promptly in cold water. Peel. Leave baby beets whole. Cut medium or large beets in ½-inch cubes or slices; halve or quarter very large slices.

Pack cooked beets in jars leaving ½-inch space at top. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 30 minutes, quart jars for 35 minutes.

Berries, other than Strawberries

Fill jars to ½-inch of top. For a full pack, shake berries down while filling jars. Cover with boiling syrup, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 10 minutes, quart jars for 15 minutes.

Carrots

Wash and scrape carrots. Slice or dice.

RAW PACK: Pack raw carrots tightly into clean jars, to 1 inch of top. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Fill jar to 1/2 inch of top with boiling water. Adjust lids.

Process in pressure canner at 10 pounds pressure (240° F); pint jars for 25 minutes, quart jars for 30 minutes.

HOT PACK: Put sliced or diced carrots into saucepan. Cover with boiling water and bring to boil. Pack hot carrots into clean jars leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling cooking liquid or water, leaving 1/2-inch headspace. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240° F); pint jars for 25 minutes, quart jars for 30 minutes.

Cherries, Sour

Wash cherries; remove pits, if desired.

RAW PACK: Pack raw cherries into clean jars leaving 1/2-inch headspace. For a full pack, shake cherries down while filling jars. Cover with boiling syrup, leaving 1/2-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in a boiling-water bath (212° F); pints for 20 minutes, quarts for 25 minutes.

HOT PACK: Measure cherries into saucepan. Add 1/2 cup sugar for each quart of cherries. Add a little water if cherries have not been pitted to keep them from sticking while heating. Cover pan and bring to a boil.

Pack hot cherries into clean jars, leaving 1/2-inch headspace. Cover with boiling cooking liquid. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in a boiling water bath (212° F); pints for 10 minutes, quarts for 15 minutes.

Corn, cream-style

Cut corn from cob at about center of kernel, then scrape the cob to remove the juice and heart of the kernel. Add 2 cups of boiling water for each 4 cups of corn and bring to a boil.

Pack hot corn to 1-inch of top of pint jar. *Use pint jars only.* Add 1/2 teaspoon salt to each jar. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 85 minutes.

Corn, whole-kernel

Cut corn from cob at about two-thirds the depth of the kernel. Do not scrape cob. Add 2 cups of boiling water for each 4 cups of corn and bring to a boil.

Pack hot corn and liquid to 1-inch of top of jars. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in a pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 55 minutes, quart jars for 85 minutes.

Fruit Juices

Wash; remove pits, if desired and crush fruit. Heat to simmering (185°-210° F). Strain through cloth bag. Add sugar, if desired — about 1 cup to 1 gallon juice. Reheat to simmering.

Pour hot juice into jars, leaving 1/2 inch headspace. Adjust lids.

Process in boiling water bath (212° F); pint jars for 5 minutes, quart jars for 5 minutes.

Greens

Wash greens several times. Lift greens out of water as grit settles to the bottom of the pan. Cut or tear out tough stems and midribs and discard.

Steam or partially cook greens until well wilted. Pack hot greens loosely to 1/2-inch of top of jar. Add 1/4 teaspoon salt to pint jars; 1/2 teaspoon to quarts. Cover with boiling water; leaving 1/2-

inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 70 minutes, quart jars for 90 minutes.

Okra

Can only tender pods. Wash and trim. Cook for 1 minute in boiling water. Cut into 1-inch lengths or leave pods whole.

Pack hot okra to 1/2-inch of top. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Remove air bubbles by running spatula between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 25 minutes, quart jars for 40 minutes.

Peas, Green

Shell and wash peas. Drain.

RAW PACK: Pack raw peas to 1-inch below top of jar; do not shake or press down. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving 1-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 40 minutes, quart jars for 40 minutes.

HOT PACK: Cover shelled peas with boiling water. Bring to a boil. Pack peas loosely in jars to 1-inch of top of jar. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling-hot cooking liquid or boiling water leaving 1-inch of headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 40 minutes, quart jars for 40 minutes.

Peas, blackeye, crowder, and field

Shell and wash peas.

RAW PACK: Pack raw peas in jars leaving 1 1/2-inches at top of pint jars; 2-inches in quart jars. Do not shake or press peas down. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 35 minutes, quart jars for 40 minutes.

