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FOOD PRESERVATION HANDBOOK

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ACIDITY

The acidity of a food as well as the density affects 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 botulism. 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. Most foods are acid as few have a pH above 7. An exception is hominy which has a pH of 7.5.

Foods with a pH below 4.5 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."

Taste is a guide to acidity. Generally, sourness and acidity go together. The red cherries are certainly sourer than the pumpkin in the earlier example.

The boiling water bath canning method can be used for foods in the "acid" group. In this method jars of food are immersed in boiling water and heat from the water is transferred to the food. Food in jars never gets hotter than the boiling point of water--212°F--even if the food is processed for several hours. Molds, yeasts, enzymes, and some bacteria are killed by this processing method but not the spores of clostridium botulinum. Foods in the "acid" group can be safely processed by the boiling water bath method as botulism spores are not active in acid foods. These foods include tomatoes, all fruits, pickles, and jams. Included are

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

The pressure canner method is the only safe way to can "low-acid" foods. The high temperatures achieved in a pressure canner (10 pounds pressure equals 240°F) are necessary to destroy the spores of clostridium botulinum. You must use a pressure canner for these foods.

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

ACIDITY (CONTINUED)

It's not enough to choose the correct method, however, you must also follow recommended processing methods and times. Remember that it is important that all food in each jar reach the desired temperature. This may not happen if you cut short the processing time or if you process at 9 pounds pressure rather than 10.

ALTITUDE

Altitude affects the boiling point of water. There is a 1°F decrease in the boiling point of water for each 500-foot increase in altitude. The internal heat needed to cook foods takes more time to develop at the lower temperature.

Adjustments for altitude are suggested at altitudes of 1000 feet or more but the adjustments are so minor (1 or 2 minutes of processing time or a half pound of pressure) that they really aren't significant. We do need to be concerned when altitude reaches 2500 or 3000 feet. Failure to increase the processing time (or temperature) would result in underprocessing.

In a boiling water bath, increase the processing times as shown in the table below.

	Increase in processing time if the time called for is	
Altitude	20 minutes or less	More than 20 minutes
1,000 feet	1 minute	2 minutes
2,000 feet	2 minutes	4 minutes
3,000 feet	3 minutes	6 minutes
4,000 feet	4 minutes	8 minutes
5,000 feet	5 minutes	10 minutes
6,000 feet	6 minutes	12 minutes
7,000 feet	7 minutes	14 minutes
8,000 feet	8 minutes	16 minutes
9,000 feet	9 minutes	18 minutes
10,000 feet	10 minutes	20 minutes

In a pressure canner, increase the pressure as the altitude increases. Add a half-pound pressure for each 1,000-foot increase in altitude. Thus at 2,000 feet, you'd process at 11 pounds pressure to get a temperature equal to 10 pounds pressure at sea level.

ALUM

Alum is an ingredient in a number of pickle recipes. It is reputed to make pickles crisp although the evidence does not support the claim. The 1924 edition of the USDA publication on pickling said that the use of alum was not necessary for making good pickles. The pickle industry has also experimented with alum but according to their research, use of alum reduced pickle firmness rather than increasing it.

The forms of alum used are aluminum potassium sulfate or aluminum ammonium sulfate. These substances are used medicinally as a styptic or astringent. They can cause nausea in humans if consumed in large enough quantities.

Probably the major reasons for not using alum in pickles are (1) its ineffectiveness, and (2) the bitter taste which is apt to result from overuse.

Alum is on the list of substances generally recognized as safe (GRAS) by the Food and Drug Administration.

ALUMINUM PANS

Every year we get questions about the use of aluminum containers for pickling. The questions fall into two categories--one having to do with the safety of the pickles, the other dealing with the pan.

Pickles made in aluminum are safe to eat. It is doubtful that much aluminum has gotten into the pickles and even if some had, aluminum is very poorly absorbed by the body.

Aluminum pans are discolored by alkaline foods. These stains can usually be removed by boiling a solution of 1 to 2 tablespoons cream of tartar in a quart of water in the pan for 5 to 10 minutes. Then lightly scour with a soap-filled pad to restore the shine. Or cooking an acid food such as tomatoes in the pan will remove the stains without affecting the cooked foods.

ANTIDARKENING AGENTS

Light colored fruits darken due to enzymatic activity. Blanching fruits would inactivate the enzymes but it would also give fruits a cooked flavor so alternative methods of inactivating enzymes are used. The addition of an antidarkening agent or agents is an effective control measure. Ascorbic acid and/or citric acid are the substances used most frequently. Ascorbic acid is effective because it serves as a substitute substrate--the enzyme works on the ascorbic acid rather than the fruit. Citric acid is effective because it increases the acidity of the food and the enzyme is less active in an acid environment.

There are several commercial products on the market (Fruit Fresh, A-C-M, etc.) which contain ascorbic acid, citric acid or a combination of the two mixed with sugar. Use according to package instructions. We get

ANTIDARKENING AGENTS (CONTINUED)

an occasional complaint about the sugar in these products. The amount of the product used is so small (1 teaspoon of Fruit Fresh per cup of sirup) that the sugar from Fruit Fresh is not very significant when compared to the sugar in the sirup. If used as a presoak, most of the sugar will stay in the presoak.

You can also buy pure ascorbic acid either in tablet or crystalline form at the drug store. The amounts used are small--from 1/8 to 1/2 teaspoon per quart of sirup. (One teaspoon weighs about 3 grams.) Crush ascorbic acid tablets before use. (See Ascorbic Acid for more information.)

Ascorbic acid loses part of its effectiveness when heated so cool sirup before adding ascorbic acid. An exception would be when using ascorbic acid with light colored fruits to be canned. Then you are counting on the ascorbic acid to delay darkening until the heat treatment inactivates the enzymes.

Citric acid can also be purchased separately. It is what you get when you buy a canning acid.

Fruit juices (lemon, orange, pineapple, etc.) make the product more acid and also have ascorbic acid. They also add flavor which may be undesirable.

Vinegar water has been used (increases acidity) as has salt water (salt competes for moisture). Fruits must be rinsed following either of these treatments.

A non-chemical method of controlling darkening is to exclude air. The sirup or water used for packing fruits helps to exclude air.

APPLE BUTTER

The Ball Blue Book has 2 recipes for Apple Butter. The Kerr Book also has a recipe for Apple Butter.

APPLE CHUTNEY

The Ball Blue Book has both Apple Chutney and Tomato Apple Chutney recipes. The Kerr Home Canning and Freezing Book has recipes for both products but the ingredients are quite different.

APPLE CONSERVE

The USDA publication How to Make Jellies, Jams, and Preserves At Home has a recipe for Apple Conserve. The Ball Blue Book has recipes for Apple and Blueberry Conserve, Apple and Cherry-Pineapple Conserve, and Apple and Pineapple-Coconut Conserve. The Kerr Home Canning and Freezing Book has a recipe for Apple-Cranberry Conserve.

APPLE JELLY

Apples have enough natural pectin and acid to make high-quality jellied products. Like other fruits, they have less pectin and acid when fully ripe. For jellies to be made without pectin, include some underripe fruit.

The USDA publication How to Make Jellies, Jams, and Preserves At Home has this recipe for making Apple Jelly without added pectin. (This same recipe is in the publication Preserving Foods.)

APPLE JELLY without added pectin

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

Select about one-fourth underripe and three-fourths fully ripe tart apples. Sort, wash and remove stem and blossom ends; do not pare or core. Cut apples into small pieces. Add water, cover, and bring to boil on high heat. Reduce heat and simmer for 20 to 25 minutes, or until apples are soft. Extract juice.

Measure apple juice into a kettle. Add lemon juice and sugar and stir well. Boil over high heat to 8°F above the boiling point of water, or until jelly mixture sheets from a spoon.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot jars leaving 1/8-inch headspace. Adjust jar lids. Process for 5 minutes in a boiling water bath.

Makes 4 or 5 half-pints.

Apple juice is used in the Mixed Fruit Jelly. The recipe for Mint Jelly in the Kerr Home Canning and Freezing Book also uses apple juice. The Ball Blue Book has the same recipe for Apple Jelly that is in the USDA bulletin. It also has 2 recipes for Apple Jelly made with an artificial sweetener and a recipe for Spiced Apple Jelly. The Kerr book has a sugar-free Apple Jelly recipe. Although you don't have to add pectin, the package inserts in both liquid and powdered pectins have recipes for Apple Jelly.

APPLE PIE, FREEZING

Apple pies are better frozen in the unbaked state. Prepare as usual but bake from the frozen state when ready to use.

APPLE PRESERVES

See the Kerr Home Canning and Freezing Book.

APPLE SELECTION

Look for bright, fresh-looking apples. The green "ground color" or background color, when visible on varieties that are not a solid red, should be a yellow-green. If the apple has too green a ground color, it will be immature, hard and have a poor, starchy flavor. If overripe, the apple will have too yellow a ground color and will be poor in flavor with a soft, mealy texture.

Always check the skins; they should be smooth and reasonably bruise free. Apples with surface russeting (brownish roughened area on skin) make good eating fruit and may be less expensive.

A bushel of apples weighs about 48 pounds and will yield 18 to 20 quarts of frozen or canned apples.

APPLE VARIETIES

The many varieties of apples grown in Virginia differ widely in appearance, flesh characteristics, and suitability for different uses. Many persons have favorite varieties for applesauce, for pies, for baking, and for eating as fresh fruit.

The VDACS leaflet How to Enjoy Apples in the Old Dominion Tradition describes summer apple varieties as tart, nippy, saucy and tangy. Summer apples are good for cooking whether in a pie or applesauce. Lodi and Rambo are two favorite summer varieties. Apples of the Lodi variety are greenish yellow, moderately firm, and slightly acid. The Rambo apple has a yellowish green flesh, is firm, tender, very juicy, and moderately acid. Other summer varieties are Astrachan, Gravenstein, Starr, N.W. Greening, Williams Red, Yellow Transparent and Fenton.

The main fall and winter apple varieties in Virginia are Red and Golden Delicious, Stayman, Winesap, Rome, and York.

Variety	Texture and Flavor	Availability	Salads	Cooking
Golden Delicious	Sweet, Crisp, Juicy	Sept.-Mar.	X	X
Grimes Golden	Crisp, Juicy	Sept.-Oct.	X	X
Jonathan	Medium tart, Crisp, Juicy	Sept.-Feb.	X	X
Red Delicious	Sweet, Tender	Sept.-May	X	
Rome	Firm, Slightly tart, Crisp	Oct.-May	X	X(Baking)
Stayman	Very firm, Tart, Crunchy	Oct.-Mar.	X	X
Winesap	Firm, Tart, Juicy	Nov.-June		X(Frying)
York	Slightly tart, Very firm, Crisp	Oct.-May		X

APPLES, CANNING

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

Boil apple slices in a thin sirup (2 cups sugar to 4 cups water) for 5 minutes. Pack hot fruit into jars. Cover with hot sirup 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°F).
Pint jars . . . . . 15 minutes
Quart jars . . . . 20 minutes

To can without sugar, boil in water. Pack hot fruit into jars. Cover with hot cooking liquid or hot water. Then proceed as directed.

APPLES, DRYING

Wash, peel, and core apples. Slice (the thinner the slice, the shorter the drying time). Treat slices to prevent darkening by (1) dipping in salt water (4 to 6 tablespoons salt per gallon of water) or (2) blanching in steam or hot water, or (3) partially cooking in sirup.

Arrange treated apple slices on trays or in flat baking pans. Dry in the sun or in an oven or dehydrator set at 150°F. Be sure air can circulate around trays or pans. Stir or turn slices frequently to insure uniform drying. If using oven, leave door ajar to permit moisture to escape.

Fruit is dry when pliable and leathery.

APPLES, FREEZING

Wash, peel, and core apples. Slice into twelfths or sixteenths.

Sirup pack. (Preferred if slices are to be used without cooking.) Make 40-percent sirup by dissolving 3 cups sugar in 4 cups water. Chill. When ready to use, add an antidarkening agent to sirup. Slice apples into cold sirup.

Package apple slices. If using rigid containers, add enough sirup to cover. Put a piece of crumpled waxed paper on top to keep the apple slices down in the sirup. Leave ½ to 1½-inch headspace--the smaller amount for wide topped pint containers; the larger amount for narrow topped quart containers. Seal. Freeze; store at 0°F or below.

Sugar pack. (Preferred for slices to be used in pies.) Slice into cold water containing an antidarkening agent or salt (2 tablespoons salt per gallon of water). Drain.

Sprinkle ½ cup sugar over each 4 cups of apples. Turn apples gently until sugar has dissolved. Package, leaving headspace as in sirup pack. Seal. Freeze; store at 0°F or below.

Unsweetened pack. Follow directions for sugar pack but omit sugar.

APPLES, STORAGE

Chemical changes take place in apples during the ripening process--starch changes to sugar, acids and insoluble pectins decrease, and volatile gases are given off. During this process, oxygen is consumed from the air, and water and carbon dioxide are produced and heat is generated. This continues until the fruit becomes overripe and mealy.

Ripening (respiration) is slowed by cool temperatures. That's why apples should be cooled as rapidly as possible after picking. Storage temperature is also important. The lower the temperature, the greater the time required for ripening. The average freezing point of apples is 28° or 29°F. At 30°F, about 25% more time is required for ripening than at 32°F. At 40°F the rate of ripening is about double that at 32°F. At 60°F the rate is close to three times that at 40°F, and at 85°F ripening is almost double that at 60°F.

Most apple varieties keep best at a temperature of 30° to 32°F and a relative humidity of 85 to 88%. However, McIntosh, Yellow Newton, and Rhode Island Greening apples do best at 35° to 38°F. This prevents internal browning and brown core.

Maintaining desired temperature for home storage of apples may be difficult. At temperatures above 40°F you won't get the good results you would at optimum temperature. Store apples in plastic bags in the hydrator drawer of the refrigerator to keep them from absorbing other food flavors and to maintain a high humidity. Bags should have some small holes to allow for air circulation.

APPLESAUCE, CANNING AND FREEZING

Make applesauce in usual way. To freeze, pack into containers leaving headspace as in sirup pack for apple slices. Seal. Freeze; store at 0°F or below. To can, 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°F).

Pint jars . . . 20 minutes
Quart jars . . 20 minutes

APPLESAUCE, COLOR OF

The color of applesauce is affected by apple variety, enzymes, and contact with certain metals.

Applesauce made from Transparent apples is lighter in color than that made from Rambo.

An anti-darkening agent such as ascorbic acid or citric acid will help to prevent enzymatic darkening. Lemon juice is sometimes used but it is less effective.

Use of rusty or chipped pans allow contact with certain metals which can cause darkening. Use of hard water can affect color but the amount used in making applesauce is too small to have much effect.

APRICOTS, CANNING

Apricots are canned in the same way as peaches. According to the Ball Blue Book, tree-ripened apricots may be canned whole but pits should be removed from fruit harvested before it was fully ripe.

Wash apricots. Peel if desired. Halve and remove pits. Drop into water containing an antidarkening agent until ready to pack into jars.

Raw pack. Pack raw fruit into jars leaving ½-inch headspace. Cover with boiling sirup leaving ½-inch headspace. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in boiling water bath (212°F).
Pints . . . . 25 minutes
Quarts . . . 30 minutes

Hot pack. Heat apricots through in hot sirup. If fruit is very juicy, you may heat with just sugar, adding no liquid.

Pack hot fruit into jars and cover with boiling sirup leaving ½-inch headspace. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in a boiling water bath (212°F).
Pints . . . . 20 minutes
Quarts . . . 25 minutes

APRICOTS, DRYING

Pit and halve for steam blanch. Leave whole for water blanching but pit and halve afterwards. Blanch in steam 3 to 4 minutes or in boiling water for 4 to 5 minutes.

Dry in the sun (temperatures of 98° to 100°F) for 2 to 3 days or in an oven or dehydrator (140°F) 4 to 7 hours. When dry, apricot halves will be soft, pliable, with no moist area in the center when cut.

APRICOTS, FREEZING

Apricots may be frozen in halves, slices, or puree. The sirup pack is preferred for halves or slices which will be served uncooked; the sugar pack for apricots to be used for pies or other cooked dishes.

Apricots will darken so use of an antidarkening agent is desirable.

If apricots are to be frozen with the peel, heat them in boiling water ½ minute to keep skins from toughening during freezing. Then cool in cold water and drain.

Sirup pack. Pack apricots into freezer containers. Cover with sirup (40% or strength desired) leaving needed headspace. A piece of crumpled wax paper, parchment paper, or plastic wrap will help to keep the fruit under the sirup. Leave needed headspace. Seal, label and freeze.

Sugar pack. Mix ½ cup sugar with each quart of fruit. Stir until sugar is dissolved. Pack apricots into containers and press down until fruit is covered with sirup. A piece of crumpled wax paper, parchment paper, or plastic wrap will help to keep the fruit under the sirup. Leave needed headspace. Seal, label and freeze.

Puree. Select fully ripe fruit. Pit and quarter the apricots. Press through a sieve; or heat to boiling point in just enough water to prevent scorching and then press through a sieve.

Mix 1 cup of sugar with each quart of apricot puree.

Pack into containers leaving needed headspace. Seal, label and freeze.

APRICOT JELLIES, JAMS, ETC.

The USDA publication How to Make Jellies, Jams, and Preserves At Home has a recipe for making an Apricot-Orange Conserve using canned or dried apricots. The Ball Blue Book has the same recipe plus recipes for Apricot Butter; Apricot Jam, cooked; Apricot Jam, uncooked; and Apricot Preserves. The recipe sheet in boxes of powdered pectin has recipes for both cooked and uncooked Apricot Jams.

APRICOT, JUICE OR NECTAR

The Ball Blue Book has directions for canning apricot juice or nectar. The juice is extracted from fruit which has been cooked in a small amount of water until soft. Add sugar to taste and 1 tablespoon of lemon juice. Reheat until sugar dissolves. Pour hot juice into clean jars, leaving ¼-inch headspace. Adjust jar lids. Process in a boiling water bath (212°F).

Half pints . . . . . 15 minutes
Pints . . . . . 15 minutes

ARTICHOKES, GLOBE, DRYING — Drying Foods At Home

Cut hearts into 1/8 inch strips. Heat in boiling water to which lemon juice has been added (1 tablespoon lemon juice to 3/4 cup water) for 6 to 8 minutes. Dry in a dehydrator (140°F) for 2 to 3 hours, or in an oven (140°F) for 4 to 6 hours, or in the sun (98° to 100°F) for 10 to 12 hours.

ARTICHOKE, GLOBE, FREEZING

The Ball Blue Book has these directions for freezing globe artichokes.

"Select those with uniformly green color, compact globes, and tightly adhering leaves. Size has little to do with quality or flavor. Remove outer bracts until light yellow or white bracts are reached. Cut off tops of bud and trim to a cone. Wash the hearts in cold water as soon as trimming is completed. Drain.

Scald 7 minutes. Cool, drain and package in freezer bags or containers. Seal, label, and freeze."

ARTICHOKE, JERUSALEM, FREEZING

The Ball Blue Book says to handle like Irish potatoes.

ARTICHOKES, JERUSALEM, PICKLED

5 pints artichokes
1 quart cider vinegar
1½ teaspoons whole pickling spices
5 whole cloves
3/4 inch stick cinnamon
1/8 teaspoon mace
1/8 teaspoon thyme leaves
½ cup sugar
lemon juice

For whole pickled artichokes, select small ones. Clean, rub each with lemon juice, and set aside. Place vinegar in boiler. Tie in a thin cloth bag whole pickling spices, whole cloves, stick cinnamon, mace and thyme leaves. Add these to the vinegar and steep for 45 minutes. Add sugar and bring mixture to a boil. Lower heat and simmer for 20 minutes. Add about 1 pint of artichokes, a few at a time, and boil for 1 minute. Immediately remove the cooked artichokes and pack in hot sterilized pint jars. Repeat until all the artichokes are in the jars. Bring spiced vinegar to a boil, fill the jars to cover the artichokes, leaving a headspace of about 3/4 inch. Adjust jar lids. Process in a boiling water bath (212°F) for 10 minutes.

ARTIFICIAL SWEETENERS

Saccharin and aspartame (Equal or Nutrasweet) are not very well suited for use in food preservation. In canning it is better to pack the fruit in water and add the sweetener when the fruit is consumed.

It is true that fruit canned in a sugar sirup will have better color, flavor and texture than that canned in water. If the goal is to decrease sugar consumption, use a light sirup.

You can't substitute an artificial sweetener for sugar in a traditional jam or jelly recipe as it won't react with pectin to form a gelled product. There are some recipes for using an artificial sweetener with unflavored gelatin to make jelly-like products. Check the Special Diet section of the Ball Blue Book and also in the Kerr Home Canning and Freezing Book.

SLIM-SET is a jelling mix which can be used with an artificial sweetener and fruit juice to make a jelly-like product. It is not pectin but contains vegetable gums which cause the product to set up.

There is a special pectin (low-methoxy pectin) which will set up with calcium chloride--no sugar is needed. Mrs. Wages Light Home Jell is an example of this pectin. Two other companies have indicated plans for marketing a similar product in 1984.

Sugar is a preservative in the amounts used in jellies, jams, and preserves. That's why these products need minimal processing. Saccharin is not a preservative so the jelly-like products made with it need to be processed as fruit juices for storage at room temperature, or stored in the refrigerator or freezer. It makes more sense to can or freeze the fruit or fruit juice and to make up small batches of the jam or jelly as needed.

ASCORBIC ACID

Crystalline ascorbic acid (vitamin C) is often used to prevent light colored fruits from darkening. You may buy it at a drugstore or health food store. One teaspoon weighs about 3 grams. The amounts used are small--from 1/8 to 1/2 teaspoon per quart of sirup.

Ascorbic acid tablets can be crushed and used but they are usually more expensive and more difficult to use than the powdered form. Also the filler in the tablets may make the sirup cloudy. If you are going to use tablets, these equivalents should help:

Crystalline	Tablets
1/8 teaspoon	375 mg
1/4 teaspoon	750 mg
1/2 teaspoon	1500 mg
3/4 teaspoon	2250 mg
1 teaspoon	3000 mg

Ascorbic acid is included in most of the antidarkening mixtures on the market (Fruit Fresh, A-C-M, etc.). It is usually mixed with sugar or with sugar and citric acid. Use in the amounts and as directed on the label.

Regardless of which form you use, ascorbic acid should not be heated as that causes it to lose part of its effectiveness. Make the sirup and cool it before adding the ascorbic acid.

An exception would be the use of ascorbic acid with light colored fruits to be canned to keep them from darkening until the heat treatment can inactivate the enzymes.

There will be some loss of effectiveness if saved from year to year. Buy in small quantities, store in a cool, dark place, exclude as much air as possible from the container. Remember to use the product when preparing salads containing light colored fruits.

ASPARAGUS, SELECTION

Select asparagus with closed, compact tips; smooth, round spears; and a fresh appearance. A rich green color should cover most of the spear. Stalks should be tender.

Avoid excessively sandy asparagus as it is difficult to remove all of the sand from beneath the scales and in the tips.

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

Allow 2½ to 3½ pounds fresh asparagus as purchased for each quart of canned or frozen food.

ASPARAGUS, CANNING

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°F).
Pint jars . . . . . 25 minutes
Quart jars . . . . 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°F).
Pint jars . . . . . 25 minutes
Quart jars . . . . 30 minutes

Presto's recommendation for processing at 15 pounds pressure is to process for 15 minutes.

ASPARAGUS, DRYING

Drying Foods At Home

Wash thoroughly. Halve large tips. Blanch in steam for 4 to 5 minutes or in boiling water for 3½ to 4½ minutes. Dry in a dehydrator (140°F) for 1 to 3 hours, or in an oven (140°F) for 3 to 4 hours, or in the sun (98° to 100°F) for 8 to 10 hours.

ASPARAGUS, FREEZING

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 . . . . . 2 minutes
Medium stalks . . . . 3 minutes
Large stalks . . . . . 4 minutes

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

Package for the freezer. Alternate tip and stem ends for a more compact pack. Seal. Freeze; store at 0°F or below.

ASPARTAME

Aspartame (marketed as Equal and Nutrasweet) is a nutritive sweetener; that is, it supplies calories as it sweetens. The calorie savings comes about because it takes so much less aspartame than sugar to achieve the same level of sweetness.

Aspartame, a synthetic compound comprised of two amino acids, was identified by scientists at G. D. Searle and Company. It is metabolized as a protein yielding four calories per gram.

Aspartame loses its sweetness when heated and on prolonged storage so it doesn't appear to be well suited for use in food preservation. It would be better to preserve the fruit unsweetened and sweeten when ready for use.

ASPIRIN

Periodically, directions surface for adding aspirin to canned foods as a preservative which is said to make processing unnecessary. Aspirin will increase the acidity of the product but there are several reasons why this method is not recommended. They are:

1. Aspirin can be toxic to persons having an allergy to aspirin or an intolerance to aspirin because of blood clotting problems.
2. Aspirin is not an approved food additive.
3. Aspirin has no effect on enzymatic reactions which are partially responsible for quality changes in food.
4. The lack of a heat treatment will result in the absence of a vacuum in containers which will generally accelerate chemical deterioration of foods.
5. Without pasteurization or sterilization of the food, the only protection against bacterial growth is the acidity of the product and that's something of a gamble.

AVOCADOS, FREEZING

Avocados are best frozen as puree--unsweetened for salads and sandwiches, sweetened for ice cream and milk shakes. Avocados are not satisfactorily frozen whole or sliced.

Puree. Select avocados that are soft ripe--not hard or mushy--with rinds free from dark blemishes. Peel the fruit, cut in half, and remove the pit. Mash the pulp.

Pack in one of the following ways:

Unsweetened pack. For a better quality product add an antidarkening agent. Pack into containers leaving needed headspace. Seal and freeze. Store at 0°F or below.

Sugar pack. Mix 1 cup sugar with 1 quart (2 pounds) of puree. Pack into containers, leaving headspace. Seal and freeze. Store at 0°F or below.

BACTERIA

Bacteria are single-celled plants that contain no chlorophyll, the coloring material that gives other plants their green color. Bacteria are microorganisms being about 1/25,000 of an inch in size.

BAKED PRODUCTS, FREEZING

Most baked foods will hold their eating quality well in a freezer at 0°F or lower.

Freeze the food as soon as it has cooled after baking. Wrap the product in moisture-vapor-resistant materials or place in a freezer container. Exclude as much air as possible from the package.

Maximum storage times recommended to assure high quality in baked food held in a freezer are:

Foods	Approximate holding period at 0°F (months)
Bread and yeast rolls (baked)	
White bread	6
Cinnamon rolls	3
Fruit and nut breads	3
Plain rolls	6
Cakes (baked)	
Angel	2
Chiffon	2
Chocolate layer	4
Fruit	12
Pound	6
Yellow	6
Pies (unbaked)	
Apple	8
Berry	8
Cherry	8
Peach	8

Unbaked batters and doughs can be frozen but the storage life is shorter than for the already baked product.

The quality of bread from frozen dough may be improved by increasing the yeast level, by making a stiffer dough than for immediate baking, and by freezing before fermentation (rising).

BAKED PRODUCTS, STORING

Bread stales less quickly in a breadbox at room temperature than in a refrigerator. Refrigeration may be desirable in hot, humid weather to slow down mold growth.

Wrap freshly baked foods, such as bread and rolls, in moisture-vapor-resistant material as soon as they are cool.

Cakes should be held in containers with tight covers. Cakes with cream or custard fillings or frostings must be stored in the refrigerator.

Cookies should be stored in airtight containers to keep them fresh. Place sheets of wax paper between layers of soft cookies.

Custard and cream pies must be refrigerated soon after baking.

Cream puffs and eclairs should be cooled, filled and refrigerated immediately.

Fruit pies keep best if refrigerated. They can be reheated in a moderate oven to freshen them.

BANANA JAM Banana Life-Times

12 cups sliced bananas (about 20 medium)
6 cups sugar
1½ cups orange juice
3/4 cup lemon juice
3 strips orange peel
6 strips lemon peel
2 cinnamon sticks
6 whole cloves

Combine sliced bananas and remaining ingredients in large kettle. Stir over moderate heat until sugar dissolves. Boil rapidly for 10 minutes, reduce heat, and simmer, stirring constantly, until thickened, about 15 to 20 minutes. When jam is thick, remove from heat and ladle immediately into sterilized jelly or canning jars. Fill to within 1/8 inch of top. Adjust jar lids. Invert for a few seconds and stand jars upright to cool. If jam is to be stored at room temperature process in a boiling water bath for 10 minutes. Remove from water and cool. Yield: About 5 pints.

BANANA JAM IN SMALL QUANTITY Banana Life-Times

Combine 1½ cups sliced bananas, 3/4 cup sugar, 3 tablespoons orange juice, 5 teaspoons lemon juice, 1 small cinnamon stick and 1 whole clove in 2-quart saucepan. Stir over moderate heat until sugar dissolves. Boil rapidly 5 minutes, reduce heat and simmer, stirring constantly, until thickened, about 10 minutes. Pour into small jars or other container, cool, and store in refrigerator. Yield: About 1½ cups.

BANANAS, DRYING

The Cornell publication Home Drying of Foods has these directions for drying bananas: "Use solid yellow or slightly brown-flecked bananas. Avoid bruised or overripe bananas. Peel and slice 1/4" to 3/8" thick, crosswise or lengthwise.

Dip into mixture of lemon juice (1 tablespoon), honey (1/4 cup), or ascorbic acid or pineapple juice. Dry in a dehydrator 8 to 10 hours. Pieces will be pliable to crisp when dry."

BANANAS, FREEZING

Peel and mash with one tablespoon of lemon juice per cup of banana.

BEANS, DRY, CANNING, with Tomato or Molasses Sauce

Sort and wash dry beans (kidney, navy, or yellow eye). Cover with boiling water; boil 2 minutes, remove from heat and let soak 1 hour. Heat to boiling, drain, and save liquid for making sauce.

Fill jars three-fourths full with hot beans. Add a small piece of salt pork, ham, or bacon. Fill to 1 inch of top with either tomato or molasses sauce. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 65 minutes
Quart jars . . . . 75 minutes

Tomato sauce. Mix 1 quart tomato juice, 3 tablespoons sugar, 2 teaspoons salt, 1 tablespoon chopped onion, and 1/4 teaspoon mixture of ground cloves, allspice, mace, and cayenne. Heat to boiling.

Or mix 1 cup tomato catsup with 3 cups of water or soaking liquid from beans, 3 tablespoons dark molasses, 1 tablespoon vinegar, 2 teaspoons salt, and 3/4 teaspoon powdered dry mustard. Heat to boiling.

BEANS, DRY, STORAGE

Dried beans and peas are among the easiest crops to store. They will keep for many months in a cool, dry location. Control weevils before storage by placing in a freezer at 0°F or lower for 4 days, or heat to 175°F for at least 15 minutes. Following this treatment, place the dry beans or peas in a tight container and place in a cool, dry place.

BEANS, OCTOBER, CANNING

I have been unable to find processing times for October beans harvested when mature but before drying. Follow the directions for lima beans.

BEANS, SHELLED, GREEN, CANNING

I have been unable to find processing times for beans harvested when mature but while still green. Follow the directions for lima beans.

BEANS, SHELLED, GREEN, FREEZING

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

Pack into containers, leaving ½-inch headspace. Seal. Freeze; store at 0°F or below.

BEEF JERKY

Preparation

1. Slice 5 pounds lean beef (flank steak or similar cut) into strips 1/4 to 1/2 inch thick, 1 to 1½ inches wide, and 4 to 12 inches long. Cut with grain of meat; remove the fat.
2. Lay out in a single layer on a smooth clean surface. (Use cutting board, counter, bread board or cookie sheet.)
3. If smoke flavor is desired, brush each strip of meat with 1/2 teaspoon liquid smoke in 2 tablespoons water. Sprinkle strips liberally with salt on both sides. Add pepper to taste and garlic salt or powder if desired.
4. Place strips, layer on layer, in a large wooden bowl or crock and place a plate with a weight on top.
5. Let stand for 6 to 12 hours.
6. Remove strips and blot dry with clean paper toweling.

Other flavors. Instead of the garlic-smoke treatment, you may brush or marinate the strips before drying in such mixtures as teriyaki sauce, sweet and sour sauce, soy sauce, hot chili sauce, or Worcestershire sauce--or combinations of these according to your choice.

Oven drying.

Remove racks from oven and stretch meat strips across the racks. Allow the edges of the meat strips to touch, but not overlap. Leave enough space free on the racks for air to circulate in the oven.

Set the temperature at 140°F and let strips dry for about 11 hours. Check early in the drying process for excessive drip. This drip can be caught on aluminum foil on a rack placed near the bottom of the oven. Lower the temperature of the oven until it feels warm, but does not cook the meat.

Keeping the oven door ajar will facilitate drying, as will the use of an electric fan placed in front of the open oven door.

Air or sun drying.

An open barbecue with a grill suspended over the charcoal container or a comparable arrangement may be used for this method.

BEEF JERKY (CONTINUED)

Line the bottom of the barbecue with aluminum foil to reflect the sun. Stretch strips of meat over the grill. Place in the sun and allow the meat to dry for 4 to 6 days, depending upon the temperature, your storage method, and how long you intend to store it. If the nights are cool, place the barbecue under cover (for example, in the garage) at night to reduce condensation of moisture on the meat. If the barbecue has a cover, you may use this.

The strips of meat can also be strung on wire, fishing line, or strong thin string. Insert a small button between each strip to prevent touching.

Place in a sunny area and dry for several days. Jerky is properly dry when it is chewy and leathery. If brittle, it is too dry.

Storage

Finished jerky can be stored at room temperature in air tight containers, if the jerky is dry enough. With moister jerky, it can be placed in plastic bags and frozen. If there is too much moisture it will become moldy. If fat is excessive, it will turn rancid more rapidly.

BEET SELECTION

Select beets that are firm, round, with a slender tap root (the large main root), a rich, deep red color, and are smooth over most of the surface. Avoid elongated beets with round, scaly areas and wilted, flabby beets. Very large beets (over 3 inches in diameter) are usually fibrous and of poor quality.

BEETS, CANNING

Wash beets and sort according to size. Trim tops leaving 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 1/2 inch cubes or slices; halve or quarter very large slices.

Pack cooked beets in jars leaving 1/2 inch space at top. 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°F).
Pint jars . . . . . 30 minutes
Quart jars . . . . 35 minutes

According to Presto, beets (whole or sliced) can be processed for 15 minutes at 15 pounds pressure.

BEETS, COLOR

Darkening is sometimes observed in beets that have been blanched to facilitate peeling and then sliced and held prior to canning. Darkening does not occur in slices of raw beet nor in those adequately blanched. Some heat is necessary to start the discoloration process.

Pickled beets sometimes turn blue because of the amount and/or strength of vinegar used.

BEETS, DRYING

Drying Foods At Home

Cook as usual. Cool; peel. Cut into shoestring strips 1/8 inch thick. Dry in a dehydrator (140°F) for 3 to 5 hours, or in the sun (98° to 100°F) for 8 to 10 hours.

BEETS, FREEZING

Pack cooked beets into containers, leaving 1/2 inch headspace. Seal. Freeze; store at 0°F or below.

BEETS, PICKLING

Pack cooked beets into jars. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling pickling sirup made with 2 cups vinegar and 2 cups sugar. Leave 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 . . . . . 30 minutes
Quart jars . . . . 30 minutes

The USDA bulletin Making Pickles and Relishes at Home uses a slightly different pickling liquid. It has 2 cups sugar, 3½ cups vinegar, 1½ cups water, 1½ teaspoons salt, 1 tablespoon whole allspice, and 2 cinnamon sticks. Tie all spice and cinnamon sticks in a cloth. Combine other ingredients in saucepan; add spice bag. Bring to a boil; cook slowly for 15 minutes.

Remove spice bag and proceed as above.

BERRIES (OTHER THAN STRAWBERRIES)

Blackberries, raspberries, and dewberries are similar in general structure. They differ from one another in shape or color, but quality factors are about the same for all. Look for a bright clean appearance and a uniform good color for the species. The individual small cells making up the berry should be plump and tender but not mushy. Look for berries that are fully ripe with no attached stem caps.

Avoid leaky and moldy berries. You can usually spot them through the openings in containers or by wet or stained spots on wood or fiber containers.

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

Sugar helps canned and frozen berries have better flavor and texture but can be omitted from a safety standpoint. Frozen fruits packed in a sirup are generally best for dessert use; those packed in dry sugar or unsweetened are best for most cooking purposes.