HOT PACK: Cover shelled peas with boiling water and bring to a boil. Drain. Pack hot peas in jars leaving 1¼-inches at top of pint jars; 1½-inches in quart jars. Do not shake or press peas down. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 35 minutes, quart jars for 50 minutes.

Peaches

Wash peaches and remove skins. Dip each peach in boiling water, then in cold water to make peeling easier. Cut peaches in halves; remove pits. Slice if desired. Treat to prevent darkening.

RAW PACK: Pack raw peaches in jars. Cover with boiling syrup, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212 degrees F); pint jars for 25 minutes, quart jars for 30 minutes.

HOT PACK: Heat peaches in syrup. Pack hot peaches in jars. Cover with boiling syrup, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 20 minutes, quart jars for 25 minutes.

Pears

Wash pears. Peel, cut in half and core. Treat to prevent darkening.

RAW PACK: Pack raw pear halves in jars. Cover with boiling syrup, leaving 1/2 inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212° F); pint jars for 25 minutes, quart jars for 30 minutes.

HOT PACK: Heat pear halves in syrup. Pack pear halves in jars. Cover with boiling syrup, leaving 1/2-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212° F); pint jars for 20 minutes, quart jars for 25 minutes.

Plums

Wash plums. To can whole, prick skins. Freestone varieties may be halved and pitted.

Pack raw plums in jars or heat plums in syrup before packing. Cover with boiling syrup, leaving

½-inch headspace. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 20 minutes, quart jars for 25 minutes.

Potatoes

Wash potatoes. Peel and cut into ½-inch cubes. Dip cubes in brine (1 teaspoon salt to 1 quart water) to prevent darkening. Drain.

Cook potatoes for 2 minutes in boiling water. Drain.

Pack hot potatoes in jars. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water, leaving ½-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 35 minutes, quart jars for 40 minutes.

Squash, summer

Wash squash, trim ends but do not pare. Cut squash into ½-inch slices; halve or quarter to make pieces of uniform size.

RAW PACK: Pack raw slices into jars leaving 1 inch of space at top of jar. Add ½ teaspoon salt to pints; 1 teaspoon to quarts. Fill jar to ½-inch of top with boiling water. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 25 minutes, quart jars for 30 minutes.

HOT PACK: Bring slices to a boil. Pack while hot into jars leaving ½-inch at top of jar. Add ½ teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling-hot cooking liquid or water leaving ½-inch headspace. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240 degrees F.); pint jars for 30 minutes, quart jars for 40 minutes.

Tomatoes

Select tomatoes which are well formed, smooth, well ripened, and reasonably free from blemishes.

Wash tomatoes. Loosen skins by dipping tomatoes into boiling water for about ½ minute; then into cold water. Skins should slip off easily. Remove stem scar and core. Leave tomatoes whole or cut into halves or quarters.

Tomatoes are still in the "acid" group despite recent publicity about new varieties which are said to be lower in acid. Actually, tests have not shown them to be lower in acid—just sweeter so they taste less sour. Yellow tomatoes and cherry tomatoes have as much acid as red ones.

Tomatoes do get less acid as they ripen so avoid canning overripe tomatoes.

Consumers have asked if acid should be added and if tomatoes should be processed in the pressure canner to insure the destruction of botulism spores. Researchers who tested the feasibility of adding acid found that vinegar was less effective than citric acid or bottled lemon juice in changing the acidity, and it adversely affected the flavor. One-fourth teaspoon of crystalline citric acid or 1 tablespoon of bottled lemon juice per pint did lower the pH without affecting the flavor.

The procedures which have been published for processing tomatoes in a pressure canner are merely substitutes for water bath processing—they are no safer than water bath processing.

HOT PACK: Bring tomatoes to a boil; stir to keep from sticking. Pack boiling hot tomatoes in jars leaving ½-inch headspace. Add ½ teaspoon salt to pint jars; 1 teaspoon to quarts. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 35 minutes, quart jars for 45 minutes.

Tomato juice

Wash tomatoes, remove stem scar and core, and cut into pieces. Simmer until softened; stir frequently to keep from sticking. Run through food mill, colander, or strainer. Add 1 teaspoon salt for each quart of juice. Bring juice to a boil.

Pour boiling hot juice into jars leaving ½-inch headspace. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 35 minutes, quart jars for 35 minutes.

PICKLING

Brined pickles, also called fermented pickles, go through a curing process of about 3 weeks. Curing changes cucumber color from a bright green to an olive or yellow green. The interior of the cucumber becomes uniformly tender and firm; not hard, rubbery, shriveled, soft, or mushy.

Fresh-pack or quick-process pickles are brined for several hours or overnight, then drained and combined with boiling-hot vinegar, spices, and other seasonings. These are quick and easy to prepare. They have a tart, pungent flavor. Fresh-pack whole cucumbers are olive green, crisp, tender, and firm.

The fruit or vegetable from which pickles are made should be of good quality, firm in texture, and free from bruises, decay, or mold. Over-

mature fruits and vegetables will shrivel during the pickling procedure. Use fruits and vegetables as soon as possible. If there is a delay of more than a few hours, refrigerate. Use unwaxed cucumbers for pickling whole so the brine can penetrate.

Wash thoroughly. Be sure to remove all blossoms from cucumbers as they may contain enzymes which cause softening of cucumbers. Sort for uniform size.

Correct proportions of fruit or vegetable, sugar, salt, vinegar, and spices are essential for successful pickling. Alum and lime are not needed to make pickles crisp and firm.

Vinegar serves two purposes in pickle making—that of preserving the product and of modifying its taste. The addition of water weakens the vinegar. If a less sour product is preferred, add sugar rather than decrease vinegar.

Use a cider or white distilled vinegar of 4- to 6-percent acidity. Cider vinegar, with its mellow acid taste, gives a nice blending of flavors but may darken white or light-colored fruits and vegetables. White distilled vinegar has a sharp, pungent, acetic acid taste and is desirable when light color is important.

Either white granulated or brown sugar may be used. White sugar gives a product with a lighter color.

Use fresh spices for best flavor.

Use pure salt. Table salt can be used but the materials added to prevent caking may make the brine cloudy. Iodized salt will cause the pickles to be dark in color.

Heat processing is recommended for all pickle products to destroy organisms that cause spoilage and to inactivate enzymes that may affect flavor, color, and texture.

Dark pickles may be the result of minerals in water, especially iron, using iron utensils, too much spice, ground spice, or cooking too long with spices, or iodized salt.

Cross Cut Pickle Slices

(Yield: 7 pints)

4 quarts sliced cucumbers (about 6 pounds medium-sized cucumbers)

1½ cups sliced onions

4½ cups sugar

1½ teaspoons turmeric

1½ teaspoons celery seed

2 large garlic cloves

½ cup salt

2 quarts crushed or cube ice

2 tablespoons mustard seed

3 cups white vinegar

Wash cucumbers thoroughly, using a vegetable brush. Drain. Slice unpeeled cucumbers into $\frac{1}{8}$ to $\frac{1}{4}$ -inch slices; discard ends. Add onions and garlic.

Add salt and mix thoroughly; cover with ice; let stand 3 hours. Drain thoroughly; remove garlic cloves.

Combine sugar, spices, and vinegar; heat just to boiling. Add drained cucumber and onion slices and heat 5 minutes.

Pack hot pickles loosely into clean, hot pint jars. Fill to $\frac{1}{2}$ -inch of top with pickling mixture. Adjust jar lids.

Process in boiling water bath canner for 5 minutes. Wait until water returns to boiling to start counting processing time. Remove jars from canner and set upright on a wire rack to cool.

Brined Dill Pickles

(Yield: 9 to 10 quarts)

20 pounds cucumbers,
3 to 6 inches in length
 $\frac{3}{4}$ cup whole mixed
pickling spice
2 to 3 bunches dill
plant, fresh or dried
 $2\frac{1}{2}$ cups vinegar
 $1\frac{3}{4}$ cups salt
 $2\frac{1}{2}$ gallons water

Wash cucumbers thoroughly but gently with a vegetable brush. Drain.

Place half of the pickling spice and of the dill in a 5-gallon crock or glass jar. Fill with cucumbers to within 3 or 4 inches of the top. Put remainder of pickling spice and dill on top of cucumbers. Combine vinegar, salt, and water, and pour over the cucumbers.

Cover with a china or glass plate. Use a weight to keep the cucumbers under the brine. Cover loosely with a clean cloth. Keep at room temperature. Scum may start forming in 3 to 5 days and should be removed daily. Do not stir pickles, but be sure they are completely covered with brine. If necessary, make additional brine using original proportions specified in recipe.

In about 3 weeks the cucumbers will have become olive-green in color and should have a desirable flavor. Any white spots inside the fermented cucumbers will disappear in processing.