BERRIES, CANNING

Fill jars to 1/2 inch of top. For a full pack, shake berries down while filling jars. Cover with boiling sirup, 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 . . . . . 10 minutes
Quart jars . . . . 15 minutes

BERRIES, FREEZING

Sirup pack. Pack berries into containers and cover with cold 40- or 50-percent sirup. Leave headspace. Seal. Freeze; store at 0°F or below.

Sugar pack. To 1 quart berries, add 3/4 cup sugar. Turn berries in sugar gently until most of the sugar is dissolved. Fill containers leaving headspace.

Unsweetened pack. Pack berries into containers, leaving headspace. Seal. Freeze; store at 0°F or below.

BLACKBERRIES, CANNING

See "Berries, Canning"

BLACKBERRIES, FREEZING

See "Berries, Freezing"

BLACKBERRY JELLY

Blackberries have enough natural pectin and acid to make high quality jellied products. Like other fruits they have less pectin and acid when fully ripe than before ripening. For jellies to be made without added pectin, use 1/4 underripe berries. Many homemakers prefer adding pectin because fully ripe fruit can be used, cooking time is shorter and is standardized, and the yield from a given amount of fruit is greater.

BLACKBERRY JELLY without added pectin

4 cups blackberry juice (about 2½ quarts fresh berries)
3 cups sugar

Crush berries, add 3/4 cup water, cover and bring to boil on high heat. Reduce heat and simmer for 5 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 9°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 hot sterile jars leaving 1/4 inch headspace. Wipe jar rims clean, place metal lids on jars, screw metal bands down firmly. Process in a boiling water bath for 5 minutes.

To seal with paraffin, pour hot paraffin onto hot jelly. Use a single thin layer of paraffin--about 1/8 inch. Prick air bubbles in paraffin. A double boiler is recommended for melting paraffin.

BLACKBERRY JELLY with powdered pectin

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 1 minute.

Remove from heat and skim. Pour into hot sterile jars. Seal and process for 5 minutes in a boiling water bath.

BLANCHING

Freezing does not destroy any of the microorganisms which cause changes in food quality and food safety. Activity of bacteria, yeasts, and molds is slowed to a standstill while food is frozen. Enzymes do continue to affect flavor, texture, and color of food in the frozen state but the action is very slow.

BLANCHING (CONTINUED)

You can minimize change by heating the food to destroy the enzymes. That's why blanching or steaming of vegetables is recommended.

Bennion in Introductory Foods lists these advantages of blanching.

1. Inactivation of enzymes
2. Green color is intensified
3. The vegetable shrinks and becomes softer which conserves space and promotes ease in handling
4. Further cleansing of the product is accomplished
5. Many but not all microorganisms are destroyed
6. Some bitter and astringent substances are eliminated which results in better flavor
7. Some objectionable odors are removed

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.

You may prefer steaming some foods rather than boiling them. The time required for heat penetration is greater for steaming than for blanching. Or partially cook food. Whether blanched, steamed, or parcooked, it is important to cool the vegetable quickly to stop the cooking process. Plunge the vegetable into ice 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.

Cooking is not a very good alternative as cooked vegetables that are frozen do not have the flavor stability of vegetables which are just blanched. The flavor is described as stale. If leftover cooked vegetables are frozen, pack tightly to exclude as much air as possible. If there's cooking liquid, use it to keep air from the vegetable pieces.

Remember enzymes affect food quality, not food safety. If you use food in a short time or add a lot of seasoning, you may not notice the changes in quality. Or you may have forgotten how the food tasted when fresh. If you are skeptical of the value of heating vegetables before freezing, you might experiment by freezing a few packages without heating. To have a really valid test, prepare a few packages at the same time by heating. This would rule out differences in variety and maturity.

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 so we use other methods.

One is to keep air (oxygen) away from the pieces of fruit. We do this when we pack fruits in sirup so that air can't get to individual pieces.

BLANCHING (CONTINUED)

Another method of interfering with enzyme activity in fruits is to add ascorbic acid. The enzyme works on the ascorbic acid instead of the fruit. A third method is to add citric acid to make the food more acid. This works because enzymes are less active in an acid medium. Ascorbic acid and citric acid are sometimes combined in commercial products designed to keep fruits from darkening.

See MICROWAVE BLANCHING

BOTULISM

Clostridium botulinum is the organism we are most concerned about in home canned foods. The organism is widespread in nature so foods are apt to be contaminated. The organism itself does not cause food borne illness. It's when the spore form exists in an oxygen- or air-free environment that a neurotoxin may be produced which can be injurious to health.

Toxin production does not occur in acid foods. We have traditionally used a pH of 4.5 as the breaking point although botulinum toxin is not produced until the pH reaches 4.8. Nor does toxin production occur at freezer temperatures.

The spore of clostridium botulinum is extremely heat resistant. Some spores have survived 5 hours of boiling! That's why processing in a boiling water bath is not recommended for foods low in acid.

Higher temperatures can be achieved in a pressure canner--10 pounds pressure is equal to 240°F. It's not enough for the canner to reach this temperature, food in jars in the canner must also reach this temperature. Each food heats at its own rate so it is important to follow recommended processing times.

Toxin production can occur without changing the visible characteristics of a food. Fortunately, the toxin can be destroyed by heat. That's why it is recommended that canned foods low in acid be boiled 10 to 20 minutes before tasting. (The shorter time is sufficient for water packed foods; the longer period is required for dense foods--greens and meat.) Any change in quality--an off-odor, frothing, etc.--will also be more evident on boiling.

Symptoms of botulism (the illness) would usually appear within 12 to 36 hours after the food was consumed although symptoms may not appear for up to 6 days. Early symptoms may include nausea, vomiting, abdominal pain, and diarrhea. Later symptoms include headache, double vision, lassitude, difficulty in swallowing and speaking, loss of coordination, respiratory distress and, ultimately, respiratory paralysis.

The fatality rate for botulism is about 65% in the United States partly because of the delay in diagnosing it. It occurs so rarely (20 to 30 outbreaks per year) that most physicians have not seen a case. It does respond to an antitoxin.

BOYSENBERRIES

Boysenberries are a dewberry variety grown mainly in the West. Berries are large and long, 1¼ inch long by 1 inch thick, dark reddish-black when fully ripe, and slightly acid.

The package inserts in commercial pectin products have recipes for using dewberries, boysenberries, and loganberries.

BRINE STRENGTH

Amounts of Salt and Water Required to Prepare Brine of Different Strengths

Strength of Brine %	Ounces/Quart Water	Amount of Salt Pounds/Gallon Water	Cups/Gallon Water
1	1/2	1/10	1/6
2½	1	1/4	1/3
5	1 3/4	1/2	3/4
10	4	1	1½
15	6¼	1½	2½
20	9	2¼	3½
26	12	3	4 3/4

BRINED PICKLES

Naturally occurring lactic-acid forming bacteria cause fermentation in pickle products. Salt is used in concentrations strong enough to suppress the growth of undesirable organisms but weak enough to allow lactic acid production.

Salt may be added to the food either dry or in the form of a brine. Salt concentration usually starts at 8 to 10% and is gradually increased to 16%. If added dry, juices from the food are drawn out and the salt dissolves in these to form a brine. The carbohydrate in these juices serves as food for the lactic-acid forming bacteria. As lactic acid is produced, the environment becomes more acid bringing other bacterial action to a standstill.

Lactic acid production is most efficient at temperatures of 70° to 75°F. Above 80°F or below 60°F, growth of the bacteria is retarded and abnormal flavor or other undesirable characteristics may develop.

The loss of liquid from the fruit or vegetable leaves it firmer. The color of cucumbers changes from bright green to an olive or yellow green. The tissue becomes translucent in the curing process.

A weak brine, 3 tablespoons to 1/2 cup of salt per quart of water allows rapid fermentation and formation of the maximum amount of lactic acid in a comparatively short time.

BRINED PICKLES (CONTINUED)

A medium brine, about 3/4 cup of salt per quart of water, is used to "cure" cucumbers for later processing. The medium brine prevents growth of spoilage organisms but permits lactic acid production. From 6 to 12 months may be allowed for the "curing."

A strong brine, one cup of salt per quart of water, prevents both bacterial action and the formation of lactic acid.

Brined products, including sauerkraut, should be packed in clean, hot jars at the end of the fermentation period, and processed in a boiling water bath. Pickle products when properly prepared are too acid for the production of botulinum toxin. However, it is possible for contaminating microorganisms to grow and utilize the acid as a food source. That results in a change in the acidity of the product perhaps enough to allow botulinum toxin production. Adequate water bath processing destroys the contaminating microorganisms, and inactivates enzymes responsible for changes in texture, flavor, and odor during storage.

BROCCOLI, CANNING

According to the authors of Putting Food By, "Broccoli and similarly strong-flavored vegetables--brussels sprouts, cabbage (unless it is done as sauerkraut), and cauliflower--usually discolor when canned and grow even stronger in flavor. But here's how you can broccoli and others if you have to."

Wash all green spears, trimming off leaves, any old blossoms, and woody parts of the stems. Soak in cold salt water (1 tablespoon salt to 1 quart of water) for 10 minutes to drive out bugs, etc. Drain and wash in fresh water. Cut in 2-inch pieces, splitting thick stalks; or size as you like.

Cover trimmed, clean, cut broccoli with boiling water and boil 3 minutes; drain.

Pack hot broccoli into clean jars leaving 1-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Add 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°F).
Pints . . . . . 30 minutes
Quarts . . . . . 35 minutes

The Kerr Home Canning and Freezing Book gives procedures for both raw and hot pack. Processing times are 25 minutes for pint jars and 40 minutes for quart jars at 10 pounds pressure whether raw or hot packed. The Ball Blue Book does not have directions for canning broccoli as "freezing results in a better product than canning." The USDA bulletin Home Canning of Fruits and Vegetables does not have directions for canning broccoli.

BROCCOLI, DRYING Drying Foods At Home

Trim, cut as for serving. Wash thoroughly. Quarter stalks lengthwise. Blanch in steam for 3 to 3½ minutes or in boiling water for 2 minutes. The latter is the preferred method.

Dry in a dehydrator (140°F) for 3 to 4½ hours, or in the sun (98° to 100°F) for 8 to 10 hours.

BROCCOLI, FREEZING

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 cold water. Split lengthwise into pieces so that flowerts are not more than 1½ inches across.

Heat in steam 5 minutes or in boiling water 3 minutes. Cool promptly in cold water and drain.

Package for the freezer. Freeze and store at 0°F or below.

BROCCOLI SELECTION

Harvest when the center head is 5 to 8 inches across but while the individual buds are still tight. Side shoots will develop and can be harvested later.

If buying, select tight, compact, dark-green heads with tender stalks free from woodiness.

BRUSSELS SPROUTS, CANNING

The authors of Putting Food By include brussels sprouts in the group of strong-flavored vegetables which do not can very satisfactorily.

If you must can, follow directions for canning broccoli.

BRUSSELS SPROUTS, DRYING Drying Foods At Home

Cut in half lengthwise through stem. Blanch in steam for 6 to 7 minutes or in boiling water for 4½ to 5½ minutes. Dry in a dehydrator (140°F) for 2 to 3 hours, or in an oven (140°F) for 4 to 5 hours, or in the sun (98° to 100°F) for 9 to 11 hours.

BRUSSELS SPROUTS, FREEZING

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 . . . . . 3 minutes
Medium heads . . . . 4 minutes
Large heads . . . . . 5 minutes

Cool promptly in cold water and drain. Pack brussels sprouts into containers. Seal and freeze.

BRUSSELS SPROUTS, PICKLED

I have been unable to find a recipe for pickling Brussels sprouts. However, I see no reason why they couldn't be substituted for cauliflower, carrots, beets, or even large chunks of cucumber. It might be advisable to partially or completely cook the Brussels sprouts before pickling, particularly if the recipe is a fresh-pack one.

CABBAGE, CANNING

The authors of Putting Food By include cabbage in the group of strong-flavored vegetables which do not can very satisfactorily.

If you must can, follow directions for canning broccoli.

CABBAGE, DRYING

Drying Foods At Home

Remove outer leaves; quarter and core. Cut into strips 1/8 inch thick. Blanch in steam until wilted--about 2½ to 3 minutes--or in boiling water for 1½ to 2 minutes. Dry in a dehydrator (140°F) for 1 to 2 hours, or in an oven (140°F) for 1 to 3 hours, or in the sun (98° to 100°F) for 6 to 7 hours.

CABBAGE, FREEZING

Frozen cabbage is suitable for use only as a cooked vegetable.

Select freshly picked, solid heads. Trim coarse outer leaves from head. Cut into medium or coarse shreds or thin wedges, or separate head into leaves. Heat in boiling water 1½ minutes.

Cool promptly in cold water and drain.

Pack cabbage into containers, leaving ½-inch headspace. Seal and freeze. Store at 0°F or below.

CABBAGE, SELECTION

Harvest when the heads are solid and before they split.

CALCIUM CHLORIDE is a firming agent used in commercially canned apples, tomatoes, and potatoes. It has not been used to any extent in home canning. Very small quantities are needed (too much can result in hard, brittle products and a bitter aftertaste). One rule of thumb says to use 1/2 oz. calcium chloride per gallon of water. The authors of Putting Food By suggest mixing it with salt--2 parts salt to 1 part calcium chloride; then using the mixture in the amounts suggested for salt--1/2 teaspoon in pints; 1 teaspoon in quarts.

Calcium chloride is also used with a special pectin--low-methoxy pectin--to form a gel without sugar.

CANNED FOODS, FROZEN

A frequent question has to do with the safety of home or commercially canned foods which have frozen in storage. If the seal is intact and there are no visible signs of spoilage, the food is safe to eat. There may be some loss of quality (evidenced by softer texture).

Food expands when it freezes and thus can exert pressure on the container. Glass jars may break if there's insufficient headspace.

CANTALOPE, FREEZING

See MELONS

CANTALOPE, PICKLES

A Kentucky Cooperative Extension Service publication had this recipe for Cantalope Sweet Pickles.

1 gallon cantalope slices
2 quarts water
1/2 cup salt
5 cups sugar
2 cups vinegar
2 cups water
3 Tbsp. whole cloves
5 sticks of cinnamon

Select cantalopes that are just beginning to ripen, but that are still firm. Peel and cut in slices about 1 inch wide and 4 inches long. Make a brine of the 2 quarts water and salt. Pour over the cantalope and let stand overnight. Drain.

Boil sugar, vinegar, the 2 cups of water, and spices (tied loosely in a bag) for 5 minutes. Add cantalope and cook slowly until fruit is tender. Let stand until the next morning.

Drain the syrup from the fruit and remove the spice bag. Bring syrup to boiling. Pack cantalope in jars, cover with boiling syrup. Adjust jar lids. Process for 5 minutes in a boiling water bath.

CANTALOPE PRESERVES

The Kerr Home Canning and Freezing Book has a recipe for Cantalope Preserves.

CARROTS, CANNING

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 jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 25 minutes
Quart jars . . . . . 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 . . . . . 25 minutes
Quart jars . . . . . 30 minutes

According to Presto, carrots can be processed for 15 minutes at 15 pounds pressure.

CARROTS, DRYING

Use only crisp, tender carrots. Wash thoroughly. Cut off roots and tops; preferably peel, cut in slices or strips 1/8 inch thick. Blanch in steam for 3 to 3½ minutes or in boiling water for 3½ minutes. Dry in a dehydrator (140°F) for 2½ to 4 hours, or in an oven for 3½ to 5 hours, or in the sun (98° to 100°F) for 8 hours.

CARROTS, FREEZING

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:
Whole carrots, small . . . . . 5 minutes
Diced or sliced . . . . . 2 minutes
Lengthwise strips . . . . . 2 minutes

Cool promptly in cold water and drain.

Pack carrots into containers, leaving 1/2-inch headspace. Seal and freeze.

CAULIFLOWER, CANNING

The USDA publication does not have directions for canning cauliflower. Cauliflower discolors when canned, gets mushy and the flavor grows even stronger. The authors of Putting Food By recommend freezing cauliflower but say that it can be canned using the hot pack method. They recommend processing at 10 pounds pressure (240°F).

Pint jars . . . . . 30 minutes
Quart jars . . . . 35 minutes

CAULIFLOWER, DRYING

Prepare as for serving. Blanch in steam for 4 to 5 minutes or in boiling water for 3 to 4 minutes (preferred). Dry in a dehydrator (140°F) for 2 to 3 hours, or in an oven set at 140°F for 4 to 6 hours, or in the sun (98° to 100°F) for 8 to 11 hours.

CAULIFLOWER, FREEZING

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. Seal and freeze.

CAULIFLOWER PICKLES

3 quarts cauliflower florets (about 3 medium heads)
2 cups sliced onions
1 cup red pepper strips
¼ cup salt
2 quarts ice cubes (2 trays)
1 quart white vinegar
2 cups sugar
1 tablespoon mustard seed
1 tablespoon celery seed
1 teaspoon turmeric
1 hot red pepper

Wash cauliflower; divide into florets. Combine cauliflower, sliced onion, red pepper strips, and salt. Cover with ice and let stand 3 to 4 hours. Drain well.

Combine remaining ingredients. Bring to a boil. Add vegetables; boil 10 minutes or until vegetables are tender-crisp.

Remove hot red pepper from vegetable mixture. Pack hot vegetables into hot pint jars. Cover with boiling liquid to 1/2 inch from top of jar. Cut hot red pepper into 5 pieces and add one piece to each jar. Adjust jar lids.

Process in boiling water for 5 minutes (start to count processing time as soon as water returns to boiling). Set jars upright on a wire rack or folded towel to cool. Yields 5 pints.

CELERY, CANNING

Putting Food By has these directions for canning celery. Wash thoroughly, trim off leaves (but if it's destined for stew, a few bits of chopped leaf are good flavor), cut stalks in 1-inch pieces. Cover with boiling water, boil 3 minutes. Drain, saving the cooking water.

Fill clean jars with hot celery, leaving 1-inch of headspace. Add 1/2 teaspoon salt to pints, 1 teaspoon to quarts. Add boiling cooking liquid or water leaving 1-inch of headspace. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pints . . . . . 30 minutes
Quarts . . . . . 35 minutes

CELERY, DRYING — Drying Foods At Home

Trim stalks. Wash stalks and leaves thoroughly. Slice stalks. Blanch in steam for 2 minutes or in boiling water for 2 minutes. Dry in a dehydrator (140°F) for 2 to 3 hours, or in an oven (140°F) for 3 to 4 hours, or in the sun (98° to 100°F) for 8 hours.

CELERY, FREEZING

Select crisp, tender stalks, free from coarse strings and pithiness.

Wash thoroughly, trim, and cut stalks into 1-inch lengths.

Heat for 3 minutes in boiling water. Cool promptly in cold water and drain.

Pack celery into containers, leaving 1/2-inch headspace. Seal and freeze.

CEREALS AND PASTA, STORING

Store cereals and pasta at room temperature in tightly closed containers to keep out dust, moisture, and insects. Choose a relatively cool, dry place in your kitchen--not above the range or refrigerator or below the sink. Do not store cereals and pasta near soap or other products with strong odors.

Close cereal packages as tightly as possible after use.

When humidity is high, ready-to-eat cereals may soon lose crispness. To restore crispness, heat the cereal in a shallow baking pan in a preheated oven at 350°F for about 5 minutes.

Food	Maximum storage time for best quality (months)
Breakfast cereals	2 to 3
Bulgur	6
Degerminated cornmeal and hominy grits	4 to 6
Pasta (except egg noodles)	12
Egg noodles	6
Rice:	
white	12
parboiled	12
precooked	12
brown	6
wild	6
seasoned mixes	4 to 6

CHEESE, FREEZING

Normally cheese should not be allowed to freeze as this may damage the characteristic body and texture and cause the cheese to become crumbly and mealy. However, small pieces (1 pound or less) not over 1 inch thick of certain varieties can be frozen satisfactorily for as long as 6 months if handled and stored properly. Since it is necessary that the cheese be frozen quickly, the temperature of the freezer should be 0°F or lower. Cut cheese should be carefully wrapped (foil or other moistureproof freezer wrapping should be pressed tightly against surfaces to eliminate air, and to prevent evaporation), then frozen immediately. Among the varieties of cheese which can be successfully frozen in small pieces are: Brick, Cheddar, Edam, Gouda, Muenster, Port du Salut, Swiss, Provolone, Mozzarella, and Camembert. Small sizes as in the case of Camembert can be frozen in their original package. When removed from the freezer, cheese should be thawed in the refrigerator and used as soon as possible after thawing.

CHERRIES, BRINED

This recipe for brined cherries (cherry olives) came from a Washington Extension Service publication.

1 gallon sweet cherries
1 quart vinegar
1/4 cup salt

Make a brine by boiling the vinegar and salt; cool.

Wash cherries carefully. Leave stems on. Prick cherries to allow vinegar to penetrate and pack tightly into jar.

Pour brine over cherries and tilt jar so that air spaces in jar are filled. Add sterilized water to cover cherries.

Seal jar. In two weeks they can be used. As the season progresses they become sharper in flavor.

CHERRIES, SOUR, CANNING

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 sirup, 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 . . . . . 20 minutes
Quarts . . . . 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 . . . . . 10 minutes
Quarts . . . . 15 minutes

CHERRIES, SOUR, FREEZING

Sirup pack is best for cherries to be served uncooked. Sugar pack is preferable for cherries to be used for pies or other cooked products.

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

Sirup pack. Pack cherries into containers and cover with cold 60 or 65% sirup, depending on tartness of the cherries. Leave at least 1/2-inch headspace. Allow more headspace in glass containers with narrow top openings. Seal and freeze.

CHERRIES, SOUR, FREEZING (CONTINUED)

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. Seal and freeze.

CHERRIES, SWEET, CANNING

Select firm, ripe fresh sweet cherries. Wash, remove stems and pit, if desired. Pack raw cherries into clean jars. Cover with hot medium sirup (1½ cups sugar to 2 cups water), 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 . . . . . 20 minutes
Quarts . . . . 25 minutes

CHERRIES, SWEET, DRYING WA State Fruit Commission

Select firm, ripe fresh sweet cherries. Wash, cut in half, remove stems and pits. Place cherries, skin side down, in single layers on dehydrator trays. Dry at a temperature of 140°F for a period of 6 to 12 hours, being careful not to over-dry cherries. Cherries should be leathery and slightly sticky when properly dried. To store, place in small plastic bags, seal and keep in dark, dry, cool spot until used.

CHERRIES, SWEET, FREEZING

Select well-colored, tree-ripened fruit with a sweet flavor. Red varieties are best for freezing. Sweet cherries should be prepared quickly to avoid color and flavor changes. The Washington State Fruit Commission suggests washing cherries in ice water.

Cherries may be frozen with pits or with pits removed. The pits tend to give an almond-like flavor to the fruit.

Whole with stems. Spread washed cherries with stems intact on cookie sheet. Freeze until firm. Pack into freezer containers or plastic freezer bags. Cover or fasten tightly and freeze.

Syrup pack. Pack cherries into containers. Shake container to pack fruit as closely as possible without crushing. Cover with cold 40% sirup (1½ cups sugar in 2 cups water) to which an antidarkening agent has been added. Leave needed headspace. Place small piece of crumpled paper on top of fruit to hold it under the sirup. Cover tightly and freeze. Store at 0°F or below.

Dry sugar pack. Add 1/3 cup sugar to each pint of pitted or unpitted fresh sweet cherries. Fill freezer containers; shake container to pack cherries closely. Cover tightly and freeze.

CHESTNUTS

Nuts in Family Meals

"Chestnuts are perishable at room temperature but will keep several months in the refrigerator in loosely covered containers or in ventilated plastic bags.

Shelled, blanched chestnuts (whole or chopped) may be frozen for longer storage. Pack them in tightly closed freezer containers and freeze immediately at 0°F or lower. Use in cooking without defrosting.

Blanch chestnuts by putting them in boiling water and letting stand 2 minutes. Remove a few at a time, cool slightly, then peel with a paring knife. If nuts are difficult to peel, return them to the hot water for a minute or two. Roasting will also loosen the skins of chestnuts.

To roast chestnuts in the shell, slash through the shells on the flat side of the nuts. Place chestnuts, cut sides up, on a baking sheet. Roast at 400°F until tender--about 20 minutes. Insert fork through cut in shell to test tenderness."

CHILE, CHILI, CHILLI

According to the Better Homes and Gardens Encyclopedia of Cooking, all of the above are acceptable spellings for a very hot pepper of the Capsicum genus. They go on to say that there are more than 5 dozen varieties of chilies available to Mexican cooks, but they use only about one dozen to any large extent. After discarding the seeds, which may be hot even if the flesh is not, green or red sweet chilies are used fresh.

However, both red and green chilies are also used dried. Dried, red peppers vary from mild and flavorful to very hot and pungent, while green chilies are often hotter than are the red ones. Like fresh peppers, the heat of dried peppers can be somewhat tamed by removing the seeds before using. If the chilies are pickled, reduce the hotness by washing them.

Mexican cooks choose specific chilies by name to give the fiery or mild flavor that they desire in a dish. Powdered chilies are also used but they must not be confused with chili powder mixtures which are an entirely different type of seasoning made of a blend of spices.

CHILE SAUCE

New Mexico Cooperative Extension Service

Whole pods or chile powder may be used in making red chile sauce. Chile pods may or may not be toasted before blending or grinding. The pods may be put through a ricer or colander to separate the pulp from the outer skin. Or an electric blender may be used, blending pulp and skin to a smooth paste.

The chile pods may be covered with hot water and brought to a boil, heat turned off, and allowed to steep for an hour. Or they may be boiled for 10 to 15 minutes before separating pulp from skins. The pulp must be soft to separate readily from the outer skin.

The pungency is largely in the veins of the chile--the amount to be removed is a personal decision.

Sauce I - Remove stem, seeds, and veins from 14 to 24 chile pods. Wash in warm water. Place chile in a pan and cover with hot water, heat to almost a boil. Remove from heat and let stand for one hour, or until the pulp separates easily from the outer skin. Put through a ricer or colander, adding enough water to remove the pulp. If sauce is very thick, thin with water to desired consistency.

Sauce II - Remove stems, seeds, and veins from 12 to 24 chile pods. Wash and drain. Spread on cookie sheet and dry chile in warm oven (200-250°F), turning frequently. Leave oven door open. Chile burns easily giving the sauce an undesirable flavor. Remove chile to pan, cover with hot water, let boil for 10 minutes or until pulp is soft and separates from skin. Blend to smooth paste using cooking water if added liquid is needed.

Sauce III - Put 3 tablespoons olive oil or shortening in saucepan. Blend in 2 tablespoons flour and cook until flour is done--3 to 4 minutes. Stir in 1/2 cup chile powder and 1 teaspoon salt. Blend in 2 cups water. Cook to desired consistency. Variations: 1 clove garlic, crushed and added to fat; 1 teaspoon oregano, blended in with chile powder; 1/4 cup finely chopped onion cooked in fat before adding flour and 1 cup tomato juice substituted for 1 cup water.

CHILI PEPPERS

See "Peppers, Canning" and "Peppers, Hot, Freezing"

CHILI POWDER

A blended spice containing ground, dried red chili peppers, ground cumin seed, ground oregano, and garlic powder. Ground cloves, ground allspice, or powdered onion are often added. No two manufacturers' blends are exactly alike.

CHILI SAUCE

Most Virginians probably think of chili sauce as a tomato sauce with peppers and onions to suit the taste. This recipe may be more to their liking.

5 medium onions
3 medium green peppers
6 pounds tomatoes
3 cups vinegar
2¼ cups brown sugar, packed
1½ tablespoons salt
1 tablespoon dry mustard

Grind onion and green pepper together through coarse blade of food grinder or blender.

Remove skins from tomatoes. Cut tomatoes into eighths to make 3 quarts.

CHILI SAUCE (CONTINUED)

Combine all ingredients. Bring to a boil and boil gently, stirring frequently, for 3 hours or until mixture is reduced one-half in volume.

Pack hot chili sauce into clean, hot pint jars. Fill jars to 1/2 inch from top. Adjust jar lids. Process in boiling water for 15 minutes. Remove jars and set on a wire rack or folded towel to cool. Yields 4 to 5 pints.

CHUTNEY

In American versions of this Indian dish, fruit is left in rather large pieces with a definite shape. Chutneys are richly spiced, but not always hot, and often hint of the sweet-sour. Traditional homemade relishes called chutneys may include mixtures of ripe or green tomatoes, plums, apricots, pumpkin, apples, or peaches.

CITRIC ACID is used to increase the acidity of products. It is less effective as an antidarkening agent than ascorbic acid but cheaper. The two are often used together in antidarkening mixtures such as Fruit Fresh, A-C-M, etc. It is what you get when you buy a canning acid.

CITRON MELON

The citron melon is a member of the watermelon family but more the size of a cantaloupe or honeydew melon. It is inedible raw. It is much harder than the watermelon, has a white flesh and red seeds. The Ball Blue Book has a recipe for making Citron Melon Preserves as does the Kerr Home Canning and Freezing Book. The preserves are sweet but that's about all. I doubt they're worth the sugar and time used in making them.

COCONUT, FRESH, FREEZING

Shred coconut meat or put it through a food chopper. Pack into containers and cover with the coconut milk. Leave needed headspace. Seal and freeze. Store at 0°F or below.

COLE SLAW Illinois Cooperative Extension Service

"Cole slaw can be frozen satisfactorily, but cannot be stored for very long, only about a month. Cole slaw made with a seasoned vinegar and sugar dressing freezes best. Do not freeze cole slaw made with mayonnaise or salad dressing."

COLOR

Color is an important characteristic of a food. Color can enhance the appeal of a food or it may be repulsive. Fruits and vegetables are the most colorful foods. The color of raw fruits and vegetables changes as the food is pared, cooked, and stored. The nature of those color changes can be predicted if you know something about the pigments and the way they react to various conditions.

COLOR (CONTINUED)

Chlorophyll is the green pigment of plants. There are two types of chlorophyll--a and b. Chlorophyll a is blue-green in color, whereas chlorophyll b is yellow-green.

The first color change noted on dropping a green vegetable into boiling water is a brightening of the green color but if cooking is continued long enough the color will change to a dull olive-green. The extent of the change will depend on the acidity of the vegetable and of the cooking medium as well as the time and temperature of cooking. Color is best if green vegetables are heated through as rapidly as possible and cooked for only a short time.

Addition of baking soda increases the alkalinity of the cooking water and results in a greener color. Addition of baking soda is not a recommended practice, however, as it is difficult to get just the right amount--too much affects the flavor and causes the vegetable to be soft and mushy.

Copper (from a pan or a penny) will react with chlorophyll to give a bright green color but the substance formed is toxic. Obviously, it is not a recommended practice.

Carotenoids are responsible for most of the yellow and orange colors and some of the red colors in fruits and vegetables. Most carotenoids are precursors of vitamin A. Ordinary cooking methods have little effect on the color or nutritive value of carotenoids. The pigments are little affected by acid, alkali, the volume of water, or the cooking time.

There can be some loss of color in dried products due to oxidation.

Flavonoids are widely distributed in plants. There are two major groups of flavonoids--the anthocyanins which are responsible for most of the red, purple and blue colors and the anthoxanthins which are almost colorless or pale yellow.

In some fruits, the anthocyanins are found in the skin but not in the flesh or, in peaches, around the seed but not in the flesh. Processing the fruit distributes the anthocyanins throughout the tissues.

The anthocyanins are the least stable of the food pigments. Color varies with the pH--red in acid; violet at a neutral pH; and blue in an alkaline medium.

Fruits usually retain a desirable color because of their acidity. Red cabbage turns a bluish color when steamed or boiled in tap water. Addition of acid as vinegar or apples during cooking will keep the reddish color.

Contact with metal results in a greenish-blue color. Enamel-lined cans are used for foods containing anthocyanins.

The anthoxanthins may occur alone or in light-colored vegetables such as potatoes and yellow-skinned onions or with other pigments. The anthoxanthins turn yellow in the presence of alkali. They react with iron (from food preparation equipment or water) to produce a yellow-to-brown discoloration in cooked white vegetables.

One member of the anthoxanthin group (leucoanthocyanins) is believed to be responsible for the pink or red color in canned pears, sauerkraut, and applesauce.

COLOR (CONTINUED)

Betalains are responsible for the color of the red beet. The color depends on pH--the red color is associated with a pH of 4 to 7. At a pH level below 4, the color shifts to violet.

COLOR PROBLEMS IN FOOD PRESERVATION

Color	Cause	Prevention
Faded	Freezer burn Oxidation of carotenes Overcooked Can corrosion Heat and light	Use vapor proof wrap None Watch time Use glass or enamel lined Store dark and cool Rotate goods
Green to gray-green	Chlorophyll degrades	None
Green to brownish green	Vegetable too mature	Select just ripe
Coffee & tea turn green	Flavanol+Metal→Green	Avoid iron utensils
Area around nuts turns green	Flavanol+Metal→Green	Avoid iron utensils
Reddish foods turn green	Anthocyanins+Metal→Green	Avoid iron, tin and aluminum Don't cook in hard water
Fermented pickles turn olive green	Chlorophyll degrades	None. If slimy, don't use
Pickles turn dark	Contact with metals, spices	Use soft water Avoid iron and tin Remove spices from brine Use whole spices
Green-Bright green	Chlorophyll+Alkali→ Bright green Cooked in soft water	Don't use soda None
Reddish fruits turn blue or violet	Anthocyanin+Metal	Avoid contact with metal
Pickled beets turn blue	Too much acid	Vinegar too strong Check recipe
Purplish discoloration	Iodized salt	Use canning salt
Onions and garlic in relish turn blue	Iodized salt Iron utensils	Use canning salt Use stainless utensils
Corn turns brown	Too mature Liquid did not cover Jars processed at too high temperature Variety of corn	Select just ripe Cover Check gauge Use different variety
Strawberry jam turns brown	Acid+heat+sugars+oxygen	None--Use different recipe

COLOR PROBLEMS IN FOOD PRESERVATION (CONTINUED)

Fruit turns brown after removal from jar	Not processed	Check time
Fruit turns brown on thawing	No inhibitor used Variety	Use citric or ascorbic acid Change varieties
Fruit turns brown with inhibitor	Flavanols+Metal→Dark	Avoid copper or iron
Food turns brown in jar	Liquid did not cover Not processed adequately Not sealed Too much headspace	Cover Check timing and gauge Use right size jar
Food has black spots in jar or can (meats, poultry, corn, peas)	Iodized salt Sulfur+Iron+Tin→Black	Use canning salt Use enameled cans
Asparagus turns black	Rutin+Tin	Avoid metal Use enameled cans
Potatoes turn black after processing	Iron+Chlorogenic Acid→ Black Variety	Next time add cream of tarter to cooking water(¼ tsp./pint) Change variety
Black spots on lid	Protein+Iron+Tin	None
Yellow crystals in asparagus, greens	Rutin - insoluble	None
White vegetables turn yellow	Contact with aluminum	Avoid aluminum Add cream of tarter
X Red spots on food	Serratia bacteria	Bacteria harmless but may not be processed correctly to destroy others
Pink cauliflower	Anthoxanthins→anthocyanin	Overcooked
Pink, red, blue or purple in pears, peaches, apples, quinces	Proanthocyanin+Heat	None
White crystals in grape juice	Tartaric Acid	Follow instruction in Ball Book for heating
X White sediment in bottom or top of jar	May be yeasts or harmful bacteria May also be starch or minerals in water	Heat--if foams and gives off odor, do not use Check seal
White sediment in pickles	Yeasts	None. If soft, do not use.
White crystals in spinach	Calcium oxalate	None
X Cloudy liquid	Starch Fillers in salt Minerals in water Spoilage	Heat. If foams and gives off odor, do not use

X - May be an indication of spoilage.

COMBINATION FOODS, CANNING

If two or more foods are combined, then the mixture must be processed according to the directions for the most difficult food in the mixture to can. Thus tomatoes combined with okra or corn would have to be processed under pressure for the time recommended for okra or for corn. Fat meat used to season beans would mean that the mixture would have to be processed as meat.

COMMUNITY CANNERIES

Each year there are fewer community canneries in operation in Virginia. This loss of community canneries is due to several factors. One is the loss of government subsidies for operation of the canneries. Another is a decrease in the number of consumers using the canneries which means less revenue generated and fewer persons to put pressure on local governmental officials to support the cannery. Consumers give several reasons for not using the cannery--cost, hours not convenient, travel distance too great, do more freezing than canning, and have purchased own canning equipment. Many of the canneries were built and equipped in the 40's so the building and equipment may be in need of repair.