The original brine may become cloudy as a result of yeast development. If this cloudiness is objectionable, fresh brine may be used to cover the pickles when packing them into jars. For the

fresh brine, use $\frac{1}{2}$ cup salt, 4 cups vinegar and 1 gallon of water.

Pack the pickles, along with some of the dill, into clean, hot jars; add garlic, if desired. Cover with boiling hot brine leaving $\frac{1}{2}$ -inch headspace. Adjust jar lids.

Process in boiling water bath canner for 15 minutes. Start to count processing time as soon as jars are placed into the actively boiling water. At end of processing time, remove jars and set upright on a wire rack to cool.

Pickled Beets

(Yield: 4 pints)

$3\frac{1}{2}$ pounds of fresh beets

Pack cooked beets into jars. Add $\frac{1}{2}$ teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling pickling syrup made with 2 cups vinegar and 2 cups sugar. Leave $\frac{1}{2}$ -inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath canner (212 degrees F.); pint jars for 30 minutes, quart jars for 30 minutes.

Sauerkraut

Remove the outer leaves and any undesirable portions from firm, mature, heads of cabbage; wash and drain. Cut into halves or quarters; remove the core. Use a shredder or sharp knife to cut the cabbage into thin shreds about the thickness of a dime.

In a large container, thoroughly mix 3 tablespoons salt with 5 pounds shredded cabbage. Let the salted cabbage stand for several minutes to wilt slightly; this allows packing without excessive breaking or bruising of the shreds.

Pack the salted cabbage firmly and evenly into a large clean crock or jar. Using a wooden spoon or the hands, press down firmly until the juice comes to the surface. Repeat the shredding, salting, and packing of cabbage until the crock is filled to within 3 to 4 inches of the top.

Cover cabbage with a clean, thin, white cloth (such as muslin) and tuck the edges down against the inside of the container. Cover with a plate or round paraffined board that just fits inside the container so that the cabbage is not exposed to the air. Put a weight on top of the cover so the brine comes to the cover but not over it. A glass jar filled with water makes a good weight.

A newer method of covering cabbage during fermentation consists of placing a plastic bag filled with water on top of the fermenting cabbage. The water-filled bag seals the surface from exposure to air, and prevents the growth of

film yeast or molds. It also serves as a weight. For extra protection, the bag with the water in it can be placed inside another plastic bag. Any bag used should be of heavyweight, watertight plastic and intended for use with foods. The amount of water in the plastic bag can be adjusted to give just enough pressure to keep the fermenting cabbage covered with brine.

Formation of gas bubbles indicates fermentation is taking place. A room temperature of 68 degrees to 72 degrees F. is best for fermenting cabbage. Fermentation is usually completed in 5 to 6 weeks.

To store: Heat sauerkraut to simmering (185 degrees to 210 degrees F.) Do not boil. Pack hot sauerkraut into clean, hot jars and cover with hot juice to ½ inch of top of jar. Adjust jar lids. Process in boiling water bath, 15 minutes for pints, and 20 minutes for quarts. Start to count processing time as soon as hot jars are placed into the actively boiling water.

Remove jars and complete seals if necessary. Set jars upright, several inches apart, to cool.

Fifty pounds of cabbage will yield 16 to 18 quarts of sauerkraut.

JELLY MAKING

Fruit, pectin, sugar, and acid are all essential ingredients of a good jelly. This may seem unusual since we often combine only two ingredients—fruit juice and sugar—when making jelly.

How do we get by with using just 2 ingredients? It is possible because some fruits contain enough pectin and acid to make a good jelly with added sugar. Other fruits have enough pectin but not enough acid. Some are acid enough but lack pectin, while a few fruits lack both acid and pectin. Fruits have less pectin and acid when fully ripe so it is recommended that some underripe fruit be used when extracting juice for jelly.

Adequate Pectin and Acid	Adequate Pectin Low Acid	Low Pectin Adequate Acid	Low Pectin and Acid
Apples, tart Blackberries, sour Cherries, sour Crabapples Cranberries Currants Grapefruit Grapes Lemons Limes Loganberries Plums	Bananas Cherries, sweet Figs, unripe Quinces	Apricots Rhubarb Strawberries	Figs, ripe Peaches Pears

It is possible to add pectin and/or acid, or to combine fruit juices to get the necessary balance for a jellied product.

Sugar

Sugar obviously adds flavor to jellies and jams but it does much more than that. Sugar combines with pectin to form a gel. You might picture this gel as an invisible sponge which holds the fruit juice. The quantity of sugar used in jellies is sufficient to prevent bacterial growth.

Beet and cane sugars can be used with equal success. Corn sugar can be used in recipes calling for added pectin. Corn syrup or honey can be used in place of part, but not all, of the sugar.

Honey can replace up to one-half of the sugar in recipes without added pectin. In products made with added pectin, 2 cups of honey can replace 2 cups of sugar if the yield is more than 5 to 6 glasses. In smaller recipes, replace only ¾ to 1 cup of the sugar with honey.

Artificial sweeteners cannot be used in place of sugar. They will sweeten the product but do not combine with pectin to give a gel nor do they have a preservative effect.

Reducing the amount of sugar won't give a less sweet jelly. A certain percentage of sugar (65%) is necessary for jelly to set. Either the necessary amount must be added at the beginning or the mixture is boiled down until the proper proportion is reached.

Pectin

Pectin is available commercially in both powdered and liquid forms. Both forms make equally acceptable products but they cannot be used interchangeably.

Powdered pectin will not dissolve in high sugar concentrations so it must be added to the fruit before the sugar. The liquid pectin is added after the sugar. Commercial fruit pectins are made from apples or citrus fruits. Fruit pectins should be stored in a cool, dry place and used in the year in which purchased to have maximum gel strength.

Add Pectin or Not?

Many homemakers prefer the added pectin method as fully ripe fruits can be used and the cooking time is shorter and standardized. Because of the shorter cooking time, the yield is greater and the product tastes more like the fresh fruit.

Others prefer the concentrated flavor of jelly cooked for a longer period of time. And they point out the greater quantity of sugar needed in recipes with added pectin.

Tests for Doneness

Products made with added pectin start with a higher proportion of sugar; consequently, the time needed to reach the desired concentration of sugar is shorter and more predictable.

Judging when products made without added pectin are done can be a problem. There are three tests which are used for determining doneness. Probably the most reliable is the temperature test. The boiling point of a sugar-water mixture is a reflection of the sugar concentration. Water will boil at approximately 212 degrees F., but add sugar and the temperature at which the mixture boils goes up. A mixture that's 65% sugar will boil at about 220 degrees F.

1. *Temperature Test:* Cook jelly until temperature of mixture is 8 degrees F. above the boiling point of water; cook jam to 9 degrees F. above the boiling point of water.

2. *Refrigerator Test:* Remove the jam or jelly mixture from the heat. Pour a small amount of the boiling mixture onto a chilled plate. Put the plate in the freezer for a few minutes. If jelly sets up, the mixture has cooked long enough. Jam will not be as firm when done as jelly.

3. *Spoon or Sheet Test:* Dip a cold metal spoon in the boiling jelly mixture. Lift the spoon out so that the jelly mixture runs off the side. When the drops run together and fall off the spoon in a sheet, the jelly is done.

Containers for Jellies

Containers for jellies have not merited much attention until recent years. Jelly glasses and odd jars were considered adequate for storing jelly. This was possible because the high sugar content of jellied products inhibits the growth of most spoilage organisms with the exception of mold.

Jelly makers have minimized mold growth by using sterilized jars and by covering the jelly with a thin layer of paraffin. Even so, often there may be some mold growth on top of and even through the paraffin. Consumers have removed the mold with the paraffin and eaten the jelly. In recent years there has been evidence that some molds produce toxins which can be injurious to health. Such a toxin has not been found in jelly, but in light of the evidence, USDA now recommends packaging jellied products in jars which can be sealed and processing the jars for a few minutes in a boiling water bath. The heat treatment is short—5 minutes after the water returns to a full rolling boil. It is sufficient to destroy mold but won't hurt the consistency of the jellied product.

Preparation

Apple Jelly (without added pectin)

Yield: 3-4 pints

4 cups apple juice (about 3 pounds apples)
2 tablespoons strained lemon juice, if desired
3 cups sugar

Wash apples thoroughly. Do not peel or core. Cut apples into sixths. Add 3 cups water for each 3 pounds of apples. Cover and bring to a boil. Reduce heat and simmer for 20 to 25 minutes, or until apples are soft. Pour the cooked apples into a damp jelly bag to extract juice.