Building, maintaining, and operating a community cannery is an expensive venture. If your unit is trying to decide what to do about an existing cannery or whether to establish a cannery, I would suggest that the planning committee work through the questions raised in the chapter "Resurgence of Community Canneries" in the 1977 Yearbook of Agriculture Gardening for Food and Fun. With the competition for tax dollars, can the unit afford to spend money on a community cannery if it will only benefit a few families? It might be more economical to buy pressure canners for those families to use at home.

If your unit has a community cannery, it should be using the Food Preservation Manual: A Guide for School-Community Canneries in Virginia developed by Jasper S. Lee and Charles B. Wood.

I'm not very knowledgeable about equipment used in the canneries as it is more like commercial equipment than that used in the home. If you have questions, contact the Department of Food Science and Technology.

COMMUNITY CANNERY USE

The community cannery offers a number of advantages to residents of a community. It is possible to process a large quantity of food at one time, the work area is large and designed to facilitate the work involved, the mess and heat are transferred from the home kitchen, and the cost of fuel for processing food is included in the operating fee.

Certain information can make use of the community cannery more satisfactory for all concerned. Among those helpful pieces of information:

1. Canning does not improve the quality of food. If the fresh produce is of poor quality, then the canned product will also be of poor quality.

COMMUNITY CANNERY USE (CONTINUED)

2. Procedures for handling foods are based on research which has been tested over and over again. If the Food Preservation Manual shows a processing time of 90 minutes at 240°F, then there is need to process for 90 minutes at 240°F. Processing for 85 minutes at 245°F is a dangerous alternative.

3. Recommended processing methods insure the safety of the canned food. Some foods do get overcooked in processing but it is better to sacrifice some eating quality than to take chances on safety.

4. Most community canneries prefer that customers use metal cans rather than glass jars because of their equipment and processing methods. Some have, or are in the process of acquiring, the necessary equipment to process in glass.

5. Procedures and times are different for metal cans and for glass jars. Metal cans are sealed before processing. Food must be heated (exhausted) in the cans before sealing to drive air from the can to insure a good vacuum after processing and cooling. Removal of air also helps to prevent discoloration of canned food and changes in flavor. Food packed hot may be sealed without further heating if the temperature of the food is 170°F or above. Use a thermometer to measure temperature in the center of the can.

Add boiling packing liquid or water if necessary to bring level to that specified for the product.

It is not necessary to exhaust glass jars as the lids used on glass jars allow for the escape of air during processing. A vacuum is formed and the lid seals when the jar cools.

6. Quart jars are the most frequently used size of jars. Metal cans may be No. 2, No. 2½, No. 303, or No. 10 The table below should help you in estimating yield.

Can Size	Approximate Volume
No. 303	2 cups
No. 2	2½ cups
No. 2½	3½ cups
No. 10	12 to 13 cups
Pint jar	2 cups
Quart jar	4 cups

7. Problems often develop as result of inadequate cooling. Organisms responsible for flat sour spoilage can survive processing. They grow best when the temperature of the food is above 110°F. Don't be in such a hurry to get home that you shortchange the cooling operation. You may undo all of your work.

CONSERVES

A mixture of two or more fruits having a jam-like consistency and containing nuts or raisins or both.

COPPER

There are a few pickle recipes which suggest using a copper pan or a copper penny in making pickles to give the pickles a bright green color. It does work but the copper acetate formed which is responsible for the green color is a poisonous substance. Obviously it is not a recommended procedure.

CORN, CANNING

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°F).
Pint jars . . . . . 85 minutes

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 pressure canner at 10 pounds pressure (240°F).
Pint jars . . . . . 55 minutes
Quart jars . . . . 85 minutes

According to Presto, whole-kernel corn in either pint or quart jars can be processed at 15 pounds pressure for 50 minutes.

Putting Food By

"Canning is the better, and certainly handier, way of putting by cream-style corn. Its density demands that it be home-canned only in pint jars or No. 2 cans: An extremely low-acid vegetable, it would be pressure cooked to death for the much longer time needed to process the interior of larger containers."

CORN COB JELLY Putting Food By

Maybe we've had our quota of requests for this recipe but just in case.
12 cobs red field corn

Water
1 package powdered pectin
4 cups sugar

Remove kernels. Boil cobs in water to cover for 20 minutes. Drain liquid through a jelly bag. Measure 3 cups strained liquid into a large saucepan; stir in pectin. Bring to a full, rolling boil, then add the sugar. Bring again to boiling, stirring until the sugar is dissolved; boil hard 1 minute. Remove from heat, skim, and pour into hot, sterile jars. Seal. Makes about 5 medium glasses.

The authors of Putting Food By describe this as a clear jelly, tasting a little like mild honey.

CORN ON THE COB, PICKLED

This recipe was supplied by the home economist with Kerr Glass Manufacturing Corporation in answer to a request.
5 or 6 medium ears of corn
1 tablespoon salt
3 cups white vinegar
2 bay leaves
1 tablespoon mixed pickling spices
1 1-inch stick cinnamon
1 cup sugar

Husk corn. Trim ends from each ear then cut each ear into four pieces about 1½ inches long. Wash corn, cover with water, add salt. Refrigerate.

Sterilize two quart jars; leave in hot water until ready to fill.

In large kettle, combine vinegar, sugar, pickling spice, bay leaves and cinnamon stick. Cook over moderate heat, stirring, until sugar is dissolved and mixture comes to a boil.

Drain corn; rinse in cold water. Add to boiling vinegar mixture. Bring back to boiling; reduce heat and simmer, covered, 10 minutes. Remove cinnamon stick.

With slotted spoon, pack corn into sterilized jars. Fill with boiling vinegar mixture to within 1/2-inch of top, but covering corn completely. Adjust jar lids.

At the time I requested this recipe, pickle products were not often processed. Now I would suggest processing in a boiling water bath (212°F) for 15 minutes.

CORN, DRYING

Corn On the Cob. Husk, trim. Blanch until milk does not exude from kernel when cut--in steam, 2 to 2½ minutes; in boiling water 1½ minutes. Dry in dehydrator (140°F) for 2 to 4 hours, or in an oven (140°F) for 4 to 6 hours, or in the sun (98° to 100°F) for 8 hours.

Cut Corn. Prepare in the same manner as corn on the cob, except cut the kernels from the cob after blanching. Dry in a dehydrator (140°F) for 1 to 2 hours, or in an oven (140°F) for 2 to 3 hours, or in the sun (98° to 100°F) for 6 hours.

CORN, FREEZING

Whole-kernel or cream-style. Heat ears in boiling water for 4 minutes. Cool quickly in ice cold 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 1/2-inch headspace. Seal. Freeze; store at 0°F or below.

On the Cob. Sort ears according to size. Heat in boiling water:
Small ears (less than 1¼" in diameter). . . 7 minutes
Medium ears . . . . . 9 minutes
Large ears (over 1½"in diameter). . . . . 11 minutes

The heating time is longer for corn to be frozen on the cob as the heat must penetrate through the cob as well as the kernels.

Drop ears of corn into ice cold water. Drain. Package ears. Seal. Freeze; store at 0°F or below.

CORN RELISH Yield: 7 pints

2 quarts whole kernel corn (16 to 20 medium ears)
1 pint diced sweet red peppers
1 pint diced green peppers
1 quart chopped celery
1 cup chopped onion
1½ cups sugar
1 quart vinegar
3 tablespoons salt
2 teaspoons celery seed
2 tablespoons dry mustard
1 teaspoon turmeric

Drop ears of corn into boiling water for 5 minutes; then into cold water. Drain; cut corn from cob.

CORN RELISH (CONTINUED)

Combine peppers, celery, onions, sugar, vinegar, salt, and celery seed. Bring to a boil in a covered pan, then boil uncovered for 5 minutes, stirring occasionally. Mix dry mustard and turmeric and blend with a small amount of liquid from boiling mixture; add, with corn, to that mixture. Bring to boil again and cook for 5 minutes, stirring occasionally.

Pack loosely while boiling hot into clean, hot pint jars leaving 1/2-inch headspace. Remove air bubbles by running spatula or knife between food and jar. Adjust jar lids.

Process in boiling water bath canner (212°F).
Pint jars . . . . . 15 minutes

CORN, SELECTION

Select corn with fresh, succulent husks with good green color, silk ends that are free from decay or worm injury, and stem ends that are not too discolored to dry. Ears should be well covered with plump, tender kernels.

Avoid ears with underdeveloped kernels which lack yellow color (in yellow corn), old ears with very large kernels, and ears with dark yellow kernels with depressed areas on the outer surface. Also avoid ears with yellowed, wilted, or dried husks, or discolored and dried-out stem ends.

Corn is one of those vegetables which is at its best when freshly harvested. If possible, prepare for freezing or canning within two hours after harvesting. If that is not possible, refrigerate corn.

Remove husks and silk, and wash the corn.

COST OF PRESERVING FOODS

There are a number of costs involved in preserving food. An obvious cost is for the food itself. Another would be the cost of added ingredients--sugar, vinegar, spices, etc. Packaging materials are a necessity. Some mechanical energy is used in most preservation methods. And then there is the value of the preserver's time and energy.

It is not as easy to calculate the exact cost as it would seem, however. How can you decide how much of the cost of tilling, fertilizing, and watering the garden should be assigned to a particular product? And more of the vegetable may be used fresh than is preserved. Or if you are reusing glass jars for canning, how do you amortize the cost over a period of years?

There are some helps included in other sections of this handbook. Check the chart "Yield of Home Canned and Home Frozen Products from Raw Materials" to determine yield. If you have cost information, you should be able to determine the value of a quart of fruit or vegetable.

The section "Sirup Cost" shows the cost of 1¼ cups of light, medium, and heavy sirup when a 5 pound bag of sugar is selling for $0.70 to $3.00. If a dry sugar pack is used for freezing or if you are figuring the cost of jelly, there are 2¼ cups of sugar in a pound or just over 11 cups in a 5 pound bag.

COST OF PRESERVING FOODS (CONTINUED)

Check the price of glass jars, jar lids, plastic containers, and other packaging materials in your area.

The best figures we have on energy use in canning come from a Cornell study.

Pressure Canner

Step	Time, minutes	Burner setting	KWH
Bring water in canner to boil	10	high	.433
Exhaust canner	10	high	.433
Bring canner to 10 pounds pressure	10	high	.433
Process food (green beans)	25	medium low	.267
			1.566

Water Bath Canner

Step	Time, minutes	Burner setting	KWH
Bring water to boil	30	high	1.300
Return to boil	15	high	.650
Process food (raw-pack tomatoes)	45	medium low	.480
			2.430

Use the energy cost in your area to calculate the cost. At 5 cents per KWH, the total energy cost for the pressure canner example would be just under 8¢ (1.566 x .05 = $0.0783) or just over a penny a quart assuming 7 quarts per canner.

Energy used in the water bath process would cost about 12¢ (2.430 x .05= $0.1215) or just under 1½¢ per quart again assuming 7 quarts per canner.

Some persons have been interested in substituting pressure processing for water bath processing on the assumption that less time and consequently less energy would be required.

In the study by Zimmerman et al. (reported more fully under "Fifteen Pounds Pressure Processing" and "Tomatoes") they did report on time and energy required for processing tomatoes in the water bath, and at 5, 10, and 15 pounds pressure. At first glance, it appears that there was a substantial saving of energy by processing at 15 pounds pressure rather than in the boiling water bath. The value of the energy saved is not so dramatic. Again assuming a cost of 5¢ per KWH, energy for the water bath processing would cost just over 2¢ a jar (3.093 x .05 = 0.1547 ÷ 7) as compared to just over 1¢ for the 15 pounds pressure process (1.666 x .05 = 0.0833 ÷ 7).

Product	Method	Processing time minutes	Total time minutes	Energy used KWH
Tomatoes (raw-pack in quarts)	water bath	45	76	3.093
	5 pounds	35	53	2.152
	10 pounds	25	47	1.890
	15 pounds	15	41	1.666

Note that there's not a lot of difference in the energy used in processing at 10 and 15 pounds pressure. The processing time is shorter but the time (and energy) required to achieve 15 pounds pressure offsets this.

COST OF PRESERVING FOODS (CONTINUED)

Canning requires energy only during the processing period while freezing requires continuous energy use. Most of the energy used in freezing is for maintaining 0°F in the freezer. Very little energy (0.1KWH per pound of food) is used for the initial freezing of food. The amount of energy used for maintaining 0°F remains pretty constant regardless of the amount of food going through the freezer. Thus one way to decrease the energy cost per pound of food is to increase the quantity of food going through the freezer.

Each cubic foot of freezer space will hold 30 to 35 pounds of food. Thus a 16 cubic foot freezer has a capacity of 480 to 560 pounds. One source estimated the average energy used by a 16 cubic foot freezer (manual defrost) as 1190 KWH per year. Their estimate of energy used by a 16.5 cubic frostless freezer was 1820 KWH per year. If we assume a 5¢ per KWH cost, then the cost per pound would look something like this.

Freezer	Turnover rate	Capacity lbs.	Estimated energy cost	Cost of energy/lb.
16 cu. ft	1	480-560	$59.50	$0.12-0.11
manual	1½	720-840	59.50	0.08-0.07
	2	960-1320	59.50	0.06-0.05
16.5 cu. ft.	1	495-575	91.00	0.18-0.16
automatic	1½	740-860	91.00	0.12-0.11
	2	990-1150	91.00	0.09-0.08

If you are buying a freezer which has the FTC Annual Energy Cost, then prorate the cost to the number of pounds of food going through the freezer.

Various values are reported on energy usage in drying foods. Authors of a Michigan State University publication calculated the energy used in drying green beans and peaches in a homemade dehydrator with a capacity of 18 pounds. Energy used for drying the green beans was 5.40 KWH and for the peaches 19.35 KWH. The weight of the dried product would be between 2 and 3 pounds.

CRAB, BUYING

You can buy crabs live, cooked in the shell, cooked and removed from the shell, or canned.

1. If you buy live crabs, be sure that they <u>are</u> alive and will move their legs when touched. DO NOT BUY DEAD CRABS.
2. If you buy cooked crabs in the shell, they should have no disagreeable odor and should be bright red or pink in color.
3. Cooked picked meat is available in several grades. The least expensive may be the best buy depending on how you plan to use it.
   a. Backfin or lump meat is whole pieces of white meat from the large body muscles in the crab. This is the most expensive grade and is used where appearance counts.
   b. Regular or flake meat is small pieces of white meat from the body.
   c. Claw meat is the reddish-brown meat from the claws. It usually is the least expensive.
   d. Cocktail claws or fingers are claw meat with a partial claw attached.

CRAB, BUYING (CONTINUED)

4. Crab meat in cans in the refrigerated case has been pasteurized so that it will keep longer--up to 6 months in the refrigerator. Once opened it must be used within 3 days.

   Canned crab meat which is shelf stable is also available. You'll find it with the other canned meat products at the store.

CRAB, FREEZING

Freezing crab meat makes it tough and watery, and causes it to lose flavor. It is better to make crab into a prepared dish ready for cooking for freezing.

CRAB, STORING

All forms of crab meat, except the shelf-stable canned variety, must be stored in the refrigerator.

Live crabs should be boiled or steamed as soon as possible. Pick the meat from the body and claws and refrigerate.

Fresh steamed crabs and cooked fresh crab meat will keep 3 to 5 days in the refrigerator.

CRAB APPLES, JELLY

Crabapples can be used for jelly making. Follow any recipe for apple jelly. Or there's a Crabapple Jelly recipe in the USDA bulletin How to Make Jellies, Jams, and Preserves at Home as well as in the Ball Blue Book and the Kerr Home Canning and Freezing Book.

You can use the fruit of flowering crabapple trees if you have the patience to fool with the small often faulty fruit.

CRAB APPLES, SPICED OR PICKLED

Putting Food By, the Ball Blue Book, and the Kerr Home Canning and Freezing Book each have a recipe for spiced or pickled crab apples.

CRANBERRIES

Cranberry Jelly

4 cups cranberries
3 cups water
sugar

Cook cranberries in water until soft. Strain juice through jelly bag. Measure juice and allow 3/4 cup sugar for each cup of juice. Heat juice to boiling point, add sugar and stir until dissolved. Cook rapidly for 5 minutes, or until a drop gels on a cold plate (220°F). Pour into sterilized jars and seal.

Source: Cranberries and How to Cook Them

CRANBERRIES (CONTINUED)

Cranberry Jelly

3 1/2 cups cranberry juice cocktail
1 package powdered pectin
4 cups sugar
1/4 cup lemon juice

Combine cranberry juice cocktail and pectin in a large saucepan. Bring to a full rolling boil. Stir in sugar. Bring again to a full rolling boil. Boil hard, uncovered, 1 minute, stirring constantly. Remove from heat. Stir in lemon juice. Quickly skim off foam with metal spoon. Pour at once into hot sterilized jars and seal.

CRYSTALS

There are several foods which may develop crystals. Canned asparagus, greens, green beans, and onions may have yellow crystals (rutin). Grape products may have white transparent crystals (tartaric acid). Canned fish and seafood may have glasslike crystals (magnesium ammonium phosphate). These are discussed in greater detail in other sections of the Food Preservation Handbook.

One other type of crystal is reported on tomato products. It is a white crystal resembling salt or sugar. It is a salt formed when the food reacts with the calcium carbonate used in the lid.

CUCUMBERS, BITTERNESS

Bitterness in cucumbers, usually attributable to the growing conditions, will persist in the pickled product. There's no way to remove it.

CUCUMBER VARIETIES, PICKLING

The Department of Horticulture suggests these varieties of cucumbers be grown in Virginia for pickling: Bounty, Pioneer, SMR18 and SMR 58. These recommendations are based on grower experience and university trials. Charlie O'Dell, Extension Specialist, Small Fruit and Vegetable Production, suggests that Pickleriffic, a new variety for 1981, will probably be added to the list after further grower tests.

DAMSON PRESERVES

Damson preserves seem to be a Virginia speciality. Damson is a variety of plum so recipes for plum jams and jellies could be used. Plums have adequate pectin and acid for a gel so it is not necessary to add pectin, lemon juice, or to combine with another fruit. Jam may be a more satisfactory product than preserves. The skins of the damson plums can be very tough in preserves. Chopping the plums for jams reduces the size of the pieces of skin.

The Ball Blue Book has this recipe for Plum Preserves.

5 cups pitted, tart plums
4 cups sugar
1 cup water

Combine all ingredients. Bring slowly to boiling, stirring until sugar dissolves. Cook rapidly almost to jellying point, about 15 minutes, stirring frequently to prevent sticking. Pour boiling hot into hot jars leaving 1/4-inch headspace. Adjust jar lids. Process 15 minutes in boiling water bath. Yield about 5 half-pints.

The Ball Blue Book has a recipe for Damson Plum Jam as does the Kerr Home Canning and Freezing Book. The USDA bulletin How to Make Jellies, Jams, and Preserves at Home has a recipe for Damson Plum-Orange Conserve.

DEHYDRATED FOODS

See "Drying Foods"

DEWBERRIES

Dewberries are trailing, ground-running kinds of blackberries. As marketed, dewberries cannot be distinguished from blackberries.

The package inserts in commercial pectin products have recipes for using dewberries, boysenberries, and loganberries.

DILL

Dried dill seed can be substituted for fresh or dried dill heads in pickling. Use one teaspoon of dill seed to replace one dill head.

For those of you who haven't seen dill growing, it's a ferny plant with a bloom similar to Queen Anne's lace. And like Queen Anne's lace, the blossom becomes a mass of seeds. Each large bloom is a dill head. The seeds may be used green or dried. The green plant (dill weed) is good when minced and incorporated into potato salad, cole slaw, or sour cream for a dip.

See "Herbs, Drying" for information on drying.

DRYING FOODS

Drying is one of the oldest methods of food preservation but not necessarily one of the best. The flavor, texture, and color of dried foods are usually quite different from those of the fresh foods. Dried fruits are more acceptable than dried vegetables. Dehydrated vegetables are best when used in combination dishes where other ingredients add flavor.

Drying does have appeal because the process is relatively simple, can be done without a lot of specialized equipment or added ingredients, and does reduce the bulk of foods by approximately one-fifth to one-tenth of original volume.

Successful drying depends upon the removal of enough moisture from the food to prevent the growth of spoilage organisms. Moisture must be removed as quickly as possible at a temperature that does not seriously affect the flavor, texture, and color of the food. If the temperature is too high, the food may harden on the surface, making it more difficult for the moisture to escape and the food to dry.

Moving air is used to conduct heat to the food being dried and to carry moisture away from the food. The drying rate increases as the velocity of air flowing over food increases. Large surface areas and porous surfaces also promote drying.

Equipment for Drying

Sun drying is the most primitive (and simplest) method of drying. However, it may be unsatisfactory in periods of high humidity.

A home oven set at a low heat setting can be used for drying. I would suggest drying small quantities of food in an oven to test the acceptability of the product before investing lots of money in a dehydrator.

Some persons have reported using the family car (or an abandoned one) as a dehydrator. Roll the windows down to allow moist air to escape.

If large quantities of food are to be dried, then a dehydrator may be built or purchased. A dehydrator is a specialized appliance so be sure that dried foods are acceptable to the family before investing time and money in one. The cost of a dehydrator ranges from as little as $50 to over $250.

The chief advantage of a dehydrator is the ability to achieve optimum drying conditions by controlling temperature and humidity.

The air may be warmed by heat from the sun, from light bulbs or from an electric heating element. It is desirable to have a thermostat to control the heat. A rating of 660 watts is adequate for up to 18 square feet of drying space. If purchasing an electric dehydrator, check for the Underwriter's Laboratory seal.

DRYING FOODS (CONTINUED)

A fan or blower to move warm air over the food and to remove moist air will shorten drying time. Some commercial dehydrators recirculate warm air rather than remove it. Although that appears to conserve energy, it may not if the moisture level of the air gets high enough to retard drying.

Cabinet construction can influence energy use. Double wall construction with insulation will reduce heat loss.

Cabinet size--both exterior and interior--should be considered. The dehydrator usually sets on the kitchen counter so be sure there's space for it. Interior space is usually stated as square feet of drying space rather than as cubic feet. Each square foot of tray space will hold from 1½ to 2½ pounds of food. Twelve square feet will hold about half a bushel of food.

Stainless steel trays or racks are excellent but other metals may discolor and corrode. Galvanized metal should not be used. Shallow wooden trays can also be used.

Trays should be slightly smaller than the oven or dryer to allow for air circulation. Trays with sides will prevent foods from sliding off, make stacking easier, and keep trays from crushing food when stacked.

How about drying in the microwave oven? The Microwave Times reported they have had success with some fruits and most herbs but vegetables are still questionable. They point out the problems of controlling humidity and temperature in a microwave oven. The lower the moisture content of the food and of the air, initially, the more satisfactory the process. They suggest drying peeled apple slices for 1½ hours in the microwave oven using a combination of medium-high and low power setting as compared to 6 hours in a conventional oven or dehydrator at 140°F. Herbs require a shorter drying time. They suggest drying parsley at a high power setting until dried and brittle--about 5½ to 6 minutes for 2 cups of fresh parsley leaves and about 10 to 11 minutes for 5 cups of parsley.

They caution against the use of paper toweling made from recycled paper in the microwave oven because of the small bits of metal picked up in the recycling process. These bits of metal can get hot enough to burn the surrounding paper and may become a fire hazard as the moisture content of the food decreases.

Fuel Costs

If heat is used in drying, the fuel cost should be considered. The amount of fuel used will vary depending on the nature of the food, the size of pieces, pretreatment, and the efficiency of equipment. Energy costs per pound of dried food can be substantial as it takes 5 to 10 pounds of fresh food to make a pound of dried food. For example, it may take 10 kwh to reduce 5 pounds of fresh apples to 1 pound of dried apples. At 4¢ a kwh, that's 40¢ worth of energy. Is it any wonder that dried fruits are so expensive?

DRYING FOODS (CONTINUED)

There are a number of companies marketing food dehydrators. Some are listed below.

Self-contained

Excalibur Products, Inc.
Sacramento, CA 95824

Dri-Mor Dehydrator
Box 692
Logan, UT 84321

Harvest Maid Food Dehydrator
Alternative Pioneering Systems, Inc.
Minneapolis, MN

To be used in conventional oven

Chilton Aluminum
Aluminum Speciality Company
Manitowoc, WA 54220

To be used in the sun

Sun Pantry Fruit Drying Kit
Holes-Webway Company
Webway Park
St. Cloud, MN 56301

EGG PLANT, CANNING — Putting Food By

The authors of Putting Food By say (and the Ball Blue Book authors concur) that egg plant loses its looks when it's canned, but some cooks feel that it makes an unhandy product if frozen alone. They suggest precooking it in a favorite casserole and freezing as a convenience food.

Wash, pare and slice or cube egg plant. Sprinkle lightly with salt and cover with cold water (to help draw out its juice). Let soak 45 minutes; drain. In fresh water, boil for 5 minutes. Drain, and pack hot into clean jars leaving 1 inch headspace. Do not add salt. Add boiling water leaving 1 inch of headspace. Adjust jar lids. Process in pressure canner at 10 lbs. pressure (240°F).

Pint jars . . . . . 30 minutes
Quart jars . . . . 40 minutes

EGGPLANT, DRYING — Drying Foods At Home

Wash, trim, cut into 1/4 inch slices. Blanch in steam for 3½ minutes or in boiling water for 3 minutes. Dry in a dehydrator (140°F) for 2½ hours, or in an oven (140°F) for 2 to 3 hours, or in the sun (98° to 100°F) for 6 to 8 hours.

EGGPLANT, FREEZING — Ball Blue Book

Harvest before seeds become mature and when color is uniformly dark. Wash, peel and slice 1/3-inch thick. Prepare quickly; just enough egg plant for 1 scalding at a time. Scald 4 minutes in 1 gallon boiling water containing 4½ teaspoons citric acid or 1/2 cup lemon juice. Cool, drain, package, and freeze.

EGGPLANT, SELECTION

Fruit must be harvested while still highly glossy on the outside. As soon as it begins to dull, the flavor becomes bitter.

EGGS, FREEZING, UNCOOKED

This information on freezing liquid eggs comes from an article by E. J. Thiessen of the University of Wyoming in the March 1953 issue of "Forecast for Home Economists."

Choose clean eggs; any dirt should be washed off and the egg allowed to dry. Cool before breaking. Use sterile utensils to prevent possible contamination with bacteria. Results are best when the whites and yolks are frozen separately.

For egg whites: Do not whip in air. The whites require nothing added. Package in small amounts, label and freeze.

1½ tablespoons thawed white equals one egg white.

EGGS, FREEZING, UNCOOKED (CONTINUED)

Frozen egg whites retain excellent quality for 6 months or longer. Angel food cakes made from the frozen whites are as good as those made from fresh ones.

For egg yolks: Run egg yolks through a sieve. Do not whip. To each cup of egg yolks, add 2 tablespoons of white corn sirup and mix. With other lots, use 1 teaspoon of salt per cup of egg yolks. (Sirup and salt are added to the yolks to keep them from getting gummy.)

Package, label and freeze. One tablespoon thawed yolk equals one egg yolk. To incorporate the thickened frozen yolks smoothly into mixes, combine with sugar (if recipe calls for sugar) and add liquid gradually. If lumps remain, strain the mixture before cooking.

The VDACS leaflet How to Enjoy Virginia Eggs in the Old Dominion Tradition has this information about freezing eggs.

Whole Eggs: Break eggs 1 at a time into an airtight container and gently mix them. Do not beat. Freeze in amounts you can normally use.

For baking or dessert: Add 1½ teaspoon sugar or cornstarch to each cup of eggs.

For main dish: Add ½ teaspoon salt for each cup of eggs.

Yolks: Press yolks through sieve.

For desserts: Add 1½ teaspoon sugar for each cup of eggs.

For main dish: Add ½ teaspoon salt for each cup of eggs.

Whites: Separate whites through a sieve. Do not add anything to them.

EGGS, FREEZING, COOKED

Cooked egg yolk freezes very well but cooked egg white toughens during the freezing process.

EGGS, PICKLED — So Easy to Can, University of Georgia

24 fresh eggs
6 cups cider vinegar
2 tablespoons peppercorns
1 tablespoon whole allspice
½ tablespoon mace
½ tablespoon coriander seeds
½ tablespoon cardamon seeds
½ tablespoon cloves
10 small hot red peppers
3 tablespoons sugar

Cook eggs in simmering water for 15 minutes. Place eggs in cold water, remove shells, and pack into sterilized jars. In a kettle combine vinegar, spices and sugar. Bring to boil, reduce heat and simmer for 5 minutes. Pour hot liquid over hard-cooked eggs. Seal. Store in refrigerator (use within a month--not for long term storage).

Dr. E. O. Essary, in FST, provided the following directions for preparing Pickled Eggs to be stored at room temperature. I would not recommend this method. Safety would be a concern but the egg white is apt to be very tough as a result of the acid and heat treatment.

Place 1 dozen hard cooked eggs in a 1/2 gallon canning jar. Add 1 cup cider vinegar, 2 teaspoons salt, and 1 can of beet juice (for color). Fill the jar to 1/2 inch of the top with boiling water.

EGGS, PRESERVING

An old USDA publication (Farmers' Bulletin 1109) Preserving Eggs issued in 1929 had directions for preserving eggs in both water glass and lime. We occasionally get requests for this information so here it is.

For best results, the eggs should be fresh and clean and preferably infertile. For this reason it is always best when possible to handle eggs carefully before preserving them unless they are known to be strictly fresh. If an egg is only slightly soiled a cloth dampened with vinegar may be used to remove the stains, but eggs should not be washed with water or soap and water, as water removes the protective coating that is on the shell and may tend to cause the contents to spoil. Under no circumstances should badly soiled or cracked eggs be used for preserving, as one or more such eggs in a jar may spoil all the others.

Preserving in Water Glass

To preserve 15 dozen eggs in water glass, the following directions should be followed:

(1) Select a 5-gallon crock (earthen or stone) and clean it thoroughly, then scald and allow to dry.

(2) Heat 10 to 12 quarts of water to the boiling point and allow it to cool.

EGGS, PRESERVING (CONTINUED)

(3) When cool, measure out 9 quarts of water, place in the crock, and add 1 quart of sodium silicate (commonly called water glass), which can be purchased at almost any drug store. Stir well so that the solution becomes thoroughly mixed.

The solution thus prepared is ready for the eggs, which may be put in all at once or from time to time as they are obtainable. Care should be taken in putting them in the jar not to crack or break the shells; also make sure that the solution covers the eggs by at least two inches at all times.

Put the crock containing the preserved eggs in a cool, dry place and cover with a tight lid or waxed paper to prevent evaporation.

To preserve a smaller or larger number of eggs, the solution should be mixed and prepared in the same proportion.

Preserving with Lime Solution

If water glass is not obtainable, lime may be used. It is not considered so good as water glass, as in some instances eggs preserved by this method have tasted slightly of lime, although at other times limewater has proved entirely satisfactory.

To preserve with lime, dissolve 2 pounds of unslaked lime in a small quantity of water and dilute with 5 gallons of water that has previously been boiled and cooled. Allow the mixture to stand until the lime settles, then pour off and use the clear liquid. Place clean, fresh eggs in a clean earthenware crock or jar and pour the clear limewater into the vessel until the eggs are covered. At least 2 inches of the solution should cover the top layer of eggs.

Using Preserved Eggs

Fresh eggs preserved according to these directions will usually keep from 6 to 10 months and can be used satisfactorily for all purposes in cooking and for the table. If, however, preserved eggs are to be boiled, a small hole should be made with a pin in the larger end of the shell before placing them in the water, to allow the air in the egg to escape when heated and thus prevent cracking.

An article in the March 1953 issue "Forecast for Home Economists" reported research conducted at the University of Wyoming by Emma Thiessen regarding home preservation of eggs. Eggs in water glass was one of the methods tested along with freezing liquid eggs and pasteurization of shell eggs. The author reports that eggs stored in water glass lost more of their fresh flavor then those preserved by the other methods but were satisfactory for use in cooked and baked dishes. They placed eggs in widemouthed glass jars with the small end down and covered them with the water glass and water mixture. They suggested spreading a thin layer of mineral oil over the top to prevent evaporation. Their results indicated that a dilution of one to 15 was more satisfactory than one to 10 as suggested by the USDA publication.

FIFTEEN POUNDS PRESSURE, PROCESSING

I suppose the interest in processing at 15 pounds pressure grew out of a concern for conserving energy. It's not a new issue having surfaced in an article in the June 1976 issue of CONSUMER REPORTS. That article advised that foods could be processed at 15 pounds pressure instead of 10. Processing time was determined by reducing the time at 10 pounds by 30%. Both FDA and USDA questioned these recommendations and requested research data to support them. Consumers Union, publisher of CONSUMER REPORTS, did not have such data and subsequently retracted the recommendation.

It is logical to assume that increasing the temperature (pressure) would enable one to shorten the processing time and that a shorter processing time would reduce energy usage.

Processing times are based on the time required for food in the jar to reach a certain end-point temperature. A different end-point temperature is used for low-acid foods than for acid foods. The size of the jar, the nature of the food, and the density of the pack all affect heat penetration.

Zottola and Wolf at the University of Minnesota have been evaluating the current recommended processes for home canning of low-acid foods and developing processes for home canning of low-acid foods at 15 pounds pressure. One test hypothesis was that it should be possible to process low-acid foods at 15 pounds pressure for 1/3 the time required at 10 pounds pressure. But their results did not support this hypothesis for all foods. It was valid for foods that heat by convection (asparagus, peas, green beans, carrots, and cubed squash), but not for foods that heat by conduction (strained squash and cream-style corn) or by both mechanisms (whole kernel corn).

Zottola and Wolf have developed recommendations for processing a number of low-acid foods at 15 pounds pressure. Those are the recommendations which appear in the Presto publications. Note that the recommendations do not distinguish between pint and quart jars. A comparison of the processing times shows a great deal of difference for some foods, very little for others.

	Processing Time (Presto) 15 p.s.i.g.[1]	Processing Time (USDA) 10 p.s.i.g.	
	Pints & Quarts	Pints	Quarts
Food	Minutes	Minutes	
Asparagus	15	25	30
Beans, lima	30	40	50
Beans, snap	15	20	25
Beets, whole or sliced	15	30	35
Carrots	15	25	30
Corn, whole kernel	50	55	85
Greens, all kinds	35	70	90
Mushrooms	20	30	-
Okra	15	25	40
Okra and tomatoes	15	25	40
Peas, green	30	40	40
Peas, blackeye	30	35	40

FIFTEEN POUNDS PRESSURE, PROCESSING (CONTINUED)

Potatoes, new whole	20	30	40
Squash, cubed, raw	20	25	30
Squash, cubed, hot	20	30	40
Sweet potatoes	50	55	90
Beef	50	75	90
Pork	50	75	90
Lamb	50	75	90
Veal	50	75	90
Poultry (with bone)	30	65	75

[1] p.s.i.g. - pounds per square inch as measured by a gauge

I have mixed feelings about the recommendations. I'm sure that new canning jars and new pressure canners are up to the stresses of processing at 15 p.s.i.g. I worry a little about those 40 year old canners and about jars which are being reused for the 10th or 12th time. And about persons who can in commercial jars even though we don't recommend it. I've also heard a number of complaints about ranges that don't supply enough energy to achieve 15 p.s.i.g. A combination of shortening the processing time and failure to reach the required temperature would result in underprocessing which could lead to spoilage. Remember that these foods are often contaminated with botulism spores and that if spores survive processing, conditions are ideal for toxin production.

I have not seen data from the Zottola et al. study regarding energy usage. Zimmerman, Phillips, Wood, and Marable in the November 1978 Home Economics Research Journal, reported the results of a study done here at Virginia Tech to test the effects of varying time and temperature combinations during processing of tomatoes. They did report on energy usage. Tomatoes (raw pack, quart jars) were processed in a boiling water bath for 45 minutes, at 5 p.s.i.g. for 35 minutes, at 10 p.s.i.g. for 25 minutes, and at 15 p.s.i.g. for 15 minutes. These processing times were used as they had been found to bring the tomatoes to the desired end-point temperature of 180°F.

Energy use was greatest for the boiling water bath treatment--3.093 KWH. There was not a great deal of difference in energy use between the 10 and 15 pounds processes; 1.890 KWH were used at 10 p.s.i.g.; 1.666 KWH at 15 p.s.i.g. More energy was used in getting the canner to 15 pounds pressure than in processing. In dollars and cents, that's 0.2 of a kilowatt hour with a value of less than 1 cent. That energy cost would be spread over the 7 jars in the canner so that the savings per jar are insignificant.

If you're wondering about time, there wasn't a great deal of difference between processing at 10 and 15 pounds pressure as it takes longer to get the canner to 15 pounds pressure. Total time (come-up time plus processing) was 47 minutes at 10 pounds pressure; 41 minutes at 15 pounds.

CONCLUSION: I think we should have available information about processing at 15 pounds pressure for those who are seeking it. I'm not ready to forsake the tried and true recommendations from USDA for processing at 10 pounds pressure.

FIG JAM recipes are in the Ball Blue Book and in the USDA bulletin How to Make Jellies, Jams, and Preserves at Home.

FIG PICKLES recipe in Ball Blue Book.

FIG PRESERVES recipe in Ball Blue Book.

FIGS Putting Food By

"The green-colored Kadota variety makes a particularly attractive product, but whatever kind you use should be tree-ripened yet still firm.

Some casual old instructions would have you soften (or even remove) fig skins by treating the fruit with a strong soda solution--but don't do it. Any such alkali will make the product less acid."

Figs are near the breaking point for classification as an acid food having a pH of 4.6.

FIGS, CANNING

Wash ripe, firm figs; do not peel or remove stems. Cover with boiling water and let simmer for 5 minutes. Drain. Pack hot figs into jars leaving 1/2-inch headspace. Make a thin or light sirup--2 cups sugar to 4 cups water. Bring to a boil and pour over figs. Add 2 teaspoons lemon juice to each pint jar; 4 teaspoons lemon juice to each quart jar to increase acidity. Remove air bubbles by running spatula or knife between jar and food. Adjust lids.

Process in a boiling water bath (212°F).
Pints . . . . . 85 minutes
Quarts . . . . 90 minutes

FIGS, DRYING Drying Foods At Home

"In dry, warm, sunny climates, it is preferable to partly dry on the tree. Figs normally drop from the tree when 2/3 dry. In coastal areas, pick fruit when ripe. No pretreatment is needed. Dry in the sun 4-5 days (98°F) or in an oven or dehydrator for 4-7 hours (140°F). When dry, flesh should be pliable and slightly sticky but not wet.

FIGS, FREEZING

Select tree-ripened soft-ripe fruit. Make sure figs have not become sour in the center. Sort, wash, and cut off stems. Peel if desired. Slice or leave whole.

Pack figs into containers and cover with a cold 35% sirup. For a better product, use an antidarkening agent. (The Ball Blue Book suggests a 50% sirup.) Seal and freeze. Store at 0°F or below.

Figs can be frozen unsweetened. Cover with water or not as desired.

The Ball Blue Book gives directions for a dry sugar pack. They say to roll whole or halved figs in one part sugar to four parts fruit and pack in plastic freezer bags. Seal, label, and freeze.

FISH, FREEZING

See "Seafood, Freezing"

FISH, SMOKING

These directions for smoking smaller quantities of fish for immediate use may be of interest.

5 pounds bluefish or trout butterfly
  fillets, fresh or frozen
1 gallon water
1 cup of salt
1 pound hickory or other wood chips

Thaw fish if frozen. The recipe specifies bluefish or trout but any fish with a high oil content is suitable for smoking. Lean fish may be smoked if basted frequently with cooking oil during the smoking process.

Combine the water and salt to make a brine. Place fish in brine and marinate in refrigerator for 30 minutes. Remove fish from brine; rinse and dry thoroughly.

Soak wood chips in 2 quarts water for several hours or overnight. Choose a cool place for soaking the wood chips to prevent mildew or sour aroma. Wood chips from apple, oak, maple, or cherry also give good flavor.

Use covered charcoal, electric or gas grill. Heat must be kept low. If using charcoal, fewer briquettes are necessary than for regular grilling. Cover glowing charcoal or ceramic briquettes with approximately 1/3 of the wet chips. Wet chips provide lower temperature and create smoke to flavor the fish. Add remaining chips as needed. Place the fish, skin side down, on a well-greased grill approximately 4 to 6 inches from smoking fire. Close hood on grill and open vent slightly to circulate smoke and air. Smoke fish approximately 1 hour at 150° to 175°F, or 30 to 45 minutes at 200°F. Fish is done when the cut surface is golden brown and flakes easily when tested with a fork. Makes 6 servings.

Cut smoked fish into bite-size pieces for hors d'oeuvres or flake for dips, spreads, salads, and sandwiches. Be sure to remove the skin and bones before using in these methods of preparation. Smoked fish may be frozen for future use, but before using, thaw the fish and heat in a moderate oven, 325°F for 12 to 15 minutes.

FISH, SMOKING

FOOD SCIENCE AND TECHNOLOGY NOTES

VPI-SG-300-2

By Cherrie L. Kassem

Smoking helps preserve fish by reducing moisture content, thereby retarding the growth of bacteria. Smoked fish acquire a wine-sweet flavor and coarser texture. Some people compare the taste of smoked fish to ham.

Smoking Techniques

The smoking technique is surprisingly easy to perform at home. There are both cold and hot-smoking techniques. Cold-smoking requires a heavier brine and a smokehouse temperature under 90°F, in which fish are smoked from one to five days. Cold-smoked fish are completely dried during smoking and thus have good keeping quality; however, cold-smoked fish are not cooked. Cold-smoking is seldom done these days.

Hot-smoking (kippering) requires a lighter brine and a smokehouse temperature of 120-200°F, in which fish are smoked from one to five hours. Hot-smoked fish are cooked; they do not, however, have good keeping quality and must be refrigerated, frozen, or canned if not eaten immediately. The hot-smoking technique is more often used and is therefore outlined in this article.

The best fish to smoke are those with high fat (oil) content, like carp, catfish, salmon, smelt, herring, whitefish, bluefish, trout, suckers, mackerel, mullet, shad, sturgeon, and eels. Lean fish tend to become coarse and dry when smoked. Either fresh or frozen fish (properly thawed) may be smoked.

The smoking process consists of five basic steps -- cleaning the fish, brining the fish, drying the fish, building the smoker, and smoking the fish.

Step 1. Cleaning the Fish

Depending on the species to be smoked, fish may be: (1) dressed in the round (whole); (2) gutted, split, and beheaded; (3) filleted; (4) halved; or (5) cut into pieces with or without the skin. For smoking in the round small fish are best. Large fish like king mackerel do well when filleted. Mullet can be halved at the backbone, and catfish are best smoked with the body skinned but intact. Fish should be cleaned and scaled immediately after removal from water. They may also be cleaned and frozen for later smoking.

Step 2. Brining the Fish

Step two, brining the fish, means steeping fish in a solution of salt, water, and spices. Brining is important for two reasons -- it helps firm and preserve fish by removing moisture, and it adds flavor to fish flesh. Fish may, however, be smoked without salt curing, in which case they are cooked but have no keeping quality. (That is, they are cooked and have good smoke flavoring but must be eaten immediately to prevent spoilage.)

There are as many brine recipes as there are individual tastes. The strength of the brine (salt content) determines the type of cure the product receives. One gallon of brine using 1½ cups salt is enough for about four pounds of fish. Here are some common brine recipes:

FISH, SMOKING (CONTINUED)

I

1 gallon water
1 pound salt
½ pound sugar
6 tablespoons lemon juice
½ tablespoon onion powder
¼ tablespoon garlic powder
½ tablespoon seafood seasoning
(This is enough brine for 20 pounds of fish.)

II

6 gallons water
4 pounds salt
1½ pounds sugar
1½ ounces saltpeter
3 ounces whole cloves (optional)
1 ounce bay leaves (optional)

III

3 gallons water
2 pounds salt
1 pound brown sugar
1 ounce saltpeter
1 ounce white pepper
1 ounce crushed bay leaves
1 ounce allspice
1 ounce cloves
1 ounce mace

IV

1 gallon water
1½ cups salt
1¼ cups brown sugar
1 teaspoon each of mustard seed, cloves, bay leaves, allspice
2 cloves garlic, sliced
2 medium onions, sliced

DIRECTIONS

Mix ingredients well. Place cleaned fish in an enamel, earthenware, or glass container large enough so fish lie flat and straight. Submerge fish in brine solution and refrigerate 12 hours. Remove fish from brine and freshen under running water for 10 minutes.

Step. 3. Drying the Fish

After brining comes step three, drying the fish. Pat fish dry with a cloth, then place them on a rack in the refrigerator and drain one to three hours. Drying increases keeping quality and promotes development of the "pellicle," a glossy finish of dissolved proteins on fish surfaces which gives them the desired appearance, retains natural juices, and helps spread smoke evenly.

Step 4. Building the Smoker

A simple smokehouse may be designed from a large cardboard box, a metal oil drum, a wooden barrel, an old refrigerator, or even plywood.

Step 5. Smoking the Fish

Smoking is the final hurdle before tasting that anxiously awaited fish treat. Here are the simple steps to follow:

a. Arrange fish on rods or rack so they do not touch. Fish may be hung on "S" shaped hooks, strung through gills by rods, split and nailed to rods, or simply laid on rack. Use regular nails, 8 or 10 guage steel wires, S-shaped iron hooks, or round wooden sticks. (Refer to diagrams below.)

b. Build fire on level gound with nonresinous (hickory, oak, maple, apple) wood chips or sawdust to produce light, constant volume of smoke. Soft (resinous) wood gives an acrid flavor and odor to fish. Never use wood containing pitch, such as pine. Liquid smoke is also less satisfactory.

c. Center smokehouse over smoldering fire and close flaps. Danger of fire is minimized if ventilation is controlled to promote smoke rather than flames. Alternate method: fire may be built in covered pit or trench outside chamber. Smoke is conducted into bottom of smoking chamber via tile or stovepipe. Outside fire can be controlled without disturbing chamber, and provides cooler smoke supply.

FISH, SMOKING (CONTINUED)

d. Put fish in smoker at inside air temperature of 100°F, where fish flesh will be about 180°F. (Monitor fish temperatures by inserting meat thermometer into fleshiest part of fish.) Maintain this temperature for well-kippered fish.

e. Smoke four to five hours. Don't overcook fish. Fish well-smoked have a glossy, brown surface. Flesh will flake easily from bones and be moist and tender. Allow fish to cool a few hours before eating or storing. Wrap in waxed paper and refrigerate or freeze for later use.

FLAT SOUR

Flat sour spoilage is caused by the bacteria Bacillus stearothermophilus. This organism is an obligate thermophile meaning it will grow only at high temperatures (100° F to 130°F). It can grow with or without oxygen. The organism is extremely heat resistant and may survive pressure processing.

Food spoiled by B. stearothermophilus will have a disagreeable sour flavor and an unpleasant odor. The liquid is usually cloudy. The food is not poisonous but should not be eaten.

The thermophilic bacteria which cause flat sour develop best at a temperature between 100° F to 130° F; therefore, avoid letting food stand at this temperature for any length of time--before, during or after canning.

Even though some of these bacteria may survive through processing, if the food is cooled quickly and stored in a cool place, the bacteria will lay dormant and cause no trouble.

FOOD PRESERVATION PLAN

Each family must make its own master plan of foods to be preserved and quantities to be preserved. Consider the following factors in making your plan.

1. Family likes and dislikes. There's nothing to be gained by stockpiling okra in the freezer if no one in the family likes okra. Even if all four family members enjoy applesauce, there's a limit to the number of quarts which can be used in a year. A supply of fifty quarts of applesauce means each family member will have at least a cup of applesauce per week.

2. Remember to allow for availability of fresh produce during the growing season. Some foods have a short season--strawberries and asparagus, for example, while others have a much longer season--greens, green beans, tomatoes, and apples.

3. Preserve for one year. It is rare to have a complete crop failure in any one year. Food will be safe to use for longer than a one year storage period but it gradually loses quality.

FOOD PRESERVATION PLAN (CONTINUED)

4. The year round availability and cost of the food through commercial channels. For example, fresh carrots and potatoes are available year round at reasonable cost. Assuming that you could get a pound of potatoes into a pint jar for canning, there would be a 3 to 5¢ cost for a new lid plus the cost of processing. To freeze potatoes, a plastic bag or container would be needed. Fuel is required for blanching the potatoes, for freezing the potatoes, and for keeping them frozen. All of that may add up to more than the 10 to 15¢ per pound cost of fresh potatoes, and neither canned or frozen potatoes are equal in quality to fresh potatoes.

5. The cost of added ingredients as well as the cost of the food itself. It is easy to calculate the cost of purchased produce but it may be more difficult to determine the cost of homegrown produce. Costs of seeds or plants, tilling, fertilizer, pesticides, and water for irrigation must be considered along with yield in calculating the actual cost. The quantity (and value) of produce used fresh may exceed that preserved.

   Sugar adds to the cost of preserving fruits; vinegar and spices add to the cost of pickling.

6. The cost of processing food. Fuel is expensive and must be counted in the total cost of preserved food. More fuel is required for freezing than for canning. Why? Fuel is used only at the time of processing canned foods but is used continuously to keep food frozen. Special equipment is needed for most food preservation. A $75.00 investment in a pressure canner may be prohibitive for the beginning preserver.

7. The time required for preserving food. Canning and freezing do take time. If you work away from home, you may have little time to invest in food preservation. Even if you are a fulltime homemaker, you may find more profitable ways to spend your time.

   To illustrate, a bushel of spinach will yield an average of 6 quarts of canned or frozen greens. Each leaf must be picked, looked over for insects, and washed several times before processing. A bushel will yield less than a full canner but will still require 90 minutes of processing at 10 lbs. pressure. It's a 3 to 4 hour job for one person! Is it worth it? (You could reduce the time by freezing rather than canning the spinach.)

   Shelling peas may be a family project but it takes time, even with helping hands, to reduce a bushel of peas in the pod to the shelled form for canning or freezing.

8. Food on hand. If you have food left from previous years, plan to use it first. Reduce the amount to be preserved this year. Discard food which has been stored for several years, freeing up the jars and containers for use this year.

FREEZER BURN

Freezer burn is seen on the surface of food. It represents an area that has lost moisture during storage as a result of sublimation of ice during temperature fluctuations. Appropriate packaging will reduce the severity of freezer burn.

Freezer burn is not harmful but it does adversely affect the flavor and texture of food. Some authorities suggest removing the fuzzy (ice crystals), grayish-white spots of freezer burn before the food is used.

FREEZER OFF

What to do when the freezer is off, or has been off, is a frequent question.

Conditions can vary a good bit--there may be a power outage (in hot or cold weather) for a few hours or several days, the freezer door may have been left ajar, or the freezer may have malfunctioned. The homemaker may be aware of the problem before food thaws, or she may become aware of the problem after food has thawed and even spoiled, or thawed and been refrozen.

The first reaction seems to be panic. I suppose that's understandable when you stop to think that a 12 cubic foot freezer will hold over 300 pounds of food. Valued at a dollar per pound (and some foods would have a much higher value) that could mean an economic loss of over $300. Then there's the loss of time and energy in growing and preparing the food for freezing. And everyone seems to have heard (and believed) that maxim "never refreeze food." Fortunately that maxim is out of date. We now say that if a food is safe to eat, it is safe to refreeze.

How can you help the inquirer determine whether food is safe to eat and thus safe to refreeze.

First you need to gather as much information about the situation as you can. Try to determine how long the freezer has been off. That's less of a problem in a power outage than for a malfunctioning freezer.

The temperature of the food provides some clues. Make some judgment (ask the caller to do this) about how cold various foods are--still frozen? thawed but with some ice crystals remaining? thawed but cold? thawed and warm? Foods with a high sugar content thaw first while large pieces of meat will be the last items to thaw. Foods next to the door whether in a chest or upright freezer will probably thaw before those which are surrounded by packages of frozen food. As long as some packages of food remain frozen, they will exert a cooling effect in the freezer.

Thawing is a reversal of the freezing process. The frozen product should be stored at a lower temperature than is required for freezing. Most foods freeze at temperatures between 25° and 31°F but the recommended storage temperature is 0°F. It will take several hours for foods to warm to the thawing point. The colder the storage temperature--0°F rather than 5° or 10°--the longer the time required for thawing.

FREEZER OFF (CONTINUED)

In a power outage, you can delay thawing by leaving the freezer door closed. You might also wrap the freezer with a blanket or other insulating material. Be careful not to cover the air-vent openings as the power may come on unexpectedly and ventilation will be needed.

Dry ice, if available, will delay thawing. Use 50 pounds of dry ice for a 20-cubic foot freezer. Handle dry ice with tongs or wear gloves. Place dry ice on a piece of heavy cardboard, not directly on the packages of frozen food.

In cold weather, the freezer may be moved to an unheated location. Sometimes food can be moved to a freezer locker or to a friend's freezer.

If the freezer has malfunctioned, moving food to a freezer locker or to a friend's freezer may be desirable. You can store food in styrofoam coolers with ice (regular or dry) for a few hours.

If food is partially or completely thawed, then there is the decision about whether to refreeze. It is safe to refreeze foods (1) if they still contain ice crystals, or (2) if they are still cold--about 40°F--and have been held at this temperature no longer than 1 or 2 days after thawing. A thermometer can help you determine the temperature or compare with refrigerator temperature.

Once foods have thawed, then the microorganisms responsible for changes in food quality become active. As the food warms up to refrigerator temperature (40°F) or even warmer, the changes in food quality speed up.

Changes in food quality may be caused by bacterial growth evidenced by an increase in the number of bacteria or by toxin production. Either would ultimately affect the safety of the food--the number of bacteria would become so great that not all would be destroyed in cooking or staphylococcus toxin might be produced which is not destroyed by ordinary cooking methods. It is not likely that there would be botulism toxin production as we don't usually manage to get all of the air from packages of food we wrap for freezing. It might be a problem in commercial products which are vacuum packed (those in plastic bags). Frozen vegetables are usually cooked before eating so that would destroy any botulism toxin which might be present.

Decomposition (softening, decay, rotting) could occur if the food was at room temperature for several days. There would be changes in appearance and aroma by this time.

Yeasts might grow in fruits causing fermentation or there might be mold growth. Both of these have more impact on the quality of the food than on safety.

Enzymes will resume their activity when food warms up causing changes in color, flavor, and texture.

Just the physical process of thawing and refreezing will result in some deterioration in the texture of the product. Refreezing may be very slow as most freezers have the capability of freezing only 2 to 3

FREEZER OFF(CONTINUED)

pounds of food per cubic foot in a 24-hour period. To speed up refreezing, turn the temperature control to the coldest setting. If possible, leave some space around packages so cold air can circulate around them. Or have foods refrozen commercially. Their facilities would speed up the freezing process a good bit.

Think about the perishability of foods as you evaluate their potential safety. Remember that some changes affect quality only--not safety.

My list of foods in terms of safety follows. Those listed first are the safest. On a scale of 1 to 10, I'd give the first two items a 10, red meats a 5 and combination dishes a 2.

Nuts, popcorn, dried beans and peas (uncooked)
Freezer jams and jellies
Bread, cakes, cookies
Fruits and fruit juices
Vegetables except those which are vacuum packed or packed in sauce
Milk and cream which have been pasteurized to destroy pathogenic organisms. Commercially made ice creams or homemade ones which do not contain uncooked eggs or unpasteurized milk or cream would be safe but there is a dramatic change in texture.
Red meats--large roasts, steaks, and chops will be safer longer than ground, chopped, or stew meat
Poultry
Fish and seafood
Combination dishes as foods may have been contaminated in preparation. These products are moist and usually contain the nutrients needed by spoilage organisms.

Cooking before refreezing is not a very good solution as cooked foods have a shorter storage life than raw or blanched foods. Cooking will destroy most of the bacteria but refreezing stops bacterial growth. The high bacterial count could pose a problem the next time the food is thawed particularly if the food is thawed at room temperature or several hours before cooking. Mark the packages which have thawed and when ready to use cook from the frozen state or thaw in the refrigerator.

FREEZING

Freezing is probably the most popular method of food preservation due to the ease with which food can be prepared for freezing, and the fresh flavor of frozen foods.

What happens to foods in the freezing process and while frozen?

There are 3 stages in the freezing process. The first is the cooling of the food to freezing. During the second stage, ice crystals form. Ice crystals form in water at 32°F (0°C) but the freezing point of food varies from product to product. Sugar and salt lower the freezing point--the more sugar or salt used, the lower the freezing point. Most foods freeze in the temperature range of 25 to 31°F(-4° to -0.5°C). The third stage is the lowering of the temperature to storage temperature 0°F.

FREEZING (CONTINUED)

The size of the ice crystals is determined by how long it takes the product to freeze. If it takes a long time for food to freeze, the ice crystals will be large and may rupture the cell walls which will result in poor texture. If freezing is rapid, many small crystals will form.

The rate of freezing in a home freezer is slow and may require as much as 72 hours. Commercial freezing is more rapid. It is speeded up by freezing food in a blast of cold air, by direct immersion in a refrigerating medium, or by indirect contact with a refrigerant.

There are several steps one can take to speed up freezing in the home freezer. Foods can be cooled in ice water or the refrigerator before being placed in the freezer. Packages should be placed against freezing plates or coils. Leaving space between packages during the freezing process allows air to circulate more freely around the packages. Package size and shape also affect the speed of freezing. Turn the thermostat down for 24 hours or so after adding food. Avoid overloading the freezer. The general recommendation is to add no more than 2 or 3 pounds of food for each cubic foot capacity.

Foods may not remain solidly frozen during storage as the freezer temperature will vary--being warmest just before the compressor runs and coolest just after it has run. Consequently, there may be some recrystallization during storage. Large ice crystals may result from this recrystallization rather than from initial slow freezing.

Accumulated frost within a package represents moisture which sublimed from the food when the temperature rose and was deposited as frost when the temperature dropped. The effects of temperature fluctuation are not great if they occur below 0°F (-18°C) and if the package is well wrapped.

Freezer burn is seen on the surface of food. It represents an area that has lost moisture during storage as a result of sublimation of ice during temperature fluctuations. Appropriate packaging will reduce the severity of freezer burn. Foods frozen at a slow rate may develop a layer of compact cells on the surface which helps to delay the development of freezer burn.

Freezer burn is not harmful but it does adversely affect the flavor and texture of food. Some authorities suggest removing the fuzzy (ice crystals), grayish-white spots of freezer burn before the food is used.

A few bacteria are destroyed in the freezing process but most are just rendered inactive. As soon as the temperature warms up abit, they will start to multiply. Enzyme activity is slowed at 0°F but not stopped. Enzymes and air, either separately, or together, cause changes in the texture, color, and flavor of food. Blanching vegetables destroys the enzymes as well as some bacteria. Fruits are not blanched as that would result in a cooked flavor. Other methods are used to minimize changes in food quality. Packing fruits in sirup prevents air from reaching the fruit or pieces of fruit. Ascorbic acid acts as an antioxidant--oxygen reacts with it instead of with the food. Or citric acid is added to make the product more acid since increased acidity slows enzymatic action.

FREEZING (CONTINUED)

Foods with even a small amount of fat will become rancid. The speed at which the rancidity develops depends on a number of factors. One is the degree of saturation of the fat. Foods with unsaturated fat will become rancid more rapidly than foods with saturated fat. This is the reason fish has a short storage life. The length of time a food is stored before freezing also has an influence. Rancidity may start to develop during refrigerator storage--before freezing. Obviously, the longer the product is frozen the greater the amount of rancidity development. Storage temperature is also important. Presence of oxygen also speeds up rancidity development. Some substances called prooxidants promote rancidity. Heme pigments (responsible for the red color of meat) and salt are two which pose problems in meat. Grinding or cutting meat releases the heme pigment which accelerates the development of rancidity. Cured meats have salt which also promotes rancidity.

Texture changes in foods are caused by the breakdown of tissues and by the movement of water out of the tissue. Salad vegetables lose so much crispness that they are no longer suitable for raw use.

Cooked foods have a shorter storage life than raw foods. Cooked meat acquires first a stale and then a rancid flavor. It is important to exclude as much oxygen as possible. This can be accomplished by use of appropriate packaging, by freezing in a large piece to minimize the amount of surface exposed, and/or by covering the meat with a gravy or sauce.

Thawing may be a greater cause of damage than freezing as the food stays near the freezing point for an extended period of time. When the ice crystals melt, the moisture can go back into the food or be lost in the drip. Food thawed slowly (in the refrigerator) will retain more moisture than food thawed rapidly. There is always some drip loss, however. Cooking from the frozen state eliminates the potential damage from slow thawing although it is not appropriate for all foods.

FRUIT OR VEGETABLE?

Have you ever gotten into an argument about whether a tomato is a fruit or vegetable? If so, maybe this information on botanical classification of fruits and vegetables from the 6th edition of Foods by Vail, Phillips, Rust, Griswold and Justin will help you win the next one.

They say that fruit is the ripened ovary of the plant with any adjacent parts that may be fused with it. A vegetable is some other part of the plant. In practice, we use a number of fruits as vegetables and don't worry about their classification. For example, legumes are classified as fruits as are cucumbers and squash. The tomato is also a fruit.

FRUIT BUTTER

Velvety-smooth near relative to jam made by cooking fruit pulp with sugar until the mixture is thick enough for spreading.

FRUIT-FRESH

Fruit-Fresh is an antidarkening agent marketed by Beecham Products. It contains ascorbic acid as the active ingredient. It also contains sugar and silicon dioxide.

See "Antidarkening Agents" for more information.

FRUIT JUICES, CANNING

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 . . . . . 5 minutes
Quart jars . . . . 5 minutes

FRUIT LEATHERS

Sometimes called fruit rolls or fruit taffies, these "leathers" can be eaten as is, or they can be made into a beverage by adding 5 parts of water to 1 part leather in a food blender. They can also be used in pie filling, in cooking, and as a topping for dessert.

Any type of fruit can be used: apricots, apples, grapes, berries, pineapple, oranges, pears, peaches, tomatoes, plums, tropical fruits, and others.

Not usually suitable are grapefruit, lemons, persimmons, and rhubarb--without certain modifications.

Preparation

1. Select ripe or overripe fruit.
2. Remove stones or pits from fruit. Seeds of berries or grapes need not be removed. Peel or not, depending upon individual preference.
3. Cut fruit into chunks and place it in a food chopper or mechanical blender.
4. To yellow or light-colored fruit, add 1 tablespoon of lemon or lime juice for each quart of fruit.
5. Chop, grind, or blend until a thick puree is formed.
6. Add 2 tablespoons of sugar per quart to orange and pineapple pulp. (Additional sugar is not needed for other fruits.)
7. Line a cookie sheet or similar flat tray with saran, coated saran, or waxed paper. Make sure that the cookie sheet or tray has an edge to prevent spillage of the puree.
8. Pour the puree onto the sheet or tray about 1/4 inch deep. Distribute evenly by tilting the tray; do not use a spatula or knife. When all spaces are covered, the right amount of puree has been applied.

FRUIT LEATHERS (CONTINUED)

Sun Drying. This will take from two to three days depending upon temperature and humidity. Test frequently for dryness.

If the weather is hot (above 85°F) and dry (less than 60% relative humidity), the trays can be placed in direct sunlight or behind a pane of glass or plexi-glass to concentrate the heat. Cover or bring inside at night if the nighttime temperatures vary more than 20°F from daytime temperatures or if fog or humidity is common at night.

Oven Drying. Set oven at lowest setting (140°F). Place the sheets or trays in the oven and leave the oven door cracked open--2 to 6 inches, depending on the oven door. The fruit leather will be dried in 4 to 5 hours.

Dehydrator Drying. Place sheets or trays in the dehydrator. Set temperature control at 140°F. Dry for 4 to 5 hours and test for dryness.

Testing for Dryness. Properly dried fruit leather will be sticky to the touch, but will be easily peeled from the saran, coated saran, or waxed paper. Lift the edge, which will adhere tightly to the surface, and peel it back about an inch. If it peels readily, it is properly dried.

Storage. After loosening the edge and peeling it back about an inch, roll the saran, coated saran, or waxed paper and the dried leather in one piece in a loose roll.

The dried fruit roll can be stored for years in the freezer, for months in the refrigerator, and for up to 30 weeks at room temperature (70°F or less).

FRUIT PIE FILLINGS

Dr. George York of the University of California at Davis is the source of this recipe for a canned fruit pie filling.

Use 10 pounds of fruit such as apricots, peaches, or apples. Wash, sort, and peel if necessary. Core and pit and cut fruit into equal-sized slices. In a small bowl combine 1 cup plus 2 tablespoons quick-cooking tapioca, 1½ cups sugar, and 3/4 cup lemon juice; reserve.

Place prepared fruit in a kettle with 4 cups sugar and just enough water to keep mixture from burning. Heat quickly to 190°F, stirring frequently to keep mixture from sticking. Add tapioca-sugar-lemon juice mixture and reheat to 190°F. Overcooking will result in an inferior flavor. Pack into hot, sterilized jars leaving 1/4 inch headspace. Adjust jar lids. Process in a boiling water bath canner (212°F) for 5 minutes.

The lemon juice is used to increase the acidity of the product. Use bottled lemon juice (canned or frozen) as the acid content is more constant than for fresh squeezed.

FRUIT PIE FILLINGS (CONTINUED)

Heating the mixture to 190°F destroys many of the spoilage organisms. The acidity of the product plus the relatively high sugar content help to prevent the growth of spoilage organisms.

The brief processing period is too short to sterilize the filling but does help to exhaust the air from the jars, create a vacuum, and to start forming a seal.

Some persons question the safety of this recipe. Research is currently underway at Penn State to develop a high quality fruit pie filling which can be safely processed at home.

FRUIT PIES, FREEZING

Fruit pies retain better quality if frozen unbaked. That's also more convenient as thawing and baking can be accomplished at the same time. Prepare as for baking; then package and freeze. Store at 0°F or below. They should retain high quality for 8 months.

Freezer space may be the limiting factor as a frozen pie takes a great deal more space than the 2 to 3 cups of fruit used in a pie.

FRUIT PUREES, CANNING

Use sound, ripe fruit. Wash; remove pits, if desired. Cut large fruit in pieces. Simmer until soft; add a little water if needed to keep fruit from sticking. Put through a strainer or food mill or process in a blender. Add sugar to taste. Heat again to simmering (185°-210°F).

Pour hot fruit puree into jars leaving 1/2 inch headspace. Adjust lids. Process in boiling water bath (212°F).

Pint jars . . . . . 10 minutes
Quart jars . . . . 10 minutes

GALVANIZED CONTAINER

The "galvanizing" material contains zinc which in the presence of acid is converted into soluble zinc salts. Zinc is an astringent substance which can cause pain in the mouth, throat and abdomen. If enough is consumed, nausea, vomiting, dizziness, and collapse can occur.

H&G 10 Home Freezing of Fruits and Vegetables says "Do not use galvanized ware in direct contact with fruit or fruit juices because the acid in fruit dissolves zinc, which is poisonous."

GARBANZO BEANS (also called chick peas)

Treat as lima beans.

GARLIC DISCOLORATION

Garlic often becomes discolored in pickles and relishes. Garlic turns green as a result of a reaction between the acid in the vinegar and the color pigment in the garlic. This will happen when the garlic is not fully mature or thoroughly dry. It is not harmful.

Blue coloration of garlic is caused by a reaction between the enzyme system of raw garlic and copper. The amount of copper required to cause this blue coloration is very low and may come from water or from copper water pipes or cooking utensils. The pickles or relish should be safe to use if there is no evidence of microbiological activity in the jar.

GARLIC, HARVESTING AND STORAGE

The Fact Sheet (MH 350) Harvesting Vegetables prepared by the Horticulture Department says that when garlic bulbs are mature, the tops are dry and yellow. Pull up bulbs and allow to dry in the garden for several days. When dry, clean by removing outer loose portions of the sheath and trimming the roots off close to the bulb with a sharp knife.

According to the 1977 Yearbook of Agriculture Gardening for Food and Fun, garlic should be harvested when the top dries down. To prepare garlic for storage, cure the bulbs under cool, dry conditions. Garlic may be stored under a wide range of temperatures, but does best under dry conditions with a temperature range of 40° to 60°F.

GOOSEBERRIES, CANNING

The Ball Blue Book has directions for canning gooseberries. Pour 1/2 cup of boiling medium or heavy sirup into jar. Fill jar with raw berries, shaking jar to pack without crushing. Leave 1/2 inch headspace.

Add more boiling sirup, if needed, to cover berries, leaving 1/2 inch headspace. Remove air bubbles. Adjust jar lids. Process in a boiling water bath canner (212°F).

Pint jars . . . . . 15 minutes
Quart jars . . . . 20 minutes

GOOSEBERRIES, FREEZING

Whole gooseberries may be frozen with sirup or without sweetening. For use in pie or preserves, the unsweetened pack is better.

Choose fully ripe berries if freezing for pies--berries a little underripe for jelly making. Sort, remove stems and blossom ends, and wash.

Unsweetened pack. Pack into containers without sugar. Leave needed headspace. Seal and freeze.

Sirup pack. Pack into containers. Cover with 50% sirup. Leave needed headspace. Seal and freeze.

GOOSEBERRY JAM AND GOOSEBERRY CONSERVE recipes are in the Ball Blue Book. The Kerr Home Canning and Freezing Book has a GOOSEBERRY-RHUBARB CONSERVE recipe.

GRAPE JELLY

Grape jelly is easy to make as grape juice contains enough pectin and acid to make a good jelly. Both the Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes for grape jelly using just grape juice and sugar.

Many people prefer to add pectin because fully ripe fruit can be used, the cooking time is shorter and is standardized so that there is no question when the product is done, and the yield from a given amount of fruit is greater.

The USDA publication How to Make Jellies, Jams, and Preserves at Home has these 3 recipes for Grape Jelly.

GRAPE JELLY with liquid pectin

4 cups grape juice (about 3 pounds Concord grapes and 1/2 cup water)
7 cups sugar
1/2 bottle (3 fl. oz.) liquid pectin

Sort, wash, and remove stems from fully ripe grapes. Crush grapes, add water, cover, and bring to boil on high heat. Reduce heat and simmer for 10 minutes. Extract juice.

Let juice stand in a cool place overnight to allow tartrate crystals to settle out. Strain through two thicknesses of damp cheesecloth to remove crystals.

Measure juice into a kettle. Stir in sugar. Place on high heat and stirring constantly, bring quickly to a full rolling boil that cannot be stirred down.

Add pectin and heat again to a full rolling boil. Boil hard for 1 minute.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot containers leaving 1/8-inch headspace. Adjust jar lids. Process for 5 minutes in a boiling water bath. Makes 8 or 9 half-pints.

GRAPE JELLY with powdered pectin

5 cups grape juice (about 3 pounds Concord grapes and 1 cup water)
1 package powdered pectin
7 cups sugar

Extract juice following directions in Grape Jelly with liquid pectin.

Measure juice into a kettle. Add pectin and stir well. Place on high heat and stirring constantly, bring quickly to a full rolling boil that cannot be stirred down.

Add sugar, continue stirring, and bring again to a full rolling boil. Boil hard for 1 minute.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot containers leaving 1/8-inch headspace. Adjust jar lids. Process for 5 minutes in a boiling water bath.

Makes 8 or 9 half-pints.

GRAPE JELLY made from frozen concentrated juice

6½ cups sugar
2½ cups water
1 bottle (6 fl. oz.) liquid pectin
3 6-ounce cans frozen concentrated grape juice, thawed

Stir sugar into water. Place on high heat and, stirring constantly, bring quickly to a full rolling boil that cannot be stirred down. Boil hard for 1 minute.

Remove from heat. Stir in pectin. Add thawed concentrated grape juice and mix well. Pour jelly immediately into hot containers leaving 1/8-inch headspace. Adjust jar lids. Process for 5 minutes in a boiling water bath.

Makes about 10 half-pints.

Check the package insert in pectin products for recipes for grape jelly (cooked and uncooked) and grape jam. The Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes for a number of products including sugar-free grape jellies.

GRAPE JUICE, CANNING Ball Blue Book

Wash, stem, crush and measure fresh, firm-ripe grapes. Add 1 cup water to each gallon crushed grapes. Heat 10 minutes at 190°F. (Boiling develops a poor flavor.) Strain through cotton flannel, jelly bag or 4 layers of cheesecloth. For greater yield of juice, twist the two ends of the bag in opposite directions until most of the juice is extracted. Let stand 24 hours in refrigerator. Strain again. Add 1 to 2 cups sugar to each gallon juice. Reheat to 190°F. Pour hot juice into hot jars, leaving 1/4-inch headspace. Adjust jar lids. Process in a boiling

GRAPE JUICE, CANNING (CONTINUED)

water bath canner (212°F).

Pint jars . . . . . 15 minutes
Quart jars . . . . 15 minutes

Another method of making grape juice is given in the Ball Blue Book. It is really a method of making grape juice in the jar. Put 1 cup of grapes into a quart jar. Add 1/2 to 1 cup sugar. Fill jar with boiling water leaving 1/4-inch headspace. Adjust jar lids. Process in a boiling water bath canner (212°F) for 10 minutes.

GRAPE JUICE, FREEZING

Select firm-ripe grapes with tender skins and full color and flavor. Wash, stem, and crush grapes. Strain them through a jelly bag. Let juice stand overnight in refrigerator or other cool place to allow sediment to settle out. Pour off clear juice for freezing.

Pour juice into containers, leaving needed headspace. Seal and freeze. Store at 0°F or below.

If tartrate crystals form in frozen juice, they may be removed by straining the juice after it thaws.

GRAPE LEAVES IN PICKLING

Some old recipes suggest putting grape leaves in pickles. It sounds like an old wives tale but it does serve useful functions--(1) it helps to preserve the color and (2) it inhibits the action of enzymes which cause pickles to soften.

GRAPE PUREE, FREEZING

Grapes may be frozen as puree with sugar added. The puree may develop a gritty texture because of tartrate crystals. The crystals disappear when puree is heated.

Wash, stem, and crush the grapes. Heat to boiling. Drain off free juice and freeze or can it separately. Cool the crushed grapes and press them through a sieve.

To 1 quart puree add 1/2 cup sugar. Pack into containers, leaving needed headspace. Seal and freeze.

GRAPEFRUIT, FREEZING

Sections or slices. Select firm tree-ripened fruit heavy for its size and free from soft spots. Wash and peel. Divide fruit into sections, removing all membranes and seeds. For grapefruit with many seeds, cut fruit in half, remove seeds; cut or scoop out sections.

Pack into containers. Cover with cold 40% sirup made with excess fruit juice and water if needed. For better quality, add 1/2 teaspoon crystalline ascorbic acid to a quart of sirup. Leave needed headspace. Seal and freeze. Store at 0°F or below.

Juice. Select fruit as directed for sections. Squeeze juice from fruit, using squeezer that does not press oil from rind.

Sweeten with 2 tablespoons sugar for each quart of juice, or pack without sugar. For better quality, add 3/4 teaspoon crystalline ascorbic acid for each gallon of juice. Pour juice into glass jars immediately leaving needed headspace. Seal and freeze. Store at 0°F or below.

GRAPES, CANNING

The USDA publication Home Canning of Fruits and Vegetables does not include directions for canning grapes. Both the Ball Blue Book and the Kerr Home Canning and Freezing Book do have directions. Grapes are packed into jars and covered with boiling sirup. Both recommend processing quart jars for 20 minutes in a boiling water bath.

GRAPES, FREEZING

Grapes are best frozen with sirup, but grapes to be used for juice or jelly can be frozen without sweetening.

Select firm-ripe grapes with tender skins and full color and flavor. Wash and stem. Leave seedless grapes whole; cut table grapes with seeds in half and remove seeds.

GRAS

GRAS is initialese for substances "generally recognized as safe." This wording is derived from the language of the 1958 Food Additives Amendment which permitted addition of a substance to food without extensive prior testing if that substance met requirements spelled out in the law. A substance would be considered GRAS if that substance was generally recognized by experts as having been "adequately shown" to be safe for its intended use in food.

There are at present about 700 GRAS substances listed in FDA regulations for direct use in food for humans and for use in food packaging and for trace minerals in animal foods.

GREEN BEANS, CANNING

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 1/2 inch of top. 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 food and jar. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240°F).
Pint jars . . . . . 20 minutes
Quart jars . . . . 25 minutes

Hot pack. Cover cut beans with boiling water and cook for 5 minutes. Pack hot beans loosely to 1/2 inch of top of jar. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling-hot liquid, leaving 1/2 inch headspace. Adjust jar lids.

Process in pressure canner at 10 pounds pressure (240°F).
Pint jars . . . . . 20 minutes
Quart jars . . . . 25 minutes

According to Presto, green beans can be processed at 15 pounds pressure for 15 minutes.

GREEN BEANS, DILLED

There's a recipe for Dilled Green Beans in the USDA bulletin Making Pickles and Relishes at Home. The Ball Blue Book has a similar recipe, just smaller.

GREEN BEANS, DRYING Drying Foods At Home

Wash thoroughly. Cut in short pieces or lengthwise. Blanch in steam for 2 to 2½ minutes or in boiling water for 2 minutes. Dry in a dehydrator (140°F) for 2½ to 4 hours, or in an oven (140°F) for 3 to 6 hours, or in the sun (98° to 100°F) for 8 hours.

GREEN BEANS, FREEZING

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 in a blancher or in a wire basket in a large kettle. Work with small quantities of beans for best results. Use at least 1 gallon of boiling water for each pound of prepared beans. Put beans in blanching basket or wire basket and lower into the boiling water. Cover and start timing immediately.

After 3 minutes, plunge basket containing beans into a large quantity of cold water (60°F or below) to stop the cooking. Allow 5 minutes for cooling.

Drain thoroughly. Pack beans, leaving 1/2-inch headspace.

Seal. Freeze; store at 0°F or below.

GREEN BEANS, SELECTION

Pick pods before the seeds reach full maturity and while they are still tender. Never allow old pods to stay on the bush or vine since this slows or stops production.

If buying, select beans with a fresh, bright appearance with good color for the variety. Get young, tender beans with pods in a firm, crisp condition.

Avoid wilted or flabby bean pods, serious blemishes, and decay. Thick, tough, fibrous pods indicate overmaturity.

A bushel of snap beans weighs about 30 pounds and will yield 18 to 20 quarts of canned or frozen beans.

GREEN BEANS, TEXTURAL CHANGES

Two textural defects have been observed in canned green beans. In one, sloughing of the layer just under the skin causes the pod to separate into layers and gives it an undesirable texture. This is associated with raw packed beans and with beans that have been overcooked before packing into jars.

The other, "squeaky" beans refers to the sound made when you bite into a too firm bean. This usually results from inadequate cooking before packing into jars.

GREEN PEAS, CANNING

Shell and wash peas. Drain.

Raw pack. Pack raw peas to 1 inch of 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°F).
Pint jars . . . . . 40 minutes
Quart jars . . . . 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°F).
Pint jars . . . . . 40 minutes
Quart jars . . . . 40 minutes

According to Presto, green peas can be processed at 15 pounds pressure for 30 minutes.

GREEN PEAS, FREEZING

Shell and wash peas. Drain.

Heat peas in boiling water for 1½ minutes in a blancher or in a wire basket in a large kettle. Work with small quantities of peas for best results. Use at least 1 gallon of boiling water for each pound of prepared peas. Put peas in blanching basket or wire basket and lower into the boiling water. Cover and start timing immediately.

After 1½ minutes, plunge basket containing peas into a large quantity of cold water (60°F or below) to stop the cooking. Allow 2 to 5 minutes for cooling.

Drain thoroughly. Pack peas, leaving 1/2-inch headspace.

Seal. Freeze; store at 0°F or below.

GREEN PEAS, SELECTION

Pick when peas have formed inside the pod but still tender and deep green. Smaller ones are sweeter than the more mature ones. Pick frequently to prolong production.

If buying, select bright-green, plump pods with sweet, tender peas. All peas should be of the same maturity.

A bushel of peas in the pod weighs about 30 pounds and will yield an average of 7 quarts of canned or frozen peas.

GREENS, CANNING

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°F).

Pint jars . . . . . 70 minutes
Quart jars . . . . 90 minutes

GREENS, FREEZING

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. Leave 1/2-inch headspace as greens will expand on freezing.

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

Seal. Freeze; store at 0°F or below.

GREENS, SELECTION

A large number of widely differing plants are used as "greens." The better known kinds are spinach, kale, collard, turnip, beet, chard, mustard, dandelion, and cress. Many others, some of them wild, are also used to a limited extent.

Select leaves that are fresh, young, tender, free from blemishes, and which have a good healthy green color. Beet tops and chard will show reddish color.

Avoid leaves with coarse, fibrous stems, yellowish-green color, softness (a sign of decay), or a wilted condition. Avoid greens with evidence of insect damage.

Look over leaves carefully when washing. It is sometimes hard to spot insects, especially aphids. 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 whether greens are to be canned or frozen.

A bushel of greens weighs about 18 pounds and will yield an average of 6 quarts of canned or frozen greens.

HALF GALLON JARS

There are no tested times for processing foods in half-gallon jars. Since there can be a health hazard associated with inadequate processing of low-acid vegetables, I think we would be wise to discourage use of half-gallon jars for these foods. There's probably less to worry about healthwise in acid foods such as fruits, pickles, and sauerkraut but an inadequate heat treatment could lead to spoilage and an economic loss.

Two older editions of canning guides did have information about canning in half-gallon jars. The information is not included in more recent editions.

An old Kerr book suggests adding 10 minutes to the processing time for quarts of fruits and tomatoes if you are using half-gallon jars. They also suggest adding 20% to the time for quarts for low-acid foods processed in the pressure canner.

The 1963 edition of the Ball Blue Book has processing times for fruits, tomatoes, and sauerkraut in half-gallon jars. Some selected ones follow:

Apples	35 minutes	Pears, hot	40 minutes
Applesauce	35 minutes	Plums, hot	40 minutes
Berries, raw	35 minutes	Sauerkraut	45 minutes
Berries, hot	30 minutes	Tomatoes, raw	60 minutes
Peaches, raw	45 minutes	Tomatoes, hot	30 minutes
Peaches, hot	40 minutes		

HEADSPACE is the space between the contents of a jar or other container and the underside of the lid or top of the container.

Headspace is important in both canned and frozen foods.

In canned foods, if too little headspace is left, the food may bubble out during processing leaving a deposit of food between the jar and the sealing compound which prevents the jar from sealing properly.

If there's too much headspace, the food at the top is likely to discolor.

As a general canning rule, leave one inch of headspace for beets, corn, peas, and low acid foods; 1/2-inch for fruits and acid vegetable; and 1/4-inch for juices, soft spreads, pickles and relishes.

In freezing, the amount of headspace needed is dependent on the type of container used and the nature of the pack. Vegetables that pack loosely such as broccoli and asparagus stalks require no headspace. Other vegetables and fruits which are dry packed require 1/2-inch headspace. Foods packed in liquid whether sirup, water, or juice require more headspace. Leave about 10% headspace to allow for expansion during freezing. In wide topped containers, 1/2-inch of headspace in pints and 1 inch in quarts. If the container has a narrow opening (a glass canning jar, for example) leave 3/4-inch headspace in pints; 1½ inches in quarts.

HEADSPACE (CONTINUED)

Insufficient headspace in plastic cartons usually results in the lid coming loose exposing the contents to the air resulting in freezer burn. Insufficient headspace in a glass container may result in a broken jar and loss of the contents.

HERBS, DRYING

Herb leaves which are to be used fresh may be picked whenever the plant has enough foliage to maintain continued growth according to Diane Relf, Extension Specialist in Horticulture.

Most herbs for drying should be picked just before the flowers open, when the leaves have the highest content of aromatic, volatile oils.

The stems should be selected and cut individually about six inches below the flower buds.

Remove dead or damaged leaves, and wipe off any dust or dirt which may be present. If the leaves are very dirty, rinse gently in cold water and dry with paper towels.

Seeds can be harvested when they change in color from green to brown or gray. Seeds can be saved for the next year by allowing the plant to completely mature, harvesting the seeds, and allowing them to dry before storing.

The herbs may be dried by tying the cut stems in small bunches and hanging in a well-ventilated, dust free, darkened room.

"Do not use artificial heat or expose the leaves to sunlight," the specialist said, "because they reduce the quality of the dried product. The best flavor will result if herbs are dried in four to six days."

If the leaves are not too small, they may be removed from the stems and dried in a single layer on trays made of window screening or quarter inch hardware cloth. Stir the leaves gently once or twice a day to speed the drying operation.

When the drying process seems to be complete, remove the leaves from the stems or trays and place in sealed glass jars in a warm place for a week. At the end of that time, examine the jars to determine if any moisture has condensed on the inside of the glass. If it has, remove the contents and spread out for further drying.

If necessary, the final drying may be completed by spreading the leaves on a cookie tray in an oven heated to not over 120°F.

Herb leaves are dry when they become brittle and will crumble into powder when rubbed between the hands. Most herbs are used in powdered form. The leaves may be crushed with a rolling pin or passed through a fine sieve.

Store herbs in air-tight bottles, preferably brown glass, in as cool a place as possible and not in direct sunlight.

As long as the herbs and spices retain their distinctive odor, they should retain their flavor.

HOMINY

Place 2 quarts of dry field corn in an enameled pan; add 8 quarts of water and 2 ounces of lye. Boil vigorously 1/2 hour, then allow to stand for 20 minutes. Rinse off the lye with several hot water rinses. Follow with cold water rinses to cool for handling.

Work hominy with the hands until dark tips of kernels are removed (about 5 minutes). Separate the tips from the corn by floating them off in water or by placing the corn in a coarse sieve and washing thoroughly. Add sufficient water to cover hominy about 1 inch, and boil 5 minutes; change water. Repeat 4 times. Then cook until kernels are soft (1/2 to 3/4 hour) and drain. This will make about 6 quarts of hominy.

Pack hot hominy into clean jars leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Adjust jar lids. Process in pressure canner at 10 lbs. pressure (240°F).

Pint jars . . . . . 60 minutes
Quart jars . . . . 70 minutes

In Putting Food By, the authors describe hominy as a traditional Southern vegetable made from dried whole-kernel field corn after the hulls are removed by long cooking in a weak lye solution. They point out that lye (a strong alkali) destroys vitamin C and some of the B vitamins.

They go on to give these warnings about the use of lye.

"The stuff called 'lye' may be one of several highly caustic alkaline compounds that, in the presence of only the moisture in the air on a muggy day, can become activated, burning and eating deeply into animal or other organic tissue--including human skin.

ANTIDOTE FOR SEARING CONTACT: Slosh immediately with cold water, follow with boric-acid solution (eyes) or vinegar.

If you buy household lye-caustic soda for hulling corn, make sure it's suitable for use with food, and is designated as 'lye' or 'lycons' on the can and contains no aluminum, nitrates or stabilizers. Above all, avoid commercial drain-openers, either crystalline or liquid.

Use only enameled- or granite-ware pots or kettles--never use utensils of aluminum, which reacts violently with lye in water."

HONEY

Honey can be used in food preservation. A strong-flavored honey may overpower the flavor of canned and frozen fruits. Combine honey with water to make a sirup.

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 3/4 to 1 cup of the sugar with honey.

HORSERADISH, DRYING

Drying Foods At Home

Wash; remove small rootlets and stubs. Peel or scrape roots. Grate. Blanching not required. Dry in a dehydrator (140°F) for 1 to 2 hours, or in an oven (140°F) for 3 to 4 hours, or in the sun (98° to 100°F) for 7 to 10 hours.

HORSERADISH RELISH

2 cups grated horseradish (about 3/4 pound)
1 cup white vinegar
1/2 teaspoon salt

Wash horseradish roots thoroughly and remove the brown outer skin. (A vegetable peeler is useful in removal of outer skin.) The roots may be grated or cut into small cubes and put through a blender or food chopper.

Combine ingredients. Pack into clean jars. Screw lid on tightly. Store in refrigerator. Yield: 2 1/2-pint jars.

ICE CREAM, THAWED

A frequent question is why the warning against using melted ice cream in the USDA publication What to Do When Your Freezer Stops. The chief reason for not attempting to salvage thawed ice cream is the loss of quality. The air which is incorporated in the initial freezing of the product to increase the volume is lost in the thawing-refreezing process.

The warning may have originated because of a concern for salmonellosis stemming from the use of eggs. However eggs used in commercial ice creams now have to be pasteurized to destroy salmonellae. There are some homemade ice cream recipes which use raw eggs. These products could be contaminated with salmonellae.

In the case of thawed ice cream (commercially made), I'd recommend drinking as a milk shake or serving as a thick cream over fruit or cereal.

IDEAL FRUIT CANNER AND STEAM COOKER

See STEAM CANNER

IRRADIATION

Irradiation may soon become a way of preserving food in the United States.

Irradiation preserves food by killing the microorganisms that cause it to spoil by the use of gamma rays, x-rays, or electrons. The dosage determines the effect. A low dose (5 to 100 kilorads) inhibits sprouting in root crops such as potatoes and onions and retards ripening of fruits. Low doses of irradiation can also sterilize or kill insects which infest and destroy grain or fresh fruits and vegetables.

Higher dose levels (100 to 700 kilorads) reduce the number of microorganisms and spores which cause deterioration of flavor, texture, odor and appearance. Elimination of these spoilage microorganisms can often double or triple the shelf life of some foods.

Much higher dose levels (over 1,000 kilorads) can sterilize food for indefinite, unrefrigerated storage by eliminating pathogens including clostridium botulinum. The dose level suggested by scientists to completely sterilize foods is 4.5 megarads (4500 kilorads).

Before irradiation can be used commercially, it must be approved by the FDA. Irradiation is considered a food additive under the 1958 Food Additives Ammendment of the Federal Food, Drug and Cosmetic Act so each use must be approved. Testing irradiated foods for safety is lengthy and expensive.

IRRADIATION (CONTINUED)

Some Foods That Can Be Irradiated

Food Item	Purpose	Dose
White potatoes,[1] root crops	Sprout inhibition	5- 15 kilorads
Wheat, wheat flour, grains	Disinfestation	20-100 kilorads
Fresh fruits & vegetables	Disinfestation, extension of shelf life	25-100 kilorads
Mushrooms	Inhibit cap opening, fresh appearance	6-100 kilorads
Tropical fruits	Retard ripening	25-100 kilorads
Strawberries, small fruits	Controlling fungus	175-225 kilorads
Cod, ocean perch	Extension of shelf life	175-225 kilorads
Crab	Extension of shelf life	200-300 kilorads
Chicken	Extension of shelf life, reduction of pathogens	300-700 kilorads
Portion controlled ham (refrigerated storage)	Extension of shelf life, reduction of pathogens	200-700 kilorads
Prime beef cuts (refrigerated storage)	Double shelf life	200-700 kilorads
Frozen shrimp, frog legs (imported)	Eradicate salmonella	500 kilorads
Spices	Sterilization	1000 kilorads
Meats, poultry, & fish	Sterilization	2500-5000 kilorads

[1]Permitted with labeling in the U.S. since 1983.

IRON

Iron from cooking utensils or from water in some localities may cause brown, black, and gray colors in some foods.

JALAPENO PEPPERS

See "Peppers, Canning" and "Peppers, Hot, Freezing"

JAM

Made with chopped or crushed fruit and sugar with a consistency looser than that of jellies.

JAR BREAKAGE

Kerr lists these reasons why jars break.

Thermal shock is characterized by a crack running around the base or lower part of the jar and sometimes extending up the side.

It may occur when:

1. Hot jars are set on a cold surface or in a cold draft.
2. Hot jars are spattered with cold water.
3. Jars are set directly on bottom of canner instead of on a rack.
4. Water or sirup was not hot enough.
5. Cold jars are set into boiling water.

Pressure breakage is characterized by the origin of the break on the side. It is in the form of a vertical crack which divides and forks into two fissures.

Possible causes:

1. Insufficient headspace.
2. Fluctuating temperature during processing.
3. Opening the canner before the pressure has gone down to zero.
4. Speeding cooling of the canner.

Impact breakage starts at the point of contact with fissures radiating from this point.

It may occur when:

1. Jars have received rough handling.
2. A sharp metal knife is used to remove air bubbles.

To prevent breakage:

1. Use a rack in the bottom of the canner.
2. Leave space between jars and between jar and side of canner.
3. Remove air bubbles gently preferably with a non-metallic instrument.
4. Keep the pressure steady. Great fluctuations in temperature may cause breakage as well as liquid loss.
5. Jars, food, liquid for filling jars, and jars in canner should be about same temperature at start.
6. Cool on a rack or towel. Don't set directly on the counter top.
7. Avoid scarring jar with metal spoon when scooping out contents.

JAR LIDS, BUCKLING

Buckling is usually an indication that the metal screw band was screwed on with too much force. If the band is screwed down too tightly, the jar cannot readily vent during processing. As air pressure builds up within the jar, something has to give. Fortunately, it is usually the lid rather than the jar.

When canning green beans, a second cause of buckling may occur. If beans are overpacked or too little headspace is left, the beans may expand on heating and produce pressure on the lid leading to buckling.

The buckled lid does seal so the food would be safe to eat if it had been processed for the full length of time at the correct temperature. However, if overpacking is the cause of buckling, the food may have received an inadequate heat treatment.

JAR LIDS, GOVERNMENTAL REGULATIONS

The U.S. Consumer Product Safety Commission has jurisdiction over articles used by consumers for storage or preparation of foods including jar lids. An exception is when the food becomes contaminated by virtue of a substance migrating from the lid into the food. Then the Food and Drug Administration has jurisdiction.

Most reputable companies will have done performance testing of lids although it is not required. The materials used in the lid must be on the FDA list of approved food packaging materials.

There is some size tolerance allowed in the manufacture of jar lids. Regular jar lids may vary in diameter by as much as .012 inch; wide mouth lids by as much as .015 inch.

JAR LIDS, NO. 63

Lids are generally available for the standard or wide mouth jars. We occasionally get questions regarding the availability of No. 63 lids. Bernardin was the only manufacturer of these lids but they are no longer producing them.

These lids were developed for use on mayonnaise and other commercial jars when the supply of regular jars was inadequate to preserve the produce from World War II Victory Gardens. The lids are 63 mm in diameter--about 1/4" smaller in diameter than the standard jar lid.

JAR LIDS, PERFORMANCE

The two-piece self-sealing jar lid has been used almost exclusively by home canners during the last 20 years or so. Most of these jar lids were made by one of three companies (Ball, Kerr, and Bernardin) up to the mid 1970's. At that time the increasing interest in home food preservation created such a demand for jar lids that several other companies started marketing them. Most of those companies have come and gone and we're back to Ball, Kerr, Bernardin, and Golden Harvest jar lids. If you get questions about other brands, they are probably leftover or imported.

JAR LIDS, REUSING

We have never recommended reusing the lid of the two-piece lid or a jar rubber as there is a high failure-to-seal rate. You will sometimes get a seal but it is not a sure thing. The sealing compound deteriorates. Lids are often bent in the process of removing them from jars. Certainly if one has invested time and effort to can something, it is wise to maximize chances for success.

JARS AND LIDS

Glass jars are the usual packaging material for home canning though a few persons choose metal cans. Glass jars for home canning are especially treated to withstand extreme temperatures. The Mason jar, the most widely used type of jar, is made by a number of companies. It is generally made in a round-square shape with a standard or wide mouth. Pint and quart sizes are the most common but half-pint and half-gallon jars are also available. Mason jars have a screw thread neck and a sloping shoulder. The jar seals on the top or on the shoulder depending on the kind of lid used.

Check jars for chips and cracks. A small chip on the sealing surface can prevent a seal. Even a hairline crack may lead to a broken jar during processing.

Wash jars in hot, soapy water and rinse well. There is no need to sterilize jars for food which will be processed. The jar and its contents will be sterilized during the processing period.

The two-piece metal lid is the closure used most frequently. One piece is the lid which is fitted with a sealing compound; the other piece is a screwband to hold the lid in place during processing. Each manufacturer uses slightly different sealing compounds so you will want to read the instructions to see how to handle the brand you have.

To use the two-piece lid, wipe the jar rim clean after produce is packed. Put lid on with sealing compound next to glass. Screw metal band on firmly. Do not turn back or adjust after processing. This lid has enough give to let air escape during processing. The seal forms as the jar cools.

The porcelain-lined zinc cap is used with a rubber ring. To use, fit the wet rubber ring down on the jar shoulder before filling. Avoid stretching the rubber unnecessarily. Fill jar; wipe rubber ring and jar rim clean. Screw cap down firmly; then turn back 1/4 inch. This is necessary to allow air to escape from the jar during processing. After processing, screw cap down tight to complete the seal. The rubber ring is no longer being manufactured so this lid will be phased out as well.

JELLY

Clear or translucent, contains no pieces of fruit. A jelly is firm enough to hold its shape, soft enough to spread.

"Ideal fruit-jelly is a beautifully colored, transparent, palatable product obtained by so treating fruit-juice that the resulting mass will quiver, not flow, when removed from its mold; a product with texture so tender that it cuts easily with a spoon, and yet so firm that the angles thus produced retain their shape; a clear product that is neither sirupy, gummy, sticky, nor tough; neither is it brittle and yet it will break, and does this with distinct beautiful cleavage which leaves sparkling characteristic faces. This is that delicious, appetizing substance, a good fruit-jelly." This word picture of a fruit jelly was painted by Goldthwaite in a 1914 publication of the University of Illinois. It makes jelly sound awfully elegant to be incorporated into a peanut butter sandwich!

JELLY, CONTAINERS

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 there was often some mold growth on top of and even through the paraffin. Consumers removed the mold with the paraffin and ate 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.

JELLY, COST OF MAKING

A frequent question has to do with the increased cost of jelly made with added pectin. Not only is there the cost of the pectin but more sugar is required. There is an increased yield, however, which usually keeps the cost per glass or half-pint near or below that of jelly made without added pectin.

Grape Jelly

	Amount and Cost			
Ingredient	Without Added Pectin		With Added Pectin	
Grape Juice (bottled)	4 cups	$0.96	5 cups	$1.19
Sugar (5 lbs. for $2.50)	3 cups	0.63	7 cups	1.47
Powdered pectin	-	-	1 pkg.	.50
Total cost		$1.62		$3.16
Yield	4 half-pints		9 half-pints	
Cost per half-pint		$0.40		$0.35

JELLY, TESTS FOR DONENESS

Products made with added pectin start with a higher ratio of sugar to juice; thus 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 can be used. The temperature test is probably the most reliable.

1. Temperature Test: Check the temperature at which water boils with a jelly, candy, or deep-fat thermometer. Water boils at approximately 212°F but the altitude and atmospheric conditions do influence the exact temperature at which it boils. A sugar-water mixture doesn't boil until the temperature goes above 212°F. The more sugar in the mixture, the higher the boiling point. Jellies are about 65% sugar so the boiling point is 8°F above the boiling point of water.

2. Refrigerator Test: Remove the jam or jelly from the heat. Pour a small amount of the boiling mixture on 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 so that the sirup runs over its side. At first the sirup runs off the spoon in a steady stream then separates into distinct lines. Later the drops become heavier and run off slower. When jelly is done, the drops run together and break from the spoon in a sheet, leaving the spoon clean.

JELLY MAKING, ARTIFICIAL SWEETENERS

Artificial sweeteners cannot be substituted for sugar in recipes for jellied products. The artificial sweetener does not react with pectin to form a gel. There are some recipes in the Ball Blue Book in the Special Diet section for fruit spreads, some made with unflavored gelatin. The Kerr Home Canning and Freezing Book also has some recipes in the section Canning for the Diabetic. The texture of products made with gelatin is different--more like a gelatin dessert than jelly. Some people object to the after taste of the artificial sweetener.

There is a commercial product SLIM SET marketed by MCP Foods, Inc. which can be used with fruit juice and an artificial sweetener for a jelly-like product. It contains a vegetable gum. The products made with it are quite stiff and not very spreadable. And there's still the problem of the after taste.

There is a special pectin (low methoxy-pectin) which will set up with calcium chloride--no sugar is needed. This pectin has not been generally available to consumers. Mrs. Wages Light Home-Jell is a low methoxy-pectin. I understand that General Foods and MCP will market a low methoxy-pectin in 1984.

JELLY MAKING, ARTIFICIAL SWEETNERS (CONTINUED)

One other point about jellied products made with an artificial sweetener is that they will spoil. The high sugar content of traditional jellies protects against spoilage. The artificial sweetener does not protect against spoilage. Jellied products made with an artificial sweetener must be processed like fruit juice if they are to be stored at room temperature. A better alternative is to make as needed and store in the refrigerator or freeze.

JELLY MAKING, CORN SIRUP

Light corn sirup can replace up to one-fourth of the sugar in jellies without added pectin; up to one-half of sugar in recipes with added pectin; and up to 2 cups of the sugar in recipes with liquid pectin.

JELLY MAKING, HONEY

Honey can be used to replace some of the sugar in jams and jellies but will give the product a distinctive flavor.

Honey can replace up to one-half of the sugar in recipes without added pectin.

In recipes 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 3/4 to 1 cup of the sugar with honey.

JELLY MAKING, JUICE EXTRACTION

Fruits are usually heated to make juice extraction easier. The extraction of pectin is also more complete as some of the protopectin is converted to pectin by boiling the fruit in the presence of the acid in the fruit. More pectin is found in the pulp than in the juice.

Wash fruit carefully. Use some underripe fruit to increase the pectin and acid content. This is especially important if you are planning to make jelly without adding pectin. Remove caps, stems and damaged areas. Cut large fruits such as apples into pieces but don't peel or core. Place fruit in a large pan. Add enough water to cover apples and other hard fruits. For berries and grapes, use just enough water to prevent scorching. Bring to a boil. Grapes and berries need to simmer 5 to 10 minutes; apples and other hard fruits need 20 to 25 minutes to be soft enough to extract the juice.

Pour the cooked fruit into a jelly bag. You may buy a jelly bag or make your own using several thicknesses of closely woven cheesecloth. The clearest jelly comes from juice that drips through the jelly bag without any pressure. You can increase the yield of juice by twisting or squeezing the bag but some pulp will be extracted along with the juice. The resulting jelly will be slightly cloudy.

JELLY MAKING, JUICE EXTRACTION (CONTINUED)

Any fresh fruit may be canned or frozen as fruit or juice to be used in jellied products at a later date. Both fruit and juice should be canned or frozen without sweetening.

Unsweetened commercially canned or frozen fruit or juice can also be used in jellied products.

JELLY MAKING, PECTIN

See Pectin

JELLY MAKING, SUGAR

Sugar obviously adds flavor to the jellied product 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 sugar is less sweet than beet or cane sugar so jellies made with it will taste less sweet. Corn sugar is not as soluble as cane and beet sugars so you are more apt to get sugar crystals. This is particularly true if the jellies are stored at low temperatures.

Reducing the amount of sugar in jams and jellies won't result in a less sweet product! A certain amount of sugar is necessary for a jelly or jam to set up. If you reduce the amount of sugar, then you'll have to boil the product longer to evaporate enough moisture to reach the desired level of sugar concentration.

Most of the pectin on the market requires 50 to 65% sugar to form a gel. Commercial jellies must be 45 parts (by weight) fruit juice to 55 parts sweetening ingredients and that's about par for homemade products.

For jellies made without added pectin, usually 3/4 to 1 cup sugar is used per cup of juice. The ratio is higher for those with added pectin--1 to 1½ cups sugar per cup of juice. That's why the cooking time is shorter--not much moisture has to be evaporated.

Too much sugar may be more of a problem than too little. If the sugar concentration is higher than 75%, crystallization is likely to occur.

JELLY PROBLEMS, BUBBLES

Bubbles may result from pouring up jelly after it has started to set or it starts to set as it is being poured up. These bubbles are trapped and do not move.

Bubbles can also indicate spoilage. If new bubbles are forming or if there's a winey or vinegary odor, then jelly is spoiling.

JELLY PROBLEMS, CLOUDY

The first step in making jelly--juice extraction--or the last--pouring up the jelly may be the cause of cloudy jelly. Underripe fruit, or fruit which is allowed to cook too long, or more pulp is extracted because juice is made from underripe fruit or from overcooked fruit, or if force is used to squeeze the juice through the jelly bag. To avoid, use firm-ripe fruit, cook until just tender, and let juice drip through the jelly bag.

At the other end of the process, jelly starts to set up as soon as it begins to cool. A delay in pouring it up or pouring it up very slowly allows the jelly to start to set up. That jelled portion traps air bubbles giving the product a cloudy appearance. The solution is to work faster. Have jars ready so jelly can be poured up quickly.

JELLY PROBLEMS, COLOR CHANGES

Color changes are of two types--one is caused by oxidation of the pigment at the top of the container; the other is a fading of color pigments all through the jar. Exclusion of air will keep the first from happening. Paraffin will work but a more effective treatment is to process for a few minutes in a boiling water bath canner. The heat treatment will drive air out of the jar. Note that the headspace for jams and jellies is just 1/8 inch.

Red fruits fade easily. The extent of fading is greater if the jelly is stored in a warm, light place.

JELLY PROBLEMS, CRYSTALS

Crystals in jelly are usually sugar crystals. They may result when too much sugar is used (there was not enough liquid to dissolve the sugar) or when the mixture is not heated long enough to get the sugar crystals into solution, or when there's an excessive evaporation of moisture due to cooking the product too long. Occasionally, sugar crystals which remain on the side of the cooking pan are poured up with the jelly. These crystals attract other crystals.

Grape jelly may have crystals of tartaric acid. They are harmless but can be prevented by allowing grape juice to stand in the refrigerator overnight. Most of the tartaric acid will settle to the bottom. Pour off juice carefully to avoid disturbing the sediment. Strain the juice through two thicknesses of cheese cloth or a jelly bag to remove any sediment.

JELLY PROBLEMS, FLOATING FRUIT

The pieces of fruit in jams and preserves may float leaving clear sirup at the bottom of the container. This may be due to the use of unripe fruit, inadequate crushing or grinding of fruits, too short a cooking time, or improper packaging.

JELLY PROBLEMS, FLOATING FRUIT (CONTINUED)

Various methods have been suggested to keep fruit from floating. One method is to stir the product occasionally for a 5 minute period after cooking and before pouring into containers.

Others swear that inverting the jars immediately after filling will prevent floating.

Some recipes suggest letting the fruit-sugar mixture set for several hours.

JELLY PROBLEMS, GUMMY

Gummy jelly may result from overcooking. The sugar is changed to invert sugar, a sirupy product.

JELLY PROBLEMS, SIRUPY

An imbalance of ingredients causes sirupy jelly. Too little pectin, or acid or too little or too much sugar can be the problem. That's why recooking is not always successful.

JELLY PROBLEMS, SOFT

Soft jellies may result from an imbalance of ingredients: too much juice for the amount of sugar or conversely too little sugar for the amount of juice or too little acid. Use of overripe fruit or omission of lemon juice if it is included in recipe may result in too little acid. Making too large a batch of jelly at a time (doubling the recipe) may also result in a soft product.

Soft jellies can sometimes be improved by recooking. For best results, work with only 4 to 6 cups of jelly at a time.

To remake with powdered pectin. Measure the jelly to be recooked.
4 cups jelly
1/4 cup water
4 teaspoons powdered pectin
1/4 cup sugar

Combine the pectin and water in a deep saucepan and bring to a boil stirring constantly. Add the jelly and sugar. Stir thoroughly. Bring to a full rolling boil over high heat, stirring constantly. Keep at full rolling boil for 1/2 minute. Remove jelly from the heat, skim, pour into hot containers, and seal.

JELLY PROBLEMS, SOFT (CONTINUED)

To remake with liquid pectin. Measure the jelly to be recooked.
4 cups jelly
3/4 cup sugar
2 tablespoons lemon juice
2 tablespoons liquid pectin

Bring jelly to boiling over high heat. Quickly add the sugar, lemon juice, and pectin and bring to a full rolling boil, stirring constantly. Boil mixture hard for 1 minute. Remove jelly from the heat, skim, pour into hot containers, and seal.

To remake without added pectin. This is simply a matter of cooking the jelly again without added ingredients. Bring jelly to a full rolling boil. Test for doneness using a thermometer, the sheet test, or the refrigerator test. When done, remove jelly from the heat, skim, pour into hot containers, and seal.

JELLY PROBLEMS, STIFF

Stiff jellies may result from too much pectin. This problem is rarely caused by adding more pectin than the recipe calls for but more usually is the result of using underripe fruit which contains more pectin than fully ripe fruit.

Stiff jellies may also result from overcooking.

JELLY PROBLEMS, WEEPING

Syneresis or weeping (the separation of liquid from the gel) usually occurs in jellies that are high in acid. It may also be seen in jellies that have been stored for a long time or under less than ideal conditions.

JELMETER

Available from the American Wine Supply, 3716 North Sherman Drive, Indianapolis, Indiana 46218 for $2.00 each or $1.50 each in lots of one dozen.

JERUSALEM ARTICHOKE

See "Artichoke, Jerusalem"

KOHLRABI, FREEZING

Select young, tender, mild flavored kohlrabi, small to medium in size. Cut off tops and roots. Wash, peel, and leave whole or dice in 1/2-inch cubes.

Heat in boiling water:

Whole kohlrabi	3 minutes
Cubes.	1 minute

Cool promptly in cold water and drain.

Pack whole kohlrabi into containers or wrap in moisture-vapor-resistant material. Pack cubes into containers, leaving 1/2-inch headspace. Seal and freeze.

KUTA SQUASH

Kuta squash was introduced in 1981. The name Kuta comes from an Indian work "askutasquash" which means "fruit eaten raw." Young squash can be eaten raw--they are crisp and smooth, have a mild, sweet nutty flavor, and an attractive lime green skin. Fruits of intermediate maturity have the texture of eggplant and may be used like it in cooking. The fully mature fruits turn a butternut yellow and are excellent for winter storage, for baking or stuffing as a winter squash.

Kuta squash has just 20 calories per 100 grams. It retains a firmer texture than other squash when cooked.

LETTUCE, BROWN SPOTS

The California Iceberg Lettuce Commission says that rust or russet spotting occurs most often in overmature heads and can be brought out by variables in storage temperature or exposure to ethylene gas which is given off naturally by fresh fruits like pears, bananas, and apples as they ripen. If Iceberg lettuce is shipped or stored with such fruits, russet spotting can result.

LIMA BEANS, CANNING

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 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Fill jar to 1/2 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°F).
Pint jars . . . . . 40 minutes
Quart jars . . . . 50 minutes

Hot pack. Cover beans with boiling water and bring to boil. Pack hot beans with boiling water and bring to boil. Pack hot beans loosely to 1 inch of top. 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°F).
Pint jars . . . . . 40 minutes
Quart jars . . . . 50 minutes

LIMA BEANS, FREEZING

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 . . . . 2 minutes
Medium beans or pods . . . 3 minutes
Large beans or pods . . . . 4 minutes

Cool promptly in cold water and drain.

Pack into containers, leaving 1/2-inch headspace. Seal. Freeze; store at 0°F or below.

LIME

Lime is used in many old pickle recipes to give firmness to pickle products. Use of lime is similar to the commercial use of calcium chloride in canned potatoes, tomatoes, and apples as a firming agent. Lime in the quantities used is not a preservative. Fermentation and spoilage will occur if soaking period is extended.

It is possible to make good quality pickles without lime. Few recent pickle recipes call for lime.

Pickling lime is sold in some supermarkets for those who have to have it. If that's not available, use slaked, builder's or household lime. Slaked lime is lime plus water (calcium hydroxide). Field lime can be used but it is not food grade. Most of the dirt will settle out during the brining process. Do not use quick lime (calcium oxide).

The amount used is relatively small. If too much is used, then pickles may be hard and brittle rather than firm and crisp.

Do not reuse lime solution for second batch of pickles as it will have been diluted and contaminated.

LIQUID LOSS, CANNED FOODS

Perhaps the most common cause of liquid loss is incorrect use of the pressure canner. Loss of liquid may occur if there are wide fluctuations in the temperature during processing. This can happen if the surface unit used does not have a heat setting which will keep the pressure constant. The user must anticipate changes in temperature and make needed adjustments.

Another cause of liquid loss is speeding the cooling of the canner by setting it in a draft, covering it with cold towels, or even allowing cold water to run over the canner.

Excess air left in the jar or in food can also cause a lowered liquid level after processing. Raw packed foods are especially vulnerable. Raw foods contain a good bit of air. If jars are underfilled, the level will drop when air is expelled from the jar during processing. On the other hand, an overfill will result in liquid boiling out of the jar during processing.

Some starchy vegetables such as corn and lima beans absorb water during processing so the liquid level is lowered.

You may wonder how liquid escapes from the jars after the lid is in place. Jar lids are designed to allow air to escape during processing. Liquid can escape in the same way. Sealing occurs after processing when the jars have cooled enough for a vacuum to develop inside the jar which pulls the lid down. A good seal has two things going for it--contact between the jar and the sealing compound of the lid and a vacuum which exerts downward pressure.

LIQUID LOSS, CANNED FOODS (CONTINUED)

What should you do about jars of food which have lost liquid? Nothing. If you opened the jars to add liquid, you'd need to start with a new lid and reprocess the food. Pieces of food not covered by liquid may discolor and soften but will be safe to eat.

LOGANBERRIES

Loganberries are a trailing blackberry variety of California origin. Berries are large, long, dark red, acid and high flavored.

The package inserts in commercial pectin products have recipes for using dewberries, boysenberries, and loganberries.

LOW-METHOXYL PECTIN

This special pectin sets up with calcium chloride--no sugar is needed. It is used in commercial dietetic jellies. It has not generally been available to consumers. Walnut Acres Mill and Store, Penn's Creek, PA., 17362, was our only source and one had to buy by the pound. Mrs. Wages Light Home-Jell is now available and I understand that General Foods and MCP will also offer low-methoxyl pectins for sale in 1984.

LYE

Lye is an alkaline compound which has varied uses in food preservation. It is probably used most frequently in the making of hominy but it is also used in peeling peaches and other fruits, in cracking the skins of fruits before drying, and in making homemade soap.

Lye is a highly caustic compound and must be handled with care. It is activated by moisture--even the small amount in the air--and can cause serious burns to the body. If lye comes in contact with the skin, wash immediately with water.

Use only stainless steel, glass, or unchipped enamelware containers. Lye in contact with other metals will form salts that change the color and flavor of food and introduce a health hazard.

To dispose of a lye solution, pour it carefully down the drain. Rinse with large amounts of cold water. Or pour the lye solution into the toilet bowl and flush several times.

MARASCHINO CHERRIES

A white or bleached cherry processed in a flavored sugar solution. Originally, maraschino cherries were soaked in the liqueur Maraschino but today, a sugar sirup is used. Maraschino cherries are artifically colored either red or green.

The liqueur Maraschino is made from the small marasca cherry grown primarily in Yugoslavia.

The 29th edition of the Ball Blue Book issued in 1974 had these directions for Home style maraschino cherries.

"Wash, stem and pit Royal Anne or other light cherries. Save juice and pits. Place cherries in shallow pan and cover with sirup made with 3 parts sugar to 1 1/2 of cherry juice (add water if there is not enough juice). Add a few drops of red vegetable coloring. Boil gently 10 minutes. Remove from heat and let stand 6 to 12 hours. Drain cherries and pack into jars. Crush cherry pits (using 1/2 cup crushed pits to 1 quart sirup drained from cherries). Tie pits in cheesecloth and add to sirup. Boil 5 minutes or until the desired flavor is obtained. Remove pits. Pour boiling sirup over cherries. Seal. Process in boiling water bath for 20 minutes.

MARMALADE

Clear, transparent jelly-like mixtures with slivers of fruit and/or peel evenly suspended in the jelly. Marmalade generally contains citrus.

MEAT, CANNING

These procedures can be used for all red meats--beef, veal, pork, lamb, mutton--and for large game animals.

The tender portions of the carcass can be canned in fairly large pieces (they do have to be small enough to fit into the jar or can). Less tender cuts should be canned in smaller pieces as for stews or ground. Bony pieces can be used for soups.

The hot pack method is probably the most logical choice for home canners. In the raw pack method, you do pack raw meat into jars but you end up cooking it in the jars for a fairly long time before you put on the jar lids and start to process under pressure.

If any amount of meat is added to a food (bacon to green beans, ground beef to tomato sauce, chicken to a soup mixture, etc.), then the food must be processed for the length of time required for meat.

Cut-up meat. Cut meat carefully from the bone. Trim away as much of the fat as possible without unduly slashing the lean. Cut meat into strips or chunks. Strips should be cut with the grain of the meat running lengthwise and may vary in thickness from 1 to 2 inches to jar mouth width.

MEAT CANNING (CONTINUED)

Hot pack. Put meat in large shallow pan; add just enough water to keep from sticking. Cover pan. Precook meat slowly until medium done. Stir occasionally so meat heats evenly without sticking.

Pack hot meat loosely into jars leaving 1 inch of headspace. Add 1/2 teaspoon salt to pints or 1 teaspoon salt to quarts. Cover meat with boiling meat juice, adding boiling water if needed. Leave 1 inch of headspace. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pints . . . . . 75 minutes
Quarts . . . . 90 minutes

Raw pack. Pack raw meat loosely into jars. Leave 1 inch of headspace. Set open jars on a rack in boiling water. Water level should be about 2 inches below tops of jars or cans. Cover the pan. Cook meat in containers at slow boil until temperature at center of jars reaches 170°F or until medium done (about 75 minutes). Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 75 minutes
Quart jars . . . . 90 minutes

Ground meat. Grind fresh, clean, cold meat. Don't mix leftover scraps with fresh meat. Don't use lumps of fat.

If desired, add 1 level teaspoon of salt per pound of ground meat. Mix well. The raw pack method is not suitable if using glass jars as the ground meat is too difficult to get out of the jars.

Hot pack. Shape ground meat into fairly thin patties that can be packed into jars without breaking.

Precook patties in slow oven (325°F) until medium done. (When cut at center, patties show almost no red color.) Skim fat off drippings; do not use fat in canning.

Pack patties into jars leaving 1 inch of headspace. Cover with boiling meat juice to 1 inch of top of jars. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 75 minutes
Quart jars . . . . 90 minutes

According to Presto, beef, pork, veal, and lamb can be processed at 15 pounds pressure for 50 minutes.

Sausage. Prepare sausage using any tested recipe. Use seasonings sparingly as they tend to change in flavor on canning and storage. Omit sage as it gets bitter. Shape sausage into patties and proceed as for ground meat.

MEAT, CANNING (CONTINUED)

Meat-Vegetable Stew - RAW PACK

Combine
2 quarts beef, lamb, or veal cut in 1½-inch cubes
2 quarts potatoes, pared or scraped, cut in 1/2-inch cubes
2 quarts carrots, pared or scraped, cut in 1/2-inch cubes
3 cups celery cut in 1/4-inch pieces
7 cups small whole onions, peeled

Fill jars to top with raw meat-vegetable mixture. Add salt if desired: 1/2 teaspoon to pints, 1 teaspoon to quarts. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 60 minutes
Quart jars . . . . 75 minutes

MEAT, FREEZING

Freezing meat is the simplest and most effective means of extending its storage life. Microorganisms which cause meat to spoil are not active at freezer temperatures. There is some loss of quality, however. The extent of the quality loss is dependent on a number of factors--the length of storage both before and after freezing, the storage temperature, the amount and type of fat in the meat, the form of the meat (ground, smoked, etc.) and the packaging of the product.

The flavor of meat is affected by freezer storage. The fat will eventually become rancid. Rancidity development is more rapid if the fat is unsaturated, or if there are heme pigments in the meat, or if salt is added, or if oxygen is trapped in the package. Several factors may affect any one food. For example, pork sausage has been ground exposing more surface area to oxygen, has heme pigments, fat which is unsaturated, and contains added salt. That's why the storage times are relatively short for sausage and other cured meats. Larger pieces of meat have a longer storage life.

Cooked meats have a shorter storage life than fresh meats. The flavor change in cooked meat has been described as first a stale flavor and ultimately a rancid flavor. The flavor change can be delayed by excluding as much oxygen as possible. An obvious way to accomplish this would be with careful packaging. Freezing as a large piece to minimize the surface area or covering the meat with a gravy or sauce can also help delay the development of rancidity.

The effect of freezing and freezer storage on meat tenderness is not clear. Some studies have shown that freezing increases the tenderness of meat, others have shown that freezing decreases tenderness while still others have shown no effect from freezing.

Texture changes may result from the breakdown of tissues by ice crystals and by the movement of water from the tissue. Thawing may be a greater cause of damage than freezing as the food stays near the freezing point for an extended period of time. When the ice crystals melt, the moisture can go back into the food or be lost in the drip. Rapidly frozen meat loses less drip than slowly frozen meat. Food thawed slowly (in the refrigerator) will retain more moisture than

MEAT, FREEZING (CONTINUED)

food thawed rapidly. In general, as the length of the storage period increases, the amount of drip increases. There is always some drip loss, however.

Prepackaged fresh meat may be frozen and stored in the freezer for one or two weeks without rewrapping. Just be sure there are no tears in the wrapping that would allow air to penetrate. For longer storage, rewrap or overwrap.

If slaughtering meat at home, hang meat and chill at a temperature of 33° to 36°F. The temperature of the meat should be down to 40°F within 24 hours. Leave pork and veal hanging in the chill room for 1 to 2 days; beef and lamb for 5 to 7 days.

Package in quantities to be cooked at one time. Separate chops, steaks, and patties with a layer of waxed paper so that individual frozen pieces can be separated easily. Wrap in heavy-duty aluminum foil or transparent polyethylene, in heavy-duty plastic bags, or specially coated freezer paper. Freezer containers may be used when the meat can be made to fit the container.

Wrap meat tightly pressing as much air from the package as possible. Seal the package and label it.

Freeze the meat immediately at minus 10°F. Leave space between packages to speed the freezing process. Try to avoid freezing a large quantity of meat at one time. Once the meat is frozen, maintain at 0°F. Higher temperatures and fluctuations of temperature cause the meat to lose quality.

Storage Periods

The recommended storage periods for home-frozen meats held at 0°F are given below. For best quality, use the shorter storage time.

Product	Storage period (months)
Beef:	
Ground meat	3 to 4
Roasts	6 to 12
Steaks	6 to 12
Stew meat	3 to 4
Lamb:	
Chops	6 to 9
Ground meat	3 to 4
Roasts	6 to 9
Stew meat	3 to 4

Product	Storage period (months)
Pork, cured:[1]	
Bacon	1 month or less
Ham	1 to 2
Pork, fresh:	
Chops	3 to 4
Roasts	4 to 8
Sausage	1 to 2
Veal:	
Cutlets, chops	6 to 9
Ground meat	3 to 4
Roasts	6 to 9
Organ meats	3 to 4

[1] Frozen cured meat loses quality quickly and should be used as soon as possible.

MELONS, FREEZING

Select firm-fleshed, well-colored, ripe melons--cantalope, crenshaw, honeydew, Persian, or watermelon.

Cut in half, remove seeds, and peel. Cut melons into slices, cubes, or balls. Pack into containers and cover with cold 30% sirup (1 cup sugar to 2 cups water). Leave needed headspace. Seal, label, and freeze.

Melons other than watermelon can be frozen, crushed or chopped. Add 1 tablespoon sugar to each quart of crushed fruit, if desired. Stir until sugar is dissolved. Pour into containers, leaving needed headspace. Seal, label, and freeze.

MICROORGANISMS

Microorganisms are small unicellular or multicellular living entities that require the use of the microscope for direct observation. Although different types of microorganisms cause foodborne illness, most outbreaks are caused by bacteria.

MICROWAVE BLANCHING

Olson, Wolf, and Olson of the University of Minnesota in a publication entitled Using Microwave Ovens say: "Directions for microwave blanching of vegetables prior to freezing are now published by a number of microwave oven manufacturers. These directions include a range of times for heating a given amount of vegetable, for example "microwave until the vegetable has a bright color throughout--from 2 to 4 minutes." These time ranges were developed by making judgments on the palatability of frozen products after a short period of storage. While there is no hazard to health connected with microwave blanching of vegetables, there is no assurance that these blanching times are sufficient to destroy enzymes which will cause nutritional and sensory deterioration of the vegetable. These timetables for microwave blanching are not the result of research conducted to determine the length of microwave exposure needed to inactivate enzymes."

General rules for blanching in the microwave:

1. Use only the amount of vegetables and water specified.
2. Cover all vegetables during cooking.
3. Cook at HIGH for the minimum time specified, stirring after half the time has elapsed.
4. Check after minimum cooking time--vegetables should be evenly heated with bright color throughout.
5. Continue cooking for maximum time, if needed.
6. Plunge into ice water at once and thoroughly chill to stop cooking.
7. Drain well.
8. Package, label, and freeze.

In 1981, a study was conducted at Virginia Tech to evaluate microwave vs. conventional blanching methods by testing the efects of both on quality factors (color, texture, flavor, and overall acceptability) of broccoli, carrots, cauliflower, green beans, and zucchini squash and to determine the storage stability of the vegetables by examining the quality factors after one, two, four and six months of frozen storage.

MICROWAVE BLANCHING (CONTINUED)

The five vegetables were blanched using both conventional and microwave recommendations and then stored frozen at 0° F. At the end of one, two, four, and six months of frozen storage the vegetables were analyzed. Significantly higher residual peroxidase activity of between 60 and 85% was found in broccoli, green beans, and zucchini after microwave blanching. All the water blanched vegetables and microwave blanched carrots and cauliflower were adequately blanched (less than 5% residual peroxidase activity). The texture of all microwave blanched vegetables, except zucchini, was consistently firmer than that of the water blanched vegetables. The firmness was translated as "toughness" by the sensory panel. Microwave blanched zucchini had an extremely limp texture and appeared to have been overcooked in the process. Water blanched vegetables retained significantly more chlorophyll than did microwave blanched samples. In general, all quality factors of the water blanched vegetables were judged to be superior by a sensory panel, although no significant differences were found between cauliflower and carrots blanched by either method. The quality factors of the microwave blanched vegetables deteriorated over time, with significant differences in texture and flavor occurring after six months of frozen storage.

The results of this study suggest that some vegetables are more suitable for blanching in the microwave oven than others. Carrots and cauliflower produced favorable results when blanched by both methods. However, microwave blanching profoundly affected the color, texture, flavor, and overall acceptability of broccoli and green beans resulting in tougher vegetables which exhibited low chlorophyll retentions and off-flavors. Microwave blanching also produced an undesirable dark color and an undesirable limp texture in zucchini.

In addition to the problems of obtaining an inadequate blanch with the microwave oven, this method seems to be rather impractical and inefficient for the consumer to use routinely for blanching. The process of blanching in the microwave oven requires about twice as much time per pound of vegetables as the conventional method of blanching. In addition, constant attention is required during blanching so that the vegetables are stirred halfway through the blanching period and then timed again to finish the blanch.

MICROWAVE BLANCHING (CONTINUED)

Vegetable	A[1]	B[1]
Asparagus, 1 lb. cut into 1 inch pieces	2 quart casserole ¼ cup water 2½ to 3½ minutes	1 quart casserole ¼ cup water 4½ minutes
Beans, green, 1 lb. 1 to 2 inch pieces	1½ quart casserole ½ cup water 3½ to 5½ minutes	- - -
Broccoli, 1 to 1½ lbs. 1 to 2 inch pieces	2 quart casserole ½ cup water 3 to 5 minutes	1½ quart casserole 1/3 cup water 6 minutes
Carrots, 1 lb. sliced	1½ quart casserole ¼ cup water 3½ to 5½ minutes	- - -
Cauliflower, 1 head cut into flowerets	2 quart casserole ½ cup water 3 to 5 minutes	2 quart casserole 1/3 cup water 6 minutes
Corn on the Cob 6 ears	- - -	12 x 8-inch dish No water 5½ minutes
Corn, cut from Cob 4 cups	- - -	1½ quart casserole No water 4 minutes
Peas, shelled 2 cups	1 quart casserole ¼ cup water 3 to 4½ minutes	- - -
4 cups	- - -	1½ quart casserole ¼ cup water 4½ minutes
Snow peas 4 cups	- - -	1½ quart casserole 1 Tbsp. water 3 minutes
Spinach, 1 lb.	2 quart casserole No water 2 to 3 minutes	2 quart casserole No water 4 minutes
Squash, summer, 1 lb. sliced or cubed	1½ quart casserole ¼ cup water 2½ to 4 minutes	- - -

[1] Times in Column A are put forth by General Electric while those in Column B come from the Microwave Cooking School.

According to the GE cookbook, other vegetables can be blanched by following the directions for the fresh vegetable but omit salt and use 1/4 to 1/3 of the cooking time.

MILK, PASTEURIZATION

Pasteurization destroys disease-causing bacteria which may be found in milk. Pasteurization also improves and extends the keeping quality of milk by destroying microorganisms and inactivating certain enzymes which may cause flavor changes and/or spoilage.

The time-temperature relationship is important. If the milk is underheated, disease-causing bacteria may survive. If milk is overheated, it will develop a flavor that varies from cooked to scorched, depending on the degree and length of overheating.

It is possible to buy a pasteurizer for use at home and that may be the most efficient alternative. It can be done without a pasteurizer if you have a thermometer.

Paul Large of the Food Science and Technology Department has described three methods in a release entitled "Milk Pasteurization Facts".

In a jar or bottle. Be certain that the jar or bottle is heat resistant, such as that used to preserve foods. Make a hole in the cover of sufficient size to insert the thermometer to be used. With the cover removed, pour the milk to be pasteurized into the container. Fill to within one inch from the top to allow room for expansion of the milk when heated.

Replace the cover, insert the thermometer, and place the container in a deep pan or pail. Pour warm water into the pan or pail until the water is level with the milk. Heat the water until the thermometer in the milk registers 145°F (62.8C).

When 30 minutes time has elapsed, gradually replace the hot water with cold water to allow time for the glass of the container to contract; a few minutes in water is sufficient. Cool the container of milk in ice water to 40°F (4.4C) or lower. Store at 40°F or below.

Saucepan on direct heat. A saucepan with a cover is needed. Pour the milk into the saucepan. The procedure for home pasteurizing by this method follows:

1. Place saucepan with milk over direct heat and place thermometer and metal spoon in the milk. DO NOT USE a glass thermometer to stir milk, and be careful not to strike thermometer with spoon during stirring. Heat milk, with constant stirring, until it reaches 165°F (73.9C). Continuous stirring is necessary to achieve even heating and to prevent formation of a scorched film.

2. When milk reaches 165°F (73.9C), place pan of milk into a larger pan which contains cold water. Discard the water when the temperature of milk and surrounding water are within a few degrees.

3. When the temperature has been lowered as far as possible with cold tap water, place ice in the water and cool, with occasional stirring, until the temperature of the milk is 40°F (4.4C) or below.

MILK, PASTEURIZATION (CONTINUED)

Double boiler, indirect heat. A double boiler requires more time to achieve the proper temperature during heating. However, one is less likely to scorch the milk than when heating in a saucepan in direct contact with the heat. Using a two-piece double boiler, with lid, follow the procedure given below.

1. Place enough water in the lower-outer part in boiler pan to reach the bottom of the inner-top pan. Heat water to a rolling boil. Place top with milk over the water in the boiler pan. Cover the top pan.

2. Keep water boiling and keep covered until the temperature reaches 165°F (73.9C). Check the temperature occasionally. It is possible, with experience, to estimate the time required for the desired temperature to be achieved, making it necessary to make only a final temperature check.

3. When the temperature of the milk reaches 165°F., remove the pan containing the milk and place it in cold water. As the cooling water becomes warm, replace it, or put ice in the water. Continue to cool the milk until the temperature is 40°F (4.4C) or below.

MINT JELLY

There are a variety of Mint Jelly recipes. There's one in the USDA bulletin How to Make Jellies, Jams and Preserves At Home, one in the Ball Blue Book, and yet another in the Kerr Home Canning and Freezing Book.

MOLDS

Molds like other microorganisms are sometimes used to produce desirable changes in foods (e.g. blue cheese) but they are more often associated with food spoilage. Molds are microscopic plants made up of several cells. Only part of the mold is visible. The hyphae, or vegetative part, extends below the surface like roots. The head contains spores that can spread through the air and start new mold plants. Under favorable conditions, these spores germinate and produce a fluffy growth, often white or gray, but sometimes bluish-green or other color depending on the variety.

Molds grow on a wider variety of foods than do yeasts or bacteria. They are not deterred by acid or by high concentrations of salt or sugar.

Most molds do require air for growth. Molds are most likely to develop in warm, damp, dark places although in general they require less moisture for growth than yeasts or bacteria. Most molds grow well between 77° to 86°F (25° to 30°C) and a few grow well above 95° to 99°F (35 to 37° C). Some mold growth can be expected at refrigerator temperatures and a few molds grow slowly at freezing temperatures.

MOLDS (CONTINUED)

One mold Byssochlamys has been found which not only survives the short processing time previously recommended for applesauce but can grow in the absence of air. The processing time for applesauce has been increased to 20 minutes.

Molds can be destroyed by boiling the food for a few minutes. Most molds can be destroyed by heating to 140°F (60°C) for 5 to 10 minutes. This is the reason why it is now recommended that jams, jellies, preserves, pickles, and relishes be processed for a few minutes in a boiling water bath.

A few molds have been found to produce toxins. The best known is aflatoxin, a word derived from Aspergillus flavus, the name of the mold that produces it. A. flavus is found most often on tree nuts and ground nuts (peanuts); cereal grains, such as corn and wheat; and oilseeds, such as cottonseed. Aflatoxin is a carcinogen which cannot be destroyed by heat or effectively removed by other food processing. It is important that drying and storage conditions after harvest eliminate toxin production.

What about the safety of foods showing mold growth? Keep these points in mind.

1. As yet, toxin production has not been associated with the molds that commonly grow on food products.
2. Mold growth will be most extensive at points where free air is readily available. You shouldn't find mold growing down in jelly or inside a block of cheese.
3. Remember that only part of the mold growth is visible; that the mold has roots under the surface. Remove and discard some of the food along with the mold.
4. Processing of canned foods by recommended methods (whether in a water bath or pressure canner) should destroy mold spores eliminating the potential for mold growth. Processing should also result in the removal of air from the jar. If mold is present on canned foods, they were probably not adequately processed. The mold itself may not be harmful but other kinds of spoilage may have occurred.

MULBERRIES, JELLY

Euell Gibbons in his book Stalking the Wild Asparagus has a chapter on mulberries. It includes directions for making Mulberry Jelly. He says mulberries lack pectin so this must be added. To make juice and then jelly, "Add 1/2 cup of water to 2 quarts of berries and simmer for 5 minutes. Then thoroughly crush the berries and simmer for 10 minutes more. Strain out the juice through a cheesecloth jelly bag. To 1 quart of juice, add the juice of 1 lemon and 1 package of powdered pectin. Bring just to a boil, then add 5½ cups of sugar. Bring to a boil again and boil hard for 1 minute. Skim, pour into jars, and seal."

MUSHROOMS, CANNING

Trim stems and discolored parts of mushrooms. Soak mushrooms in cold water for 10 minutes to remove adhering soil. Wash in clean water. Leave small mushrooms whole; cut larger ones in halves or quarters. Steam 4 minutes or heat gently for 15 minutes without added liquid in a covered saucepan.

Pack hot mushrooms into clean jars leaving 1/2-inch headspace. Add 1/4 teaspoon salt to half pints; 1/2 teaspoon to pints. For better color, use an antidarkening agent. Add boiling-hot cooking liquid or boiling water to cover mushrooms, leaving 1/2-inch headspace. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Half pint jars . . . . . 30 minutes
Pint jars . . . . . 30 minutes

According to Presto, mushrooms can be processed at 15 pounds pressure for 20 minutes.

MUSHROOMS, DRYING

Drying Foods At Home

Scrub thoroughly. Discard any tough, woody stalks. Cut tender stalks into short sections. Do not peel small mushrooms or "buttons." Peel large mushrooms, slice. Blanching not required. Dry in a dehydrator (140°F) for 3½ hours, or in an oven (140°F) for 3 to 5 hours, or in the sun (98° to 100°F) for 6 to 8 hours.

The toxins of poisonous varieties of mushrooms are not destroyed by drying or by cooking.

MUSHROOMS, FREEZING

Choose mushrooms free from spots and decay. Sort according to size. Wash thoroughly in cold water. Trim off ends of stems. If mushrooms are larger than 1 inch across, slice them or cut them into quarters.

Mushrooms may be steamed or heated in fat in a fry pan.

To steam. Mushrooms to be steamed have better color if given antidarkening treatment first.

Dip for 5 minutes in a solution containing an antidarkening agent. Then steam:

Whole mushrooms (less than 1") . . . 5 minutes
Buttons or quarters . . . . . 3½ minutes
Slices . . . . . 3 minutes

Cool promptly in cold water and drain.

To heat in fry pan. Heat small quantities of mushrooms in table fat in an open fry pan until almost done.

Cool in air or set pan in which mushrooms were cooked in cold water.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

MUSHROOMS, SELECTING

Select fresh mushrooms which are firm and smooth. Normal color is white to pallid brown. All mushrooms will eventually oxidize and turn dark. This process is slowed at refrigerator temperatures. A darkened or spotted mushroom is not necessarily old but instead may be bruised. An open veil--the membrane between the cap and the stem--is a sign of age and will have allowed for some moisture loss.

Mushrooms will keep in the refrigerator for a week. Discard if they become mushy soft and slippery surfaced.

Handle mushrooms gently. Rinse in cool water; do not soak. Do not peel as much of the flavor and nutritive value is in the skin. If the bottom of the stem looks dry and brown, trim away a thin slice and discard.

NUTRIENT LOSSES IN PRESERVED FOODS

A frequent question has to do with the nutritive value of preserved foods. Most of the studies of nutrient loss in food processing have dealt with commercial methods of food preservation but it can be assumed that results would be similar for home processed products.

The actual nutrient loss is not the only factor to be considered. Consider these factors as well.

1. Nutrient losses in processing may be instead of, rather than in addition to, those that occur in cooking. Losses during blanching and storage may be offset by the shorter cooking times required for frozen than for fresh vegetables.
2. Processing extends the period of availability of foods. Without processing, a number of foods would be unavailable at some times of the year.
3. Some nutrients are lost from fresh food. Spinach loses 50% of its original vitamin C content in about 2 days at 68°F.
4. Processing actually helps to conserve some nutrients.
5. Nutrient losses must be weighed against the advantages of processing. For example, pasteurization of milk is designed to kill pathogenic organisms but it also destroys ascorbic acid and thiamin.
6. The nutrient losses must be weighed in terms of the relative importance of the food in question as a source of a particular nutrient. For example, one-fourth to one-half of the vitamin C in low-acid foods such as beans and peas may be lost in canning but these foods are not considered to be major sources of vitamin C.

Minerals are stable under the conditions of food preservation. Water-soluble ones, like water soluble vitamins, will be found in both solids and liquids.

Vitamin C (ascorbic acid) is the most unstable of the vitamins. It is well protected in acid foods such as citrus juices and tomatoes. One-fourth to one-half of the vitamin C in low-acid foods such as beans and peas may be lost. Probably the most significant loss is in greens as these low-acid foods do contain good amounts of vitamin C naturally.

Carotene which is converted to vitamin A in the body, riboflavin, and niacin are stable under canning conditions. The loss of any one of these nutrients rarely exceeds 15 percent.

Thiamin is sensitive to heat, particularly in low-acid foods. Thiamin is present in greater quantities in meats and in enriched and whole-grain bread and cereal products so the loss of small quantities in fruits and vegetables is not serious.

Water-soluble vitamins--ascorbic acid, thiamin, niacin, and riboflavin--will be present in both solids and liquids.

Freezing itself has little, if any, effect on the nutritive value of foods. There is some loss of water-soluble vitamins in blanching and subsequent chilling of vegetables before freezing. There is some additional loss of ascorbic acid if the food is stored at temperatures above 0°F. Losses during blanching and storage may be offset by the shorter cooking times required for frozen than for fresh vegetables. Overcooking or cooking in a large volume of water will increase the loss of water soluble nutrients.

NUTRIENT LOSSES IN PRESERVED FOODS (CONTINUED)

Factors Affecting Stability of Certain Vitamins in Food

Vitamin	Solubility in water	Subject to oxidation	Heat-labile	Light sensitive
Vitamin A	No	Yes	No	Slight
Thiamin	Yes	No	Yes	No
Riboflavin	Yes	No	No	Yes
Niacin	Yes	Yes	No	No
Ascorbic Acid	Yes	Yes	No	Slight
Vitamin D	No	Yes	No	No

Dehydration causes only moderate losses in the B vitamins of vegetables. Thiamin destruction ranges from 3% to not more than 25%. Non-enzymatic browning limits the storage life of freeze-dried foods. Off-flavor and color develop with a resultant nutritional loss because ascorbic acid and lysine are used in the browning reaction. One-third of the thiamin content of fresh-ground pork has been reported destroyed during freeze-drying. Other reports, however, have shown no loss of thiamin, riboflavin, or niacin in freeze-dried chicken cubes.

See also "Vitamin Losses During Food Processing and Storage."

ODOR PROBLEMS IN REFRIGERATORS/FREEZERS

One of the most frequent questions asked by consumers concerns how to get rid of odors in refrigerators and/or freezers which have been caused by spoiled food due to power outages.

Whirlpool has made the following suggestions for coping with these odors:

Take out all removable parts from the appliance and wash with warm water and mild soap or detergent. Also wash gasket and door liner. Rinse well and dry.

Wash the interior walls with solution of two tablespoons of baking soda to one quart of water.

Pour baking soda onto jelly roll pans and place pans on refrigerator shelves to absorb odors.

If activated charcoal can be obtained (sometimes available at an appliance store), it is usually quite effective. Spread the activated charcoal onto jelly roll pans and place on shelves inside refrigerator. Allow refrigerator to run empty for a few days to allow odors to be absorbed.

Another method that helps odors disappear is the use of fresh ground coffee. Place the coffee in cereal bowls inside the refrigerator and allow refrigerator to run for several days. A slight coffee odor can remain but after washing the inside of the refrigerator it will soon disappear.

Another technique: Pack each refrigerator shelf with crumpled newspaper. Set a cup of water on the top shelf or sprinkle the newspaper lightly with water. Allow refrigerator to run for about 5-6 days. This method takes a bit longer but has been effective in removal of strong odors.

There are also several commercial products available for removal of refrigerator odors. These products may be obtained from hardware, grocery, discount and variety stores.

If the above methods do not satisfactorily take care of odor problems, it may be that the wet drippings from meat or fish may have leaked into the insulation. This problem will require service by a refrigerator technician who may have to remove the liner and replace the insulation.

Source: RECAP, June 1982

OKRA, CANNING

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

Pack hot okra into clean jars leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 25 minutes
Quart jars . . . . 40 minutes

According to Presto, okra can be processed at 15 pounds pressure for 15 minutes.

OKRA, DRYING

Wash, trim, slice crosswise in 1/8 to 1/4 inch rounds. Blanching not required. Dry in a dehydrator (140°F) for 2 to 3 hours, or in an oven (140°F) for 4 to 6 hours, or in the sun (98° to 100°F) for 8 to 11 hours.

OKRA, FREEZING

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

Heat in boiling water:
Small pods . . . . . 3 minutes
Large pods . . . . . 4 minutes

Cool promptly in cold water and drain.

Leave whole or slice crosswise.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

OKRA, PICKLED

3 pounds whole okra
6 hot red or green peppers
6 garlic cloves
1 quart vinegar
1 1/2 cups water
1/4 cup salt
1 tablespoon mustard seed

Wash okra. Trim stems; do not cut into pods. Pack okra into clean, hot pint jars; add a hot pepper and garlic clove to each jar.

Bring remaining ingredients to a boil. Cover okra with hot liquid, leaving 1/2-inch headspace. Adjust jar lids.

Process in boiling water bath canner for 10 minutes.

The University of Georgia publication So Easy to Can suggests using 1/2 teaspoon of dill seed per pint instead of mustard seed.

OLIVES

We have on occasion gotten questions about processing olives at home. This information from the California Olive Industry leads me to believe that it is not a procedure easily duplicated in the home.

Olives fresh from the tree are exceedingly bitter. They cannot be eaten until that bitterness is leached out. Olives are picked green; the method of curing determines their ultimate color and taste.

In the ripe olive cure, olives are put into a curing solution; a flow of air bubbles through the tanks oxidizing the fruit and turning it dark brown or black. The olives are then leached to a neutral pH with gallons of fresh water. A trace of organic iron salt (ferrous gluconate) is added in one of the last washes to fix the color so the olives will have less tendency to fade while stored in the can. Most ripe olives are pitted. Machinery can pit 2,400 olives per minute. Some are then wedged (like orange segments), sliced or finely chopped. After processing and pitting, the olives are packed into cans with a brine made of water and 2.7% salt. The cans are hermetically sealed and pressure cooked. The process takes from 8 to 10 days.

Spanish green olives are processed by neutralization, leaching and fermentation. Oxidation is avoided to maintain the green color. The olives are soaked in a curing solution to remove the bitterness and then are leached with changes of fresh water. They are then covered with an 8% salt brine in a closed container. Fermentation takes months during which the olive sugar and some added sugar is converted to lactic acid. Spanish style olives are not pressure cooked; they will keep for years when packed cold in jars with acidified brine. Most are pitted and stuffed with pimiento.

Green style olives are cured in oil or a high concentrate brine. They are bitter and salty in taste and wrinkled in appearance.

Sicilian style olives are prepared similarly to Spanish olives, but are prepared in a spiced brine.

The Time/Life book Preserving has information about brining olives.

ONIONS, CANNING Putting Food By

Onions that are properly cured and stored carry over so well that many cooks don't bother to can them--on top of which home-canned onions are apt to be dark in color and soft in texture.

Sort for uniform size--1 inch in diameter is ideal--and wash. Peel, trimming off roots and stalks. (If you push a hole downward through the middle with a slender finishing nail, their centers will cook with less chance of shucking off outer layers.) Cover with boiling water, parboil gently for 5 minutes. Drain.

Pack hot onions into clean jars as tightly as possible leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Add boiling cooking liquid or water, leaving 1/2-inch headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

ONIONS, CANNING (CONTINUED)

Process in pressure canner at 10 pounds pressure (240°F).
Pint . . . . . 25 minutes
Quarts . . . . 30 minutes

The Kerr Home Freezing and Canning Book has the same procedure but the processing time is longer--40 minutes for both pint and quart jars.

ONIONS, DRY STORAGE

The brown Ebenezer onions are easy to store in a cool dry basement. Other onions may be stored, but usually will not keep as long as the Ebenezer type. Pull mature onions when the neck above the shoulder becomes dry and the top falls over. Dry for a few hours in the sun and cut the leaves off about one inch above the top of the onion. Carefully remove the dirt and roots and place in shallow, open trays not more than 3 or 4 onions deep. Place on shelves and not on the basement floor, where it may be somewhat damp. The best storage temperature is 40°F but onions will keep quite well in any moderately cool, dry place. Sort onions every few weeks to remove any which may start to decay.

ONIONS, DRYING — Drying Foods At Home

Wash, remove outer "paper shells." Remove tops and root ends, slice 1/8-1/4 inch thick. Blanching is not required. Dry in a dehydrator (140°F) for 1 to 3 hours, or in an oven (140°F) for 3 to 6 hours, or in the sun (98° to 100°F) for 8 to 11 hours.

ONIONS, FREEZING — Idaho-Oregon Onion Promotion Committee

Chopped. Peel and chop Sweet Spanish onions and place them in plastic bags or freezer containers. When ready to use, simply scoop out as many as you need with a fork and return remainder to the freezer.

Sliced. Remove bronze skins from Sweet Spanish onions and slice in desired thickness. Place in single layer on baking sheet and quick-freeze. Remove from freezer and pack in plastic bags or freezer containers. Return to freezer.

The Ball Blue Book also has directions for freezing onions. They are "Choose mature bulbs and clean as for eating. Scald for 3 to 7 minutes, or until the center is heated. Cool, drain, package, and freeze. These are suitable for cooking only.

Young green onions may be washed and chopped for salads and sandwiches and frozen without scalding. They will not be crisp. These will be highly flavored but may be slightly tough."

OPEN KETTLE CANNING

Some persons use the open kettle method of canning for acid foods. In this method food is heated and then packed into hot jars. No further processing is done. OPEN KETTLE CANNING IS NOT RECOMMENDED as spoilage organisms may get into the food while it is being transferred to jars. Some air will be trapped in the top of the jar which will allow for activity of these spoilage organisms. The most usual evidence of activity is a darkening of light colored fruits in the top of jars.

ORANGES, FREEZING

Sections or slices. Select firm tree-ripened fruit heavy for its size and free from soft spots. Wash and peel. Divide fruit into sections or slice removing all seeds.

Pack fruit into containers. Cover with cold 40% sirup made with excess fruit juice and water if needed. For better quality, add 1/2 teaspoon crystalline ascorbic acid to a quart of sirup. Leave needed headspace. Seal and freeze. Store at 0°F or below.

Juice. Select fruit as directed for sections. Squeeze juice from fruit, using squeezer that does not press oil from rind.

Sweeten with 2 tablespoons sugar for each quart of juice, or pack without sugar. For better quality, add 3/4 teaspoon crystalline ascorbic acid for each gallon of juice. Pour juice into glass containers immediately. Leave needed headspace. Seal and freeze. Store at 0°F or below.

ORANGES, GREENING

Exterior color of oranges has nothing to do with ripeness. Summer Valencia oranges from California begin to turn golden in the winter months long before they are ripe. (Ripeness is determined by sugar content.) As the fruit hangs on the tree during warm weather, a botanical phenomenon occurs--the oranges begin to turn green again. This "regreening" occurs because warm ground temperatures cause chlorophyll to return to the skins.

California law prohibits the addition of dyes to the skins of fresh citrus to cover this regreening.

OVEN CANNING

Processing canned foods in the oven is not recommended. It will take longer for heat to penetrate to the center of the jar in the oven than it would take in either a pressure canner or water bath canner. The heat from the boiling water or steam which surrounds the jars of food is transferred to the jar and to the food by conduction heating. This difference in heating rate can be seen in cooking times for the same food cooked on top of the stove and in the oven. Rice cooks in 20 minutes on top of the range but it takes 60 minutes in a 350°F oven. A boiled potato takes less than half an hour cooking time but a baked one takes an hour at 350°F.

OVEN CANNING (CONTINUED)

Food cooked in the oven does not reach the temperature of the oven. The end-point temperature for a turkey is 165°F after several hours of cooking.

There is also some concern about jar breakage in the oven although I think heat penetration is sufficient reason to "blackball" oven canning.

OYSTERS, FREEZING

Shucked oysters can be frozen to preserve them for a longer period of time--up to 6 months. Spoon the oysters into rigid plastic containers. Strain the liquid to remove bits of shell, and then pour it back over the oysters. Leave 1/2 inch headspace as food expands when it freezes. Seal the container; label and freeze.

OYSTERS, RED Seafood Memorandum 1

At various times of the year, Virginia oysters may have a red or pink color in the meat and/or in the liquor. This occurs in fresh, frozen, and further processed oysters, for example: frozen breaded oysters. The red color results from the ingestion of a red dinoflagellate used by oysters as a source of food. The red pigment is not rapidly metabolized by the oyster's digestive system and eventually accumulates. When the oysters are cut during the shucking process or frozen after shucking, the red pigment leaches out.

The colored oysters or liquor are visually unappealing but present no potential health hazard. Both the Food and Drug Administration (FDA) and the U.S. Army Quartermaster Corps have issued releases stating the acceptability of red oysters. During recent oyster seasons, several Virginia oyster processors have prepared stick-on labels for fresh and processed oysters stating that red oysters are a seasonal occurence and are both normal and acceptable. It is important to note that the red oysters are not in any way related to the red tide that is associated with paralytic shellfish poisoning (saxitoxin). Toxic red tide occurs only in Maine, Massachusetts, New Hampshire, and Florida on the Atlantic Coast. Numerous attempts to isolate a toxic dinoflagellate in the middle Atlantic region have been unsuccessful.

The red pigment is heat labile and will disappear if the oysters or liquor are subjected to a temperature of 120°F for several minutes. Consequently, once red oysters are prepared for home or institutional consumption, the color will be absent.

OYSTER, STORAGE

Oysters in the shell will keep 2-3 weeks if kept on ice or in the refrigerator. Shucked oysters will keep for 7-10 days if kept on ice or in the refrigerator.

PACKAGING MATERIALS, 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 the food at the peak of quality than others. What are the marks of a good packaging material?

(1) It should be moisture and air tight. No moisture should escape from the package and no outside moisture or air should get into the package. If moisture escapes from the package, the food product will be drier as a result. Outside air may bring with if off-flavors.
(2) It should stand up at freezer temperatures. Some materials like cellophane and waxed paper crack at freezer temperatures permitting an exchange of air and moisture. Brittle plastic containers and glass jars which have not been heat tempered will sometimes crack at freezer temperatures.
(3) It should suit the food. Most fruits and vegetables can be made to fit the container. But the container has to be flexible for meats and baked products.
(4) It should be strong. This is especially important when wrapping meat as the bone may tear a hole in the wrapping.
(5) Some people like packaging materials which can be reused. Certainly, you could afford to pay more for a container that you were going to use several times. None of the papers are reuseable. Glass and plastic containers can be reused. Waxed cartons should be interlined with a plastic bag if they are reused.

If glass jars are used in the freezer, it is imperative to leave headspace to accommodate the expansion of food on freezing. If plastic containers are overfilled, the bulging food will force the lid up. The lid on a glass jar can't be pushed up in this way to release pressure so the jar may break instead.

PARSNIPS, CANNING Putting Food By

"This is probably the only vegetable that actually improves by wintering over in frozen ground--so why take the shine off it as the 'first of spring' treat?

But if you can't keep them in a garden or a root cellar: wash, trim, scrape, and cut them in pieces, then proceed as for broccoli."

PARSNIPS, FREEZING

Choose small to medium-size parsnips that are tender and free from woodiness. Remove tops, wash, peel, and cut in 1/2-inch cubes or slices.

Heat in boiling water 2 minutes. Cool promptly in cold water; drain.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

PASSION FRUIT - the small, yellow, edible fruit of the passion flower also known as maypop.

The Better Homes and Gardens Encyclopedia of Cooking describes it as an egg-shaped fruit grown in tropical and warm temperate climates. The two common varieties are the purple and yellow passion fruit.

Reportedly, passion fruit was named by missionaries to South America who thought the flower resembled the crown of thorns and other symbols of Christ's crucifixion. Both the tart-sweet, yellow pulp and the black seeds of the passion fruit are edible. Passion fruit, also called granadilla, is delicious eaten fresh as a dessert or cooked in pies, candies, or cakes. The juice of this fruit adds a distinctive flavor to jellies and beverages.

Faye Taylor in Suffolk says that Foxfire III has a description and recipes.

PEACH BUTTER OR HONEY

A fruit butter or honey is of smoother consistency than a jam. They are usually made without added pectin and require a longer cooking period to evaporate moisture and to "cook up" the fruit. Low heat and frequent stirring are needed to avoid scorching. The Ball Blue Book, the Kerr Home Canning and Freezing Book, and Putting Food By have recipes for Peach Butter or Honey.

PEACH CONSERVES AND CHUTNEY

See the Ball Blue Book or the Kerr Home Canning and Freezing Book.

PEACH JAM Yield: 3 pints

3 3/4 cups crushed peaches (about 3 pounds fresh peaches)
1/4 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 1 minute, stirring constantly.

Remove from heat. Skim off foam. Pour hot jam into hot sterile jars leaving 1/2-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 canner. This short processing time, designed to kill mold, will not affect the quality of the jam. Store in a cool, dry place.

PEACH JAM with liquid pectin Yield: 4 pints

4¼ cups crushed peaches (about 3½ pounds peaches)
1/4 cup lemon juice
7 cups sugar
1/2 bottle or 1 3-oz. package liquid pectin

Sort and wash fully ripe peaches. Remove stems, skins, and pits. Crush peaches. Measure crushed peaches into a kettle. Add lemon juice and sugar and stir well. Place on high heat and bring to a full rolling boil stirring constantly. Boil for 1 minute, stirring constantly.

Remove from heat; stir in pectin. Skim off foam. Pour hot jam into hot sterile jars leaving 1/4-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 canner.

PEACH JAM without added pectin.

The Kerr Home Canning and Freezing Book has this recipe.
"Peel and cut well ripened peaches into small pieces. Put into large kettle without the addition of water. Heat slowly. When peaches have begun to soften, crush them slightly. Cook slowly about 20 minutes or until peaches are softened. Measure peach pulp and for each cup of pulp add 1 cup of sugar. Return to heat and cook until thick (about 20 minutes). Pour into hot sterilized jars, leaving 1/4 inch headspace. Process for 10 minutes in a boiling water bath canner.

PEACH JAM with an artificial sweetener

See the Ball Blue Book or the Kerr Home Canning and Freezing Book.

PEACH JAM, SPICED

Add 1 to 2 ounces of finely chopped candied ginger to crushed peaches in above recipes. The Ball Blue Book suggests using 1 teaspoon whole cloves, 1/2 teaspoon whole allspice and 1 stick cinnamon in a spice bag during cooking.

PEACH JAM, SPICED, FREEZER

2 pounds fully ripe peaches (about)
2 tablespoons lemon juice
1 teaspoon ascorbic acid crystals
1/2 teaspoon ground ginger
1/2 teaspoon ground nutmeg
4 cups sugar
1 cup light corn syrup
3/4 cup water
1 package powdered fruit pectin

PEACH JAM, SPICED, FREEZER (CONTINUED)

Rinse, peel, pit and fully crush peaches. Measure 2¼ cups. If necessary add water to make exact measure. Turn peaches into 4-quart bowl. Add lemon juice and ascorbic acid; stir well. Add ginger and nutmeg; stir well. Add sugar and corn syrup, stirring thoroughly to dissolve sugar. Let stand 10 minutes. In small saucepan mix water and fruit pectin. Stirring constantly, bring to boil over medium heat and boil 1 minute. Turn into fruit mixture. Stir vigorously 3 minutes. Ladle into 1/2 or 1-pint freezer containers leaving 1/2-inch headspace (no paraffin needed). Cover with tight lids. Let stand at room temperature until set. (It may take up to 24 hours.) Store in freezer for at least 24 hours. Remove from freezer as needed and store in refrigerator between uses. Makes about 7 (1/2-pint) containers.

Food Processor Method: In bowl of food processor, use metal chopping blade to coarsely chop a few peaches at a time.

PEACH JELLY is often made by boiling peels and pits with added water. Proceed as for making apple jelly with added pectin. There is a recipe in the Kerr Home Canning and Freezing Book.

PEACH JUICE, NECTAR OR PUREE

See the Ball Blue Book, the Kerr Home Canning and Freezing Book, or Putting Food By.

PEACH LEATHER

See "Fruit Leathers"

PEACH PRESERVES

Both the Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes. The two are quite different in method of preparation. The Ball recipe says to combine the fruit and sugar and let stand for 18 to 24 hours before cooking. The Kerr recipe has you cook the mixture first and then let it stand for 24 hours.

For variations on Peach Preserves, see Honeyed Peach Preserves in the Ball Blue Book or this recipe for Caramel Peach Preserves from Jam Today.

8 cups sliced medium-ripe peaches
3 peach pits
1/3 cup orange juice
1 pound light brown sugar
4 cups granulated sugar

Place peaches, pits and orange juice in large kettle. Cover and cook over low heat for 10 minutes. Add sugars. Bring slowly to a boil, stirring almost constantly. Cook over moderate heat, stirring frequently, until sirup thickens and peaches are translucent. Remove from heat and ladle immediately into hot sterile jars. Leave 1/8-inch headspace. Adjust jar lids. Process in a boiling water bath for 5 minutes.

PEACH SELECTION

A great many varieties of peaches are grown in Virginia. These varieties fall into two general types: freestone (flesh readily separates from the pit) and clingstone (flesh clings tightly to the pit). The freestone peach softens more than the clingstone peach during canning resulting in a ragged appearance.

Look for a creamy yellow to gold background color when selecting peaches. The red blush on peaches is not a good guide as it varies with variety. A green tint in the background means the peach was picked too green and will never have the sweet flavor and juiciness of a mature fruit as peaches do not increase in sweetness after picking.

Avoid overripe peaches and those with large bruises or signs of decay. (Decay starts as a pale tan spot which expands in a circle.)

A bushel of peaches weighs about 48 pounds and will yield about 18 quarts of canned or frozen peaches--that's two to 3 pounds of fresh peaches per quart of preserved product. There are about 3 medium sized peaches in a pound.

PEACH VARIETIES

There are a number of varieties of peaches grown in Virginia. Consumers often ask which variety or varieties are best for canning or freezing.

The VDACS brochure How to Enjoy Peaches in the Old Dominion Tradition lists a number of yellow fleshed varieties and their suitability for canning and freezing. Dr. R. E. Byers, Extension Specialist, Fruit and Mr. Charles Wood, Professor, Food Science and Technology, have updated the VDACS list.

Variety	Type	Fresh	Canning	Freezing
Blake	Freestone	Good	Poor	Excellent
Canadian Harmony	Freestone	Excellent	Good	Good
Cresthaven	Freestone	Excellent	Good	Good
Elberta	Freestone	Fair	Good	Fair
Glohaven	Freestone	Excellent	Good	Excellent
J. H. Hale	Freestone	Excellent	Good	Good
Jefferson	Freestone	Excellent	Good	Excellent
Loring	Freestone	Excellent	Good	Good
*Madison	Freestone	Excellent	Excellent	Excellent
Redhaven	Semi-Freestone	Good	Fair	Excellent
Redskin	Freestone	Good	Fair	Good
Sunhigh	Semi-Freestone	Excellent	Good	Good

*Mr. Wood commented that the Madison variety is practically non-browning and is free from heavy red pigmentation around the pit cavity which often becomes discolored in canning.

PEACHES, BRANDIED see the Ball Blue Book or Putting Food By.

PEACHES, CANNING

Wash peaches and remove skins. Dipping each peach in boiling water, then in cold water makes peeling easier. Cut peaches in halves; remove pits. Slice if desired. To prevent fruit from darkening use an anti-darkening agent. Follow package directions regarding use. An older but less effective method of preventing darkening is to drop peach halves or slices into water containing 2 tablespoons each of salt and vinegar per gallon of water. The peaches treated in this way must be drained before packing.

Use a thin, medium, or heavy sirup to suit the sweetness of the fruit and family preference. Sugar improves the flavor and texture of canned peaches but can be omitted.

Raw pack. Pack raw peaches in jars. Cover with boiling sirup, 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 . . . . . 25 minutes
Quart jars . . . . 30 minutes

Hot pack. Heat peaches in sirup. Pack hot peaches in jars. Cover with boiling sirup, 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 . . . . . 20 minutes
Quart jars . . . . 25 minutes

PEACHES, DRYING

Drying Foods At Home

Leave whole for steam or water blanching, then pit and halve. Blanch in steam or boiling water for 8 minutes.

Dry in the sun (temperatures of 98° to 100°F) for 3-5 days or in an oven or dehydrator (140°F) 4 to 7 hours. Smaller pieces will dry faster. When dry, pieces will be soft and pliable with no moist area in the center when cut.

PEACHES, FREEZING

Wash peaches and remove skins and pits. It is better not to use a boiling water dip when peeling peaches to be frozen. Slice if desired.

Unsweetened pack. Pack peaches into containers and cover with cold water containing an antidarkening agent. Leave headspace as in sirup pack. Seal. Freeze; store at 0°F or below.

PEACHES, FREEZING (CONTINUED)

Sirup pack. Slice peaches directly into cold sirup in container--starting with 1/2 cup sirup to a pint container. An antidarkening agent will result in a better quality product. Press fruit down and add sirup to cover, leaving needed headspace. A piece of crumpled wax paper will help to keep the pieces of fruit under the sirup. Seal. Freeze; store at 0°F or below.

Sugar pack. Slice peaches into cold water to which you've added an antidarkening agent. When ready to package, drain and add 2/3 cup sugar for each quart of prepared fruit. Mix well. Pack into containers leaving needed headspace. Seal. Freeze; store at 0°F or below.

PEACHES, PICKLED

Both the Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes.

PEANUTS

Peanuts are legumes not nuts. The three common varieties grown in the U.S. are Virginia, Runner, and Spanish. The shelled Virginia peanut is long and slender; the Runner, small and stubby; and the Spanish peanut, round.

Blanching. Put shelled Virginia or Runner peanuts into boiling water and let stand 3 minutes. Drain. Slide skins off with your fingers. Spread nuts on absorbent paper to dry.

Roasting in the shell. Spread peanuts in a shallow pan and roast at 350°F (moderate oven), stirring occasionally, for 15 to 20 minutes.

To test doneness, remove a nut from the oven and shell it. The skin should slip off easily and the kernel should be lightly browned and have a roasted flavor.

Roasting shelled nuts. Mix 1 teaspoon cooking oil or melted fat with each cup of nutmeats, if desired, for richer flavor and even browning.

To roast or toast, spread nuts on a shallow pan or baking sheet. Heat at 350°F (moderate oven) for 5 to 12 minutes, or until lightly browned, stirring occasionally.

Toasting may also be done in a heavy pan on top of the range. Heat nutmeats slowly for 10 to 15 minutes until lightly browned, stirring frequently.

Nuts continue to brown slightly after removing from heat so avoid overbrowning.

Sprinkle hot nuts with salt, if desired.

Cool nuts on absorbent paper.

PEARS, CANNING

Wash pears. Peel, cut in half and core. To prevent darkening, use an antidarkening agent.

Use a thin, medium, or heavy sirup to suit the sweetness of the fruit and family preference. A thin sirup (30%) is made with 2 cups sugar and 4 cups water. Increase sugar to 3 cups for a medium sirup (40%) and to 4 3/4 cups for a heavy sirup (50%). Sugar improves the flavor and texture of canned pears but can be omitted.

Raw pack. Pack raw pear halves in jars. Cover with boiling sirup, 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 . . . . . 25 minutes
Quart jars . . . . 30 minutes

Hot pack. Heat pear halves in sirup. Pack hot pear halves in jars. Cover with boiling sirup, 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 . . . . . 20 minutes
Quart jars . . . . 25 minutes

PEARS, DRYING

Drying Foods At Home

Cut in half, core and peel. Steam blanch for 6 minutes. Dry in the sun (98°F) for 5 days or in an oven or dehydrator (140°F) for 4-7 hours.

PEARS, FREEZING

Heat pear halves in boiling 40% sirup for 1 to 2 minutes. Drain and cool. Pack cooled pear halves into containers and cover with cold sirup. Put a piece of crumpled waxed paper on top of pears to hold them under the sirup.

Seal. Freeze; store at 0°F or below.

PEARS, JELLIES, ETC.

Pears are low in both pectin and acid so are often combined with other fruits which have these substances. Both the Ball Blue Book and the Kerr Home Canning and Freezing Book have a variety of recipes.

PEARS, PINKISH COLORATION

Pinkish color in overcooked stewed pears is due to the presence of a tannin pigment. It is seen most often in canned pears with a high tannin content and in those with a lower pH. Over processing or failure to cool cans promptly favor the development of the pinkish color. Using a different variety may be the most effective way of eliminating the problem.

PEARS, SELECTION

The Kieffer pear is large and attractive but must be harvested and ripened properly to be of good quality. Ripen by holding pears at 60° to 65°F for 2 to 3 weeks. The ripened pears may be canned, made into preserves, or frozen although frozen pears are not as high in quality as many other fruits.

PEAS (BLACKEYE, CROWDER, AND FIELD), CANNING

Shell and wash peas.

Raw pack. Pack raw peas in jars leaving 1/2 inch 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°F).

Hot pack. Cover shelled peas with boiling water and bring to a boil. Drain. Pack hot peas in jars leaving 1¼ inchs at top of pint jars; 1½ 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°F).
Pint jars . . . . . 35 minutes
Quart jars . . . . 40 minutes

According to Presto, peas can be processed at 15 pounds pressure for 30 minutes.

PEAS, FIELD, FREEZING

Select well-filled flexible pods with tender seeds. Shell peas, discarding those that are hard.

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

Pack into containers, leaving needed headspace. Seal, freeze and store at 0°F or below.

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.

PECTIN (CONTINUED)

Powdered fruit pectin is packaged in moisture-proof paper inside a cardboard package to protect it from humidity. Excessive heat and humidity will cause the pectin to become caked and brownish in color, thereby losing some of its jellying qualities. If stored in an air-tight container, powdered pectin will remain in good condition from one season to the next.

Liquid pectin must be given more care than powdered pectin. If stored at 72°F or lower, it will retain its jellying qualities from one season to the next. If it is stored at a temperature higher than 72°F, the liquid pectin may either congeal or become thin and watery. In such cases, it cannot be used for jelly making. If liquid pectin is stored in the refrigerator, it will congeal; it will liquefy upon standing at room temperature and can be used successfully.

A touch of nostalgia. An early Farmers' Bulletin (Home-made Jellies, Jams, and Preserves issued in 1938) gave directions for making pectin from apples and from the white portion of orange and lemon peel. The process involved grinding the peel, boiling it in a tartaric acid-water solution until the volume was reduced in half and straining through several thicknesses of cheesecloth. The peel was boiled again with more water and tartaric acid and strained. And a third boiling took place. The 3 extractions yielded about 2½ pints of pectin extract from a pound of peel and two to three hours of work! And you still had to make the jelly.

The Kerr Home Canning and Freezing Book has directions for making Apple Pectin. Apples are a rich source of pectin so the recipe is essentially for apple juice which can be mixed with other fruits having little pectin.

PECTIN-ACID CONTENT OF FRUITS

A balance of ingredients is essential for a good jelly. 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 underrripe fruit be used when extracting juice for jelly.

PECTIN-ACID CONTENT OF FRUITS (CONTINUED)

Adequate Pectin and Acid[a]	Adequate Pectin, Low Acid	Low Pectin, Adequate Acid	Low Pectin and Acid
Apples, tart	Bananas, unripe	Apricots	Figs, ripe
Blackberries, sour	Cherries, sweet	Rhubarb	Peaches, ripe
Cherries, sour	Figs, unripe	Strawberries	Pears, ripe
Crabapples	Melon, ripe		Pomegranates
Cranberries	Quinces, ripe		
Currants			
Grapefruit			
Guavas, sour			
Grapes			
Lemons			
Limes			
Loganberries			
Oranges, sour			
Plums, Damson, etc.			

[a]Some authorities include gooseberries, tart quinces, and black and red raspberries in this classification.

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

PECTIN TESTS

A rough estimate of the amount of pectin in fruit juice may be obtained through use of denaturated alcohol or a jelmeter.

Alcohol test: Add 1 tablespoon cooked, cooled fruit juice to 1 tablespoon denaturated alcohol. Stir slightly to mix. Juices rich in pectin will form a solid jelly-like mass. Juices low in pectin will form small particles of jelly-like material.

NOTE: Denaturated alcohol is poisonous. Do not taste the tested juice. Wash all utensils used in this test thoroughly.

Jelmeter test: A jelmeter is a graduated glass tube with an opening at each end. The rate of flow of fruit juice through this tube gives a rough estimate of the amount of pectin in the juice.

If either test indicates that the juice is low in pectin, use a recipe calling for the addition of powdered or liquid pectin.

The Kerr Home Canning and Freezing Book suggests testing for pectin content by mixing 2 tablespoons sugar, 1 tablespoon Epsom Salts, and 2 tablespoons cooked fruit juice. Stir well and let stand for 20 minutes. If mixture forms into a semi-solid mass the juice contains sufficient pectin.

PEPPER JELLY — Ball Blue Book

6 large green peppers, cut in pieces
1½ cups cider vinegar
6 cups sugar
1/2 teaspoon salt
1 teaspoon crushed red pepper
2 3-oz. pouches liquid pectin
Green food coloring

Put half the green peppers and half the vinegar into blender container, cover and liquefy. Pour into saucepan. Repeat with remaining peppers and vinegar. Add the red pepper, sugar and salt. Bring to a boil and add pectin. Boil until it thickens when dropped from spoon, about 20 minutes. Add a few drops of green food coloring. Pour into hot jars. Adjust jar lids. Process in a boiling water bath for 5 minutes.
Yield: About 4 half-pints

PEPPER SAUCE — Wisconsin Cooperative Extension Service

Wash small cherry or chile peppers. Prick each pepper with a needle. Pack into a jar, cover with cider vinegar, put lid on, and store in the refrigerator a few days before using. As you use the sauce, add more vinegar to the peppers.

PEPPERS, CANNING

There is concern about some of the methods for canning peppers in the literature. I suppose that the outbreak of botulism associated with home canned peppers is responsible for this concern.

The current recommended method is to prepare peppers (remove seed pods and skins, if that is necessary), pack into jars, and cover with boiling water leaving 1/2-inch headspace. Add salt, if desired. Remove air bubbles. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pints . . . . . 35 minutes
Quarts . . . . 35 minutes

This method is recommended for chili, jalapeno, green, bell, and pimiento peppers.

Do not recommend other methods. There are some which add vinegar to increase the acidity and then recommend processing in a boiling water bath canner. It is doubtful that the product is acid enough to prevent botulism toxin production.

Another method suggests packing the peppers tightly into jars and processing without added liquid. The rate of heat transfer will be very different than in a product packed in liquid. So different, in fact, that we don't know how long to recommend.

PEPPERS, HOT, FREEZING

Wash and stem peppers. Pack into small containers leaving no headspace. Seal and freeze.

According to a New Mexico Cooperative Extension Service publication, many blister the pods and then pack and freeze them, unpeeled. The chile is peeled when it is used. Freezing the pods blistered but not peeled reduces the preparation time for freezing. Also, fewer pods are broken. Apparently the thin skin, although blistered, serves as a shield, resulting in more attractive pods.

PEPPERS, PICKLED So Easy to Can, University of Georgia

4 quarts long red, green or yellow peppers
(Hungarian, Banana or other varieties)
1½ cups salt
2 cloves garlic
2 tablespoons prepared horseradish
10 cups vinegar
2 cups water
1/4 cup sugar

Wash and drain peppers.

Cut two small slits in each pepper. Dissolve salt in 4 quarts water. Pour over peppers and let stand 12 to 18 hours in a cool place. Drain; rinse and drain thoroughly. Combine remaining ingredients; simmer 15 minutes. Remove garlic. Pack peppers into jars. Cover with hot pickling solution, leaving 1/2 inch headspace. Adjust lids. Process in a boiling water bath (212°F) for 10 minutes. Yields: 8 pints.

PEPPERS, PIMIENTOS, FREEZING

Select firm, crisp, thick-walled pimientos. Wash, cut out stems and remove seeds.

To peel, first roast pimientos in an oven at 400°F for 3 to 4 minutes. Remove charred skins by rinsing pimientos in cold water. Drain. Or cover with water and boil until peppers are tender.

Pack pimientos into containers leaving needed headspace. Seal and freeze. Store at 0°F or below.

PEPPERS, SWEET, FREEZING

Peppers frozen without heating are best for use in uncooked foods. Heated peppers are easier to pack and good for use in cooking.

Select firm, crisp, thick-walled peppers. Wash, cut out stems, cut in half, and remove seeds. If desired, cut into 1/2-inch strips or rings or chop.

PEPPERS, SWEET, FREEZING (CONTINUED)

Heat in boiling water if desired:
Halves . . . . . 3 minutes
Slices . . . . . 2 minutes

Cool promptly in cold water and drain.

If peppers have not been heated, pack into containers, leaving no headspace. Seal and freeze. If peppers have been heated, leave 1/2-inch headspace. Freeze chopped pepper pieces in the amount used most frequently. Place small packages in a large bag or container for easy access.

PERFRINGENS

Perfringens poisoning is a type of foodborne illness most often associated with cooked meat and poultry products. Clostridium perfringens is the causative organism. It is a spore-forming bacteria which grows in the absence of oxygen. The spores are quite heat resistant--some have survived 4 hours of boiling. It is theorized that cooking meat or poultry drives off oxygen and kills competitive organisms and that the heat shocks the spores leading to germination. If food is allowed to stay warm for several hours, then considerable growth may occur.

Illness results from an enterotoxin produced by the spores which is released in the gut. Symptoms usually appear within 8 to 24 hours after consuming contaminated food. The symptoms are acute abdominal pain and diarrhea. Nausea, vomiting, fever, and chills are rare. The duration is 1 to 2 days.

Chill foods rapidly to minimize growth. Or hold hot foods at 140°F or above. Reheat leftover foods to 165°F.

PERSIMMONS

Puree. Select orange-colored, soft-ripe persimmons. Sort, wash, peel, and cut into sections. Press the fruit through a sieve.

To each quart of persimmon puree add 1/8 teaspoon crystalline ascorbic acid or 1½ teaspoons crystalline citric acid to help prevent darkening and flavor loss.

Persimmon puree made from native varieties needs no sugar. Puree made from cultivated varieties may be packed with or without sugar. Use 1 cup sugar with 1 quart puree.

PICKLE PROBLEMS Kerr Glass Manufacturing Corporation

Soft or Slippery Pickles

1. Using too weak brine for curing.
2. Using too weak vinegar.
3. Not removing scum daily on surface of brine.
4. Not covering cucumbers with brine.
5. Storing pickles in too warm storage area.
6. Use of hard water.
7. Using cucumbers with blossom attached.

Shriveling

1. Allowing too much time between gathering and pickling.
2. Using too strong brine at beginning of curing.
3. Using too heavy sirup--too sweet pickling solution.
4. Using too strong vinegar solution.

Hollow Pickles

1. Faulty growth.
2. Improper curing.
3. Cucumbers standing too long before processed. (24 hours)
4. High temperature during fermentation process.

Dark Pickles

1. Minerals in water--especially iron.
2. Cooking utensils. Do not use copper, brass, galvanized or iron.
3. Ground spices (such as cloves).
4. Cooked too long with spices.
5. Low nitrogen content of cucumbers.

Dull or Faded Color

1. Poor quality of cucumber.
2. Sunburned.
3. Overmature.
4. Grown under unfavorable conditions.
5. Cucumbers not graded.

White Sediment at Bottom of Jar

1. Use of table salt.
2. Bacteria that grows during fermentation.
3. Temperature not controlled.

Causes of Spoilage

1. Not sterilizing jars.
2. Using ingredients that have lost strength.
3. Not using standard jars and new lids.
4. Not measuring ingredients accurately.

Reasons for Lids Not Sealing or Release of Seal

1. Using recipe that does not require heat treatment.
2. Using off-standard jars.
3. Using Open Kettle Method.
4. Filling jars with large, cold cucumbers and pouring boiling solution over several jars before capping. Solution cools down and air is not exhausted from jar.

PICKLE PROCESSING

Pickle products require heat treatment to destroy organisms that cause spoilage and to inactivate enzymes that may affect flavor, color and texture. (Blue-green garlic is caused by an enzyme reaction.)

Processing is recommended for all pickle products using the Boiling Water Bath Method.

TIME TABLE

		Minutes
Pickles - Dill		
Fermented (whole)*	Quart	15
Unfermented (whole)*	Quart	20
Sauerkraut	Quart	15
Pickles and Relishes		
Bread and Butter	Quart	10
	Pint	5
Chutney	Pint	5
Cross Cut Slices	Pint	5
Dill Green Beans	Pint	5
Sweet Gherkins	Pint	5
Picallili	Pint	5
Pepper-Onion Relish	Pint	5
Corn Relish	Pint	15
Watermelon	Pint	5
Fruit Pickles		
Peaches	Quart or Pint	20
Pears	Quart or Pint	20

*Fermented cucumbers and fresh dill pickles are processed differently from the usual procedures. Start processing time when jars are placed in boiling water rather than waiting for the water to return to a boil. This will prevent the development of cooked flavor and loss of crispness.

PICKLES

Pickles are of two types: brined and fresh-pack. 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 translucent. A desirable flavor is developed. The skin of the pickle is tender and firm; not hard, rubbery, or shriveled. The inside is tender and firm; not 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. Overmature 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.

PICKLES (CONTINUED)

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 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.

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.

PICKLES, CRISPNESS

Consumers would like a cool, crisp, crunchy pickle--one with texture similar to a raw cucumber. That's not really possible, however.

There is some softening or loss of crispness due to the pectinolytic enzymes in cucumbers and some occurs because of the natural organic acids in the food.

Temperature also has a lot to do with crispness. Too much heat in blanching or processing, inadequate cooling after heating, or storage temperatures above 86°F will contribute to loss of crispness.

Processing to achieve an internal temperature of 160°F is recommended for all pickle products using the Boiling Water Bath Method.

PICKLES, REFRIGERATED DILL PRODUCTS

1. Kosher, Refrigerated Dills, Non-Acidified - This is a green cucumber packed in a low-salt content brine (10-12° salometer equilibrated) and refrigerated immediately to try to prevent fermentation. The green color denotes little or no fermentation and acid development which would destroy the green color. This has a very short storage life.

2. Half-done, Refrigerated Dills - This is a fresh green cucumber type that is supposed to ferment slightly and then is refrigerated to retard fermentation. Fermentation may continue, however, resulting in a gaseous mess that foams and spurts.

3. Vinegared, Refrigerated Dills - This is a low-salt (10-12° salometer), vinegar-added, kosher dill. The finished acidity runs between 4 and 6 grains vinegar (0.4 to 0.6%) and contains benzoate of soda or another chemical preservative. It is very crisp, and if left at room temperature, a few jars may get by for a few weeks without fermenting. The product is quite stable under refrigeration amd may keep its greenish-straw colored, fresh-pack appearance and texture for several weeks. Look for vinegar and a preservative in the ingredient list to identify this product. It is essentially a non-heated, well-acidified, low-salt content, refrigerated green cucumber containing one or more preservatives with spices and flavorings.

4. Genuine Kosher Dills - This is a genuine dill containing about 4% (equilibrated) salt content that may or may not have been refrigerated in bulk storage. It is repacked into glass and displayed in the refrigerated counters. The brine will normally be fairly clear and the product cured.

Salt content of refrigerated dill pickles is rather low and has very little effect on the preservation of the product.

Refrigeration (34-40°F) is necessary to inhibit or retard growth of microorganisms.

The pH (4.5 or lower) is also a inhibitory factor.

PICKLING IN PLASTIC

Plastic containers which are obviously intended for food use, like mixing bowls and food storage containers, can be used for brining and fermenting pickles. Plastic pails and trash cans are not food grade and should not be used. Toxic substances could migrate from these containers into the brine.

PICKLING SPICE is a blend of several whole spices commonly used in pickling. Each company's blend is unique but usually includes allspice, black and white peppercorns, bay leaves, cardamom, cassia, chilies, cloves, dillseed, fennel seed, ginger, mace, and mustard seed.

PIGS FEET, PICKLED So Easy to Can, University of Georgia

Scald, scrape, and clean feet thoroughly. Sprinkle lightly with salt and let stand for 4 to 8 hours. Wash the feet well in clean water. Place them in hot water and cook until tender but not until meat can be removed from bones. Pack feet into clean jars, leaving 1/2 inch headspace. Cover with boiling hot spiced vinegar. Adjust lids. Process in pressure canner at 10 pounds pressure (240°F).

Pints . . . . . 75 minutes
Quarts . . . . 75 minutes

Vinegar Solution:
2 quarts vinegar
1 small red pepper
2 tablespoons grated horseradish
1 teaspoon whole black pepper
1 teaspoon whole allspice
1 bay leaf

Mix all together and bring to a boiling point.

PIMIENTO PEPPERS

See "Peppers, Canning" and "Peppers, Pimientos, Freezing."

PINEAPPLE

You aren't apt to find this growing in Virginia but just in case someone has an overabundance, both the Ball Blue Book and the Kerr Home Canning and Freezing Book have directions for canning pineapple.

The USDA bulletin Home Freezing of Fruits and Vegetables has these directions for freezing pineapple.

Select firm, ripe pineapple with full flavor and aroma. Pare and remove core and eyes. Slice, dice, crush, or cut the pineapple into wedges or sticks.

Pack fruit into containers without sugar or sirup or cover with 30% sirup made with pineapple juice or water. Leave needed headspace. Seal and freeze.

Home Drying of Foods from Cornell says to wash, peel, and remove thorny eyes of fully ripe pineapple. Cut in 1/2-inch slices, crosswise. Dry 24 to 36 hours in a dehydrator. Fruit should be leathery but not sticky.

PLUM JAM with powdered pectin

6 cups crushed plums (about 3½ pounds plums)
1 package powdered pectin
8 cups sugar

Sort fully ripe plums, wash, cut into pieces, and remove pits. If flesh clings tightly to pits, cook plums slowly in a small amount of water for a few minutes until they are softened, then remove pits. Crush fruit.

PLUM JAM with powdered pectin (CONTINUED)

Measure crushed fruit into a kettle. Add pectin and stir well. Place on high heat and, stirring constantly, bring quickly to a full boil with bubbles over the entire surface.

Add sugar, continue stirring, and heat again to a full bubbling boil. Boil hard for 1 minute. Remove from heat; skim. Pour immediately into hot jars. Adjust jar lids. Process in a boiling water bath for 5 minutes. Makes about 9 half-pints.

The USDA publication How to Make Jellies, Jams, and Preserves At Home also has a recipe for Plum Jam with liquid pectin. Check the Ball Blue Book, the Kerr Home Canning and Freezing Book, and the package inserts in pectin products for additional plum jams, jellies, preserves, etc.

PLUM JELLY with liquid pectin

4 cups plum juice (about 4½ pounds plums and 1/2 cup water)
7½ cups sugar
1/2 bottle (3 fl. oz) liquid pectin

Sort and wash fully ripe plums and cut in pieces; do not peel or pit. Crush fruit, add water, cover and bring to boil over high heat. Reduce heat and simmer for 10 minutes. Extract juice.

Measure juice into a kettle. Stir in sugar. Place on high heat and, stirring constantly, bring quickly to a full rolling boil that cannot be stirred down.

Add pectin; bring again to full rolling boil. Boil hard 1 minute.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot jars. Adjust jar lids. Process in a boiling water bath for 5 minutes. Makes 7 or 8 half-pints.

PLUM JELLY with powdered pectin

5 cups plum juice (about 4½ pounds plums and 1 cup water)
1 package powdered pectin
7 cups sugar

Prepare juice as in previous recipe.

Measure juice into a kettle. Add pectin and stir well. Place on high heat and, stirring constantly, bring quickly to a full rolling boil that cannot be stirred down.

Add sugar, continue stirring, and heat again to a full rolling boil. Boil hard for 1 minute.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot jars. Adjust jar lids. Process in a boiling water bath for 5 minutes. Makes 7 or 8 half-pints.

PLUMS, CANNING

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

Raw pack. Pack raw fruit to 1/2-inch of top of clean jars. Cover with boiling sirup, leaving 1/2-inch of headspace. Remove air bubbles by running spatula or knife between jar and food. Adjust jar lids.

Process in boiling water bath (212°F).
Pint jars . . . . . 20 minutes
Quart jars . . . . 25 minutes

Hot pack. Heat plums to boiling in sirup or juice. If fruit is very juicy, you may heat it with sugar, adding no liquid.

Pack hot fruit into clean jars. Cover with boiling liquid 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 (212°F).
Pint jars . . . . . 20 minutes
Quart jars . . . . 25 minutes

PLUMS, FREEZING

Frozen plums are good for use in pies and jams, or in salads and desserts. The unsweetened pack is preferred for plums to be used for jams.

Choose firm tree-ripened fruit of deep color. Sort and wash. Leave whole or cut in halves or quarters.

Unsweetened. Pack whole fruit into containers leaving needed headspace. Seal and freeze.

Sirup pack. Pack cut fruit into containers. Cover fruit with cold 40 or 50% sirup to which an antidarkening agent has been added. Leave needed headspace. Seal and freeze.

POTATOES

The Potato Board has this to say about preserving potatoes.

"Because of the wide variety, high quality and economy of processed potato products and the year-round availability of fresh potatoes, most people don't find it practical to can or freeze fresh potatoes at home."

POTATOES, CANNING

Cubed. Wash, pare, and cut potatoes into 1/2-inch cubes. Dip cubes in brine (1 teaspoon salt to 1 quart water) to prevent darkening. Drain. Cook for 2 minutes in boiling water, drain.

Pack hot potatoes into clean jars leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 35 minutes
Quart jars . . . . 40 minutes

Whole. Use potatoes 1 to 2½ inches in diameter. Wash, pare, and cook in boiling water for 10 minutes. Drain.

Pack hot potatoes into clean jars leaving 1/2-inch headspace. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling water, leaving 1/2-inch headspace. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 30 minutes
Quart jars . . . . 40 minutes

According to Presto, new whole potatoes can be processed at 15 pounds pressure for 20 minutes.

POTATOES, FREEZING

The best potatoes for freezing are those that have been cooked such as mashed potato patties, baked stuffed potatoes or french fries.

Raw potatoes or potatoes in combination dishes such as soups and stews do not freeze well. Upon thawing and reheating, they tend to disintegrate, particularly if the potatoes are whole or cut in large cubes. If preparing a combination dish for freezing, omit the potatoes and add them, instead, during the thawing/reheating step before serving.

To freeze baked stuffed potatoes or mashed potato patties, prepare them according to your favorite recipe, cool quickly in the refrigerator, then freezer-wrap in moisture-vapor-proof packaging. Seal, label, date and freeze. Recommended maximum storage time is one month at 0°F. To serve, unwrap and reheat at 350°F.

To freeze homemade french fries, pare and cut potatoes into strips about 1/4-inch thick.

Rinse quickly in cold water and dry well on paper towels. Par cook in oven or in oil.

Oven method. Arrange potato strips in shallow baking pan, brush with melted butter or margarine and bake at 450°F just until they begin to brown, turning occasionally. Cool quickly in refrigerator.

Oil method. Blanch potato strips in vegetable oil heated to 370°F until tender but not brown. Drain and cool quickly in the refrigerator.

Place par cooked strips in moisture-vapor-proof containers or bags. Seal, label, date and freeze. Recommended maximum storage time is 2 months at 0°F.

POTATOES, STORAGE Vail, et al. Foods

Potatoes are best stored in a cool, dry, dark place with good ventilation and a temperature of 45° to 50°F. During storage of potatoes some of their starch is converted to sugar. If the storage temperature is 40°F or below, the sugar accumulates because the metabolic activities of the tuber are too slow to use the sugar. The sugar gives the potato an undesirable sweet taste and causes them to brown too much when used for potato chips or French fried potatoes. If such potatoes are held at room temperature for a week or two, however, the excess sugar is used by the potato and the cooking quality is improved.

POTATOES, SWEET

See "Sweet Potatoes"

POTATOES, WHITE, GREENING

Greening is caused by exposure to natural or artificial light. Sometimes only the skin is affected but greening may penetrate the flesh. The green portions contain the alkaloid solanin which causes a bitter flavor and is said to be poisonous to some people. USDA, H&G 198 How to Buy Potatoes.

Solanine, a glyco-alkaloid, is found throughout the plant, with the highest concentrations in the unripened fruit. Symptoms are headache, stomach pain, subnormal temperature, paralysis, dilated pupils, vomiting, diarrhea, shock, circulatory and respiratory depression, loss of sensation, and death. Solanine is extremely toxic and small amounts can be deadly.

Misconceptions occur concerning the poisonous qualities of the solanums, probably because of the harmless nature of the completely ripe fruit of certain species. Many are considered edible; for instance, the well known cultivated "wonderberry" is safe to use in pies if ripe.

However, cases of poisoning from eating the unripened fruits of many native species have been reported from the Hawaiian Islands and North America. Children have been poisoned from black nightshade, deadly nightshade, and horse nettle, green and spoiled potatoes, and potato sprouts have caused severe cases of poisoning. Never eat potato tubers if they look spoiled or green below the skin, and always discard the sprouts.

Source Human Poisoning from Native and Cultivated Plants by Harin and Arend. 2nd edition. 1974. Duke University Press

POULTRY, CANNING

Chicken, duck, goose, guinea, squab, turkey and game birds are canned in the same day. Domestic rabbits and small-game animals should also be canned like poultry. These foods may be canned with or without bone. Bone is a conductor of heat so processing times are shorter for foods packed with bone than without.

Cut up and sort into meaty and bony pieces. Use bony pieces for broth or soup. Can giblets separately.

Hot Pack, with bone. Bone breast. Saw drumsticks off short. Leave bone in other meaty pieces. Trim off large lumps of fat. Place raw meaty pieces in pan and cover with hot broth or water. Put on lid. Cook, stirring occasionally, until medium done. To test, cut piece at center; if pink color is almost gone, meat is medium done.

Pack hot poultry loosely into jars. Place thighs and drumsticks with skin next to glass. Fit breasts into center and small pieces where needed. Leave 1 inch of headspace. Add salt if desired: 1/2 teaspoon to pints, 1 teaspoon to quarts. Cover poultry with boiling broth, leaving 1 inch of headspace. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 65 minutes
Quart jars . . . . 75 minutes

According to Presto, poultry with bones can be processed at 15 pounds pressure for 30 minutes.

Hot Pack, without bone. Remove bone but not skin from meaty pieces either before or after precooking. Pack hot cooked meat into jars leaving 1 inch of headspace. Add salt if desired: 1/2 teaspoon per pint or 1 teaspoon per quart. Cover with boiling broth leaving 1 inch of headspace. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 75 minutes
Quart jars . . . . 90 minutes

Raw Pack, with bone. Bone breast. Saw drumsticks off short. Leave bone in other meaty pieces. Trim off large lumps of fat.

Pack raw poultry loosely. Place thighs and drumsticks with skin next to glass or tin. Fit breasts into center and small pieces where needed. Leave 1 inch of headspace. Set open jars of raw meat on a rack in a large pan of boiling water. Water level should be about 2 inches below tops of jars. Cover the pan. Cook meat in containers at slow boil until temperature at center of jars reaches 170°F or until medium done (about 75 minutes). Add salt if desired: 1/2 teaspoon to pint jars, 1 teaspoon to quarts. Adjust jar lids. Process in pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 65 minutes
Quart jars . . . . 75 minutes

POULTRY, CANNING (CONTINUED)

Raw Pack, without bone. Cut up poultry. Remove bone but not skin from meaty pieces before packing into jars. Leave 1 inch of headspace. Set open jar of raw meat on a rack in a large pan of boiling water. Water level should be about 2 inches below tops of jars. Cover the pan. Cook meat in containers at slow boil until temperature at center of jars reaches 170°F or until medium done (about 75 minutes). Add salt if desired: 1/2 teaspoon per pint or 1 teaspoon per quart. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 75 minutes
Quart jars . . . . 90 minutes

POULTRY, FREEZING

Raw poultry may contain Salmonella bacteria so should be handled with care.

Ready-to-cook poultry from the market should need little cleaning. Remove any pinfeathers and any lung tissue that may have been left inside the bird. Wash poultry inside and out.

Maximum storage times for best eating quality of home-frozen poultry that has been properly wrapped and frozen and stored at 0°F or below are:

	Months
Uncooked poultry:	
Chicken and turkey, whole	12
Chicken, cut up	9
Turkey, cut up	6
Duck and goose, whole	6
Giblets	3
Cooked poultry:	
Slices or pieces, covered with broth or gravy	6
Slices or pieces, not covered with broth or gravy	1
Cooked poultry dishes	2 to 6
Fried chicken	4

Food stored longer than the recommended maximum period may develop an off-flavor. Frozen raw or cooked poultry that has thawed may be safely refrozen if it still contains ice crystals or if it is still cold--below 40°F--and has been held no longer than 1 or 2 days at refrigerator temperatures after thawing. Thawing and refreezing may lower the eating quality of the food.

Darkening of the tissue surrounding the bone in frozen poultry is due to liberation of the hemoglobin from the bone marrow during freezing and thawing.

POULTRY, STORAGE

The storage life of eviscerated poultry depends on the extent of contamination after eviscerating and cooling and the temperature at which the finished product is stored. Under the best conditions of storage and sanitation, a storage life of approximately 16 days or possibly slightly longer may be expected. Under poor conditions of sanitation, a storage life of approximately 8 days at 32°F (0°C), 4 days at 41°F (5°C), and 3 days at 50°F (10°C) has been reported.

Bacteria on poultry surfaces may have been present prior to killing, picked up from machines, knives or hands, from evisceration (from intestinal contents), or from cooling (cross contamination from one carcass to another).

PTOMAINE POISONING

Ptomaine poisoning is an old term used to describe foodborne illness. It was believed at one time that illness was caused by toxic amines formed when proteins decompose. Now we know that in order for food to contain toxic amines, decomposition would have to occur to the point where food would be unfit for consumption. Outbreaks of foodborne illness are usually associated with foods that appear sound and unspoiled.

PRESERVES -- Whole fruits or large chunks of fruit suspended in a thick transparent sirup.

PRESSURE CANNER LID STUCK

Three or four times a season we get a question about how to get a lid off a canner. I posed this question to Jeff Marshall of Presto and this was his answer. (At first I thought the heat had gotten to him!) Round up 3 strong persons and a rubber mallet. One person holds both body handles, a second holds both cover handles, and the third uses the rubber mallet to strike the cover at rim only. Person holding handles should apply extra force in direction of opening lid.

Obviously not an easy task!

We probably need to look at reasons why the lid is stuck and see if it can be prevented. If the lid doesn't come off easily, check to see if

1) the lid has been forced on. Most canners have marks for proper alignment of the body and lid. Cover handles should be centered over body handles. Do not force beyond this position.

2) there is still pressure inside the canner. The seal won't release until the pressure is down. Cool awhile longer and try again.

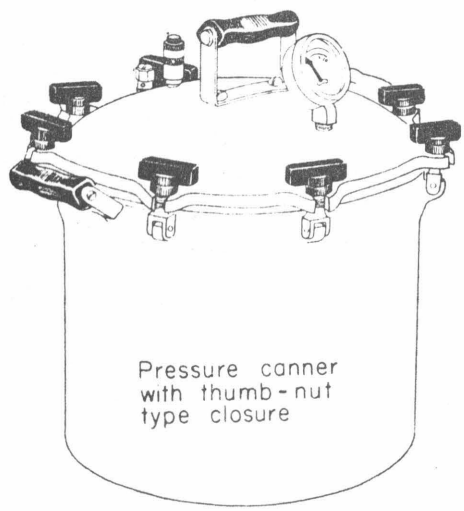
3) there is a gummy substance on the ring and metal lugs. This can result from over oiling the ring or gasket. After several uses the oil becomes gummy and prevents easy rotation of the canner lid. Remove gummy substance by using Duro Aluminum Jelly. Continue to oil ring but treat occasionally with aluminum jelly.

Before resorting to the strong arm measures described above, try pressing down on the cover while turning the lid. That may be all that's needed.

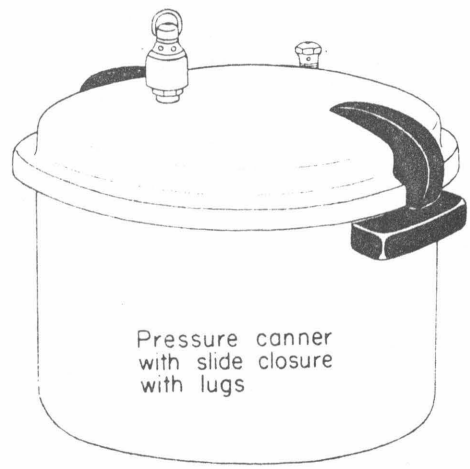
PRESSURE CANNERS

There's probably a greater reluctance to use a pressure canner than any other piece of household equipment. There is need to treat the pressure canner with respect but that's true of all equipment. The pressure canner has built in safety devices which reduce the chance of an accident.

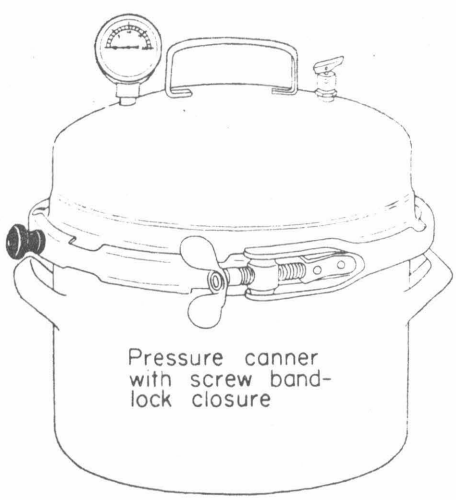
Pressure canners are made of materials strong enough to withstand pressure. Aluminum, either cast or heavy-gage is most common. In hard water areas, the inside of an aluminum canner will darken but this does not impair its usefulness. Lids of pressure canners are locked in place to keep in steam. If steam were allowed to escape, the temperature inside the canner would stay near the 212°F mark. The lids in older canners are fastened on with several thumb-screw type closures or lugs. Covers on newer canners usually slide into a locked position.



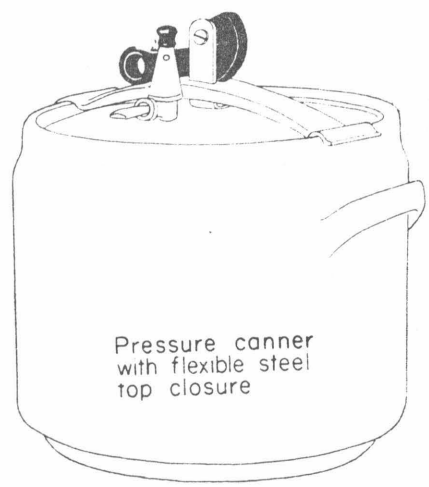
Pressure canner with thumb-nut type closure



Pressure canner with slide closure with lugs



Pressure canner with screw band-lock closure

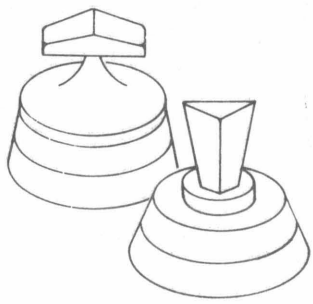


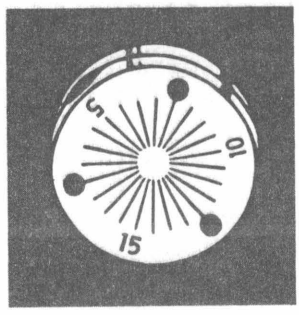
Pressure canner with flexible steel top closure

PRESSURE CANNERS (CONTINUED)

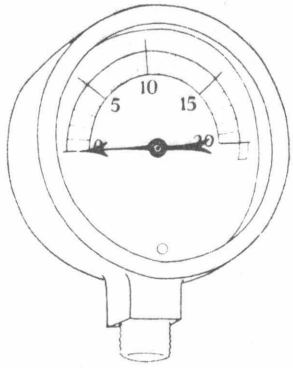
A gauge is essential to indicate pressure (temperature) inside the canner. Two types of gauges are used--dial and weight. The dial gauge gives a visual picture of the temperature; a weighted gauge gives an audio picture. The user must watch the dial gauge and make necessary adjustments in heat to keep the reading constant. The weighted gauge allows excess steam to escape with a resulting jiggling of the weight.

WEIGHTED GAUGES



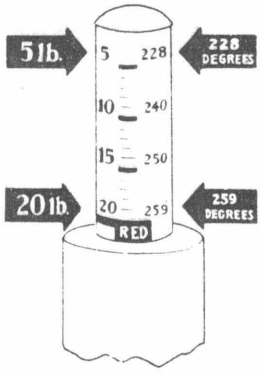


DIAL PRESSURE GAUGE

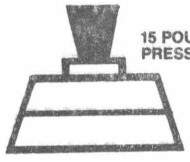


5 POUNDS PRESSURE

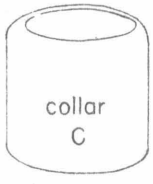
SLIDING CORE GAUGE



10 POUNDS PRESSURE



15 POUNDS PRESSURE



For 10 pounds pressure, use *A* plus *B*. For 15 pounds pressure, use *A* plus *B* plus C.

PRESSURE CANNERS (CONTINUED)

This noise is an indication of the temperature. If the noise is very insistent, then the pressure is above the desired level. If the jiggle is infrequent, then the canner is not hot enough.

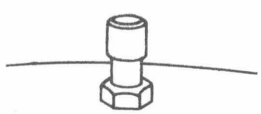
The Mirro Company says that the weight should jiggle 1 to 4 times a minute for cooking or about 4 times a minute for canning. The hissing sound and the slight escape of steam around the control which is noticeable between jiggles are additional assurances that proper pressure is being maintained. They feel that the most common mistake in using a weighted-gauge cooker or canner is the use of too much heat which results in excessive loss of moisture due to the control jiggling too often. Too much heat may be the most common mistake but too little heat is a more serious problem in canning.

To test for presence of steam when cooling the canner, nudge the control and if steam spurts out, pressure is not yet down; if no steam spurts out, remove control. The important thing is to see the steam, not hear it.

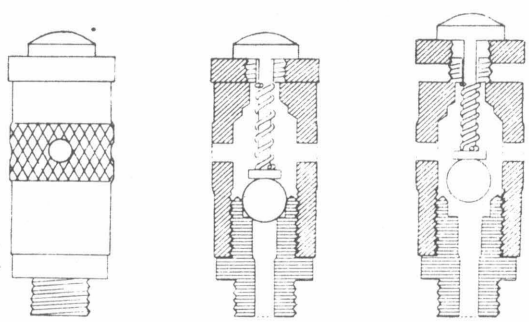
Which is best? Both types of gauges have loyal supporters. There's not much that can go wrong with a weighted gauge but the noise is annoying to some persons. A dial gauge does need to be checked periodically. It's also important to keep water out of the dial gauge which means extra care when cleaning up.

Most canners have a gasket of rubber or a rubberlike material that prevents steam from leaking out around the cover. Those older canners which close with lugs do not have a gasket; they have a very deep overlap to give a tight seal. The gasket deteriorates with use and age and is the part which needs to be replaced most often.

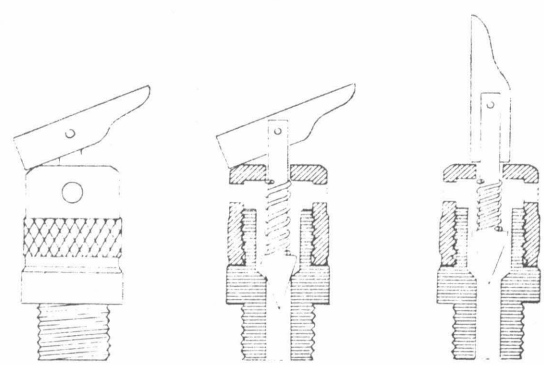
Vents are provided to allow air to be exhausted from the canner and to permit the release of steam as needed. A petcock or weight is used to control the escape of air or steam.



Vent pipe--may be closed by placing weight or pressure regulator over vent pipe.



Ball-and-socket combination pet cock and safety valve: (1) Outside view; (2) cross section, closed; (3) cross section, open.



Needle-type combination pet cock and safety valve: (1) Outside view; (2) cross section, closed; (3) cross section, open.

PRESSURE CANNERS (CONTINUED)

In addition, all pressure utensils have a safety plug of some type which goes into action when the pressure inside the canner gets too high. A metal alloy safety plug will melt, allowing excess steam to escape; a composition-type safety plug will be blown out. The most usual reason for this is a dry canner.

A pressure saucepan can be used for canning but is practical only when a small amount of food is to be canned. USDA recommends adding 20 minutes to the processing time when using a pressure saucepan because of the shorter heating/cooling time.

Two companies manufacture most of the pressure canners--the Mirro Aluminum Company and National Presto Industries, Inc. Replacement parts can be ordered direct if they are not available in local hardware and department stores. You will need to know model number in order to get the correct part. The Burpee Company still offers replacement parts although they no longer manufacture canners.

Addresses for the three companies follow.

Mirro Aluminum Company
P. O. Box 409
Manitowoc, WI 54220

National Presto Industries, Inc.
Eau Claire, WI 54701

Burpee Company
128 W. Liberty Street
Barrington, IL 60010

PRESSURE CANNERS - LEAKAGE

It is not unusual to have some loss of moisture or steam as the canner is heated. However, most leakage should stop once the canner has reached the desired temperature. Excessive leakage of moisture can make it difficult, if not impossible, to get the canner up to the desired pressure. If enough moisture is lost, the canner may boil dry and overheat.

Leakage of steam or moisture may be caused by

1) A small amount of moisture may form under the pressure regulator or weight at the beginning of processing due to condensation of moisture. This occurs because the pressure regulator or weight is not as hot as the canner and should disappear within a few minutes. If excess condensation continues, the vent pipe may be lose and should be tightened.

2) Leakage between the cover and body of the canner is usually caused by shrinkage of the sealing ring. Remove the ring and stretch it gently. Rubbing the ring with cooking oil or shortening may give a better seal or the ring may need to be replaced.

Oiling the ring can lead to other problems. With repeated heating, the oil gets to be gum-like and makes it difficult to rotate the lid on and off the canner. The Presto representative, Jeff Marshall, suggests using Duro Aluminum Jelly (in a blue bottle) periodically to cut the grease and remove the gum.

3) A slight amount of leakage around the air vent/cover lock at the beginning of processing is normal. If leakage continues, the cover handles may not be fully aligned with the body handles.

4) A small amount of steam or moisture may be visible around the overpressure plug (safety valve) as processing begins. This should stop when the overpressure plug seals.

PRESSURE CANNERS, OPERATING

Pour 2 or 3 inches of water into the canner and set on heat while you are packing food into jars. Set jars on rack in canner. Fasten the lid in place leaving the petcock or vent open to allow air to escape. Heat rapidly. Exhaust the canner--allow steam to escape--for 10 minutes. This expels the air in the canner and assures that pressure obtained will be true steam pressure.

Close the petcock or vent pipe. Watch a dial gauge or listen for a weighted gauge. When the pressure approaches the desired point reduce the heat. Start counting processing time when desired pressure is reached. Adjust heat throughout processing period to keep the pressure as constant as possible.

When processing time is up, turn off heat or set the canner off the heat. (It's probably better to set it off the heat if you have sufficient strength!) Let the canner cool naturally until dial gauge registers zero or a weighted gauge has stopped jiggling. Then open the petcock or remove weight to let the remainder of steam escape. Never hurry the cooling of a canner as this causes loss of liquid from jars.

Loosen the cover as soon as steam stops coming out of the vent. If you hurry this step, you may find the canner difficult to open because of the vacuum which has formed inside the canner. Always lift the canner lid away from you so that you won't get steam in the face.

PRESSURE CANNERS, OPERATING (CONTINUED)

Remove jars and set top side up on a rack or towel to cool. Sealing occurs during this cooling period. You can count the "pings." Check for seals on the day after canning. If you used a two-piece lid, the center should be depressed (sucked down) and give a clear ringing sound when thumped with a finger or tapped with a spoon. If a jar has not sealed, refrigerate it and use as soon as possible or reprocess. If you choose to reprocess, you'll have to use a new lid and process for the full amount of time again.

PRESSURE GAUGE TESTING

Several units have purchased testing equipment from Presto. The testing units are made to order by modifying an electric pressure saucepan. A dial gauge and a vent pipe for the gauge being tested have been added. The directions indicate it is to be used only with Presto gauges and indicator weights. It can be used, however, to test any dial gauge if you can get the gauge fitted down on the vent pipe.

Indicator weights from Mirro and other companies will not fit the vent pipe so cannot be tested. They really shouldn't need to be tested anyway.

The testing unit requires an electrical outlet and access to water. It will take a few minutes to heat water and bring the test unit up to pressure. For that reason it seems better use of time to schedule a day or days for concentrated testing.

The units sell for $35-$40 and are available from the Service Department, National Presto Industries, Inc., Eau Claire, WI 54701.

Presto is interested in having the equipment stay in good working order. To insure this, Presto is willing to test and repair the equipment free of charge. You may choose to detach the gauge and send it to be checked or you may send the entire lid. Unless there is a problem with the heating element or with the way the lid fits, there's no need to send the bottom.

Send to the Service Department (address above). Enclose a letter describing any problems you've had with the equipment or particular parts you'd like to have checked. Also be sure there's a return address for your office. If it's a new gasket or safety valve which is needed, it may be cheaper to buy that locally than to pay postage to Wisconsin.

PRESSURE GAUGE TESTING - Care of the unit

To clean, remove Control Master and submerse body of Electric Testing Unit in hot, sudsy water. Wash off the cover of the unit but do not immerse. Dry thoroughly before storing.

The outside polished aluminum surface can be cleaned with silver polish.

The sealing ring and automatic air vent should be replaced when they become hard or deformed.

To prolong the life of and for ease of operation of the two levered valves, oil the valves at least every other time the testing unit is used. Invert cover and drop 3 to 10 drops of 3-in-One brand household oil (red can) in each valve. Work valves thoroughly after each oiling to coat the entire mechanism. The oil not only lubricates the metal working parts but helps to prevent rust.

Occasionally check accuracy of Master Gauge against the 4-piece Regulator. Disassemble the 4-piece Regulator. Each of the pieces maintains 5 pounds pressure. Place the center core weight on vent pipe for 4-piece Regulator. Turn Control Master to 350°. When the center core weight begins to rock, the Master Gauge should read 5 pounds pressure. Add one ring weight. When it begins to rock, Master Gauge should read 10 pounds pressure.

PRESSURE SAUCEPANS

Zottola and Wolf of the University of Minnesota verified the need to add time when processing in a small pressure saucepan (4, 6, or 8 quart capacity) because of the shorter heat-up and cool-down time. They recommend adding 20 minutes when processing at 10 pounds pressure and 10 minutes when processing at 15 pounds pressure.

PROCESSED FOODS

Some consumers seem to have a natural distrust of processed food. Their concern may be for changes in a food as a result of processing or about substances added in processing.

Processing is necessary

1. To preserve perishable products for future consumption,
2. To transform or convert agricultural products into other forms making them suitable for human consumption or into forms for which a demand has been created, or
3. To extract substances (starch, sugar, flour and oils) that are not readily available in the naturally harvested products.

Food processing describes intentional alterations in the properties of food from point of origin to consumption. The "process" may be physical (adding or removing heat), chemical (salting, bleaching, adding food additives), or biological (fermentation).

PROCESSED FOODS (CONTINUED)

The major preservation methods are

1. thermal processing
2. dehydration
3. refrigeration and freezing
4. control of chemical environment
   a. the production or use of chemicals in the food to control or prevent growth of undesirable microorganisms. Fermentation is an example.
   b. the addition of chemicals.

For information about changes in nutritive value, see "Nutrient Losses in Preserved Foods" and "Vitamin Losses During Food Processing and Storage."

PUMPKIN, CANNING

Zottola and Wolf of the University of Minnesota have evaluated the recommended processing procedures and times for a number of food products. The one procedure which they questioned was for canning strained squash or pumpkin. The thickness or viscosity of this product affects the rate of heat penetration. The thicker the product, the slower the rate of heat penetration. Since the home canner does not have a method to measure and standardize the thickness, the heat treatment may be inadequate. It would be best to can the product in a cubed form and mash or strain just prior to use. Or freeze the mashed product.

The USDA bulletin Home Canning of Fruits and Vegetables has directions for canning cubed pumpkin. I would suggest we encourage homemakers to can cubed pumpkin and freeze strained pumpkin and squash.

PUMPKIN, CUBED, CANNING

Wash pumpkin, remove seeds and pare. Cut into 1-inch cubes. Add just enough water to cover; bring to boil.

Pack hot cubes to 1/2 inch of top. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with hot cooking liquid, 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°F).

Pint jars . . . . . 55 minutes
Quart jars . . . . 90 minutes

PUMPKIN, DRY STORAGE

Winter type pumpkins and squash are also very easy to store, and may keep for several months in a cool, medium dry basement, garage, or tool shed. Allow the fruit to ripen fully on the vine, and cure in the sun to form a hard rind. Harvest before frost, and leave a piece of stem on each when they are cut from the vine. Place pumpkins and squash on shelves to reduce the possibility of rot. The best storage temperature is about 60°F.

PUMPKIN SEEDS Food and Home Notes, USDA

To roast, pour boiling, salted water (3 tablespoons salt in 1 1/3 cups of water) over 1/2 pound (1 2/3 cups) pumpkin seeds. Cover and let stand at room temperature for 12 to 24 hours. Drain liquid from seeds. Spread seeds in a 10x15-inch baking dish. Bake in a 350°F oven for 20 to 25 minutes or until seeds are dry and puffed and kernel separates in center. Stir frequently. Let cool and stir occasionally while cooling. Store in air-tight container. The roasted seeds will stay fresh up to 10 days.

For flavored seeds, omit salt in soak water. After draining, sprinkle with onion salt, garlic salt or a mixture of chili powder and salt.

PUMPKIN, STRAINED, FREEZING

Select full-colored, mature pumpkin with texture that is fine rather than coarse and stringy.

Wash, cut into quarters or smaller pieces, and remove seeds. Cook pumpkin pieces until soft in boiling water, in steam, in a pressure cooker, or in the oven.

Remove pulp from rind and mash it or press it through a sieve.

To cool, place pan containing pumpkin in cold water. Stir pumpkin occasionally.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

QUALITY DETERIORATION IN CANNED FOODS

Excerpts from an article by Dr. Anthony Lopez, Department of Food Science and Technology

Loss of quality in canned foods may take place in a number of different ways. The causes may be bacteriological or chemical. Bacteriological processes usually produce a rapid and pronounced deterioration of the canned food. This is usually called "spoilage." The chemical type of deterioration also contributes in an important way to loss of quality.

What causes these chemical reactions? To understand this better, we must remember that canned foods, as well as all foods, are a mixture of chemicals produced and put together through processes in nature. These chemicals are the proteins, carbohydrates, fats, fiber, minerals, vitamins, pigments, and flavoring substances which, with water, make up foods. Some of these canned food components are continuously reacting in the container with other food substances, with oxygen gas present in the foods, with air trapped in the container, or with the can when this is the container used.

Warm or hot storage temperatures, above 70° F., accelerate the chemical reactions responsible for deterioration of color, flavor, texture, and nutritive value of canned foods. Therefore, cool storage temperatures are recommended since quality loss is proportional to the storage temperature.

In canned fruits, particularly, air trapped within the container can cause surface darkening and sometimes off-flavors and small losses of vitamin C. Contact of the raw materials with utensils or equipment and dissolution of minute