Measure juice into a large kettle. Add lemon juice and sugar and stir well. Boil over high heat to 220 degrees F, or 8 degrees F. above the boiling point of water in area. Or use the spoon or sheet test to judge doneness.

Remove from heat; skim off foam. Pour hot jelly into clean hot jars leaving ¼-inch headspace. Adjust jar lids. Process in a boiling water bath for 5 minutes.

Blackberry Jelly (without added pectin)

Yield: 3-4 pints

4 cups blackberry juice (about 2 ½ quarts fresh berries)
3 cups sugar

Crush berries, add ¾ cup water, cover and bring to boil on high heat. Reduce heat and simmer for five minutes. Put the cooked fruit in a damp jelly bag to extract juice. The clearest jelly comes from juice that drips through without pressure.

Measure juice into a large kettle. Add sugar and stir well. Boil over high heat to 220 degrees F., or 8 degrees F. above the boiling point of water in area. Or use the spoon or sheet test to judge doneness.

Remove from heat; skim off foam quickly. Pour hot jelly into clean hot jars leaving ¼-inch headspace. Adjust jar lids. Process in a boiling water bath for 5 minutes.

Blackberry Jelly (with powdered pectin)

Yield: 5-6 pints

3½ cups blackberry juice (about 3 quarts fresh berries)
1 package powdered pectin
4½ cups sugar

Extract juice and measure into kettle. Add the pectin and stir well. Place on high heat and, stirring constantly, bring to a full rolling boil that cannot be stirred down. Add the sugar, continue stirring, and heat again to a full rolling boil. Boil hard for one minute.

Remove from heat and skim. Pour into clean hot jars. Adjust jar lids. Process in a boiling water bath for 5 minutes.

Peach Jam (with powdered pectin)

Yield: 3 pints

3¾ cups crushed peaches (about 3 pounds fresh peaches)

¼ cup lemon juice

1 package powdered pectin

5 cups sugar

Select fully ripe peaches. Wash, peel and remove pits. Crush peaches and measure into a large kettle. Add the lemon juice and pectin and stir well. Place on high heat and, stirring constantly, bring quickly to a full rolling boil.

Add the sugar, continue stirring, and bring again to a full rolling boil. Boil hard for one minute, stirring constantly.

Remove from heat. Skim off foam. Pour hot jam into clean hot jars leaving ¼-inch headspace. Wipe jar rims clean, place metal lids on jars, and screw metal bands down firmly. Process for 5 minutes in a boiling water bath.

Strawberry Jam (without added pectin)

Yield: 2 pints

4 cups crushed strawberries (about 2 quarts fresh berries)

4 cups sugar

Crush berries and measure into a large kettle. Add sugar and stir well. Boil rapidly, stirring constantly, until mixture thickens. The jam is done when the temperature reaches 221 degrees F or 9 degrees F above the boiling point of water.

Remove from heat and skim off foam.

Pour into containers, seal and process in boiling water bath canner for 5 minutes.

Strawberry Jam (uncooked)

Yield: 2½-3 pints

2 cups crushed strawberries (about 1 quart fresh berries)

4 cups sugar

1 package powdered pectin

1 cup water

Crush berries and measure into a large mixing bowl. Add sugar, mix well, and let stand for 20 minutes, stirring constantly.

Dissolve pectin in water. Bring to boil and boil for one minute. Add to the berry-sugar mixture and stir for 2 minutes.

Pour into freezer containers. Cover and let stand at room temperature for 24 hours or until the jam has set.

When jam has set, store in refrigerator or freezer. Storage time in the refrigerator is approximately a month; in the freezer, a year.

If jam is too firm, stir to soften. If it tends to separate, stir to blend. If too soft, bring to a boil; it will thicken on cooling.

Strawberry Preserves

Yield: 2 pints

6 cups strawberries (about 2 quarts fresh berries)

4½ cups sugar

Select firm, tart berries for preserves. Wash berries and remove cap stems.

Combine fruit and sugar in alternate layers and let stand for 8 to 10 hours in the refrigerator or other cool place.

Bring to a boil, stirring gently. Boil rapidly, stirring as needed to prevent sticking. Cook until the syrup is somewhat thick (about 15 to 20 minutes) or until temperature reaches 221 degrees F., or 9 degrees F. above the boiling point of water. Remove from heat; skim.

Pour into containers, seal and process in boiling water bath canner for 5 minutes.

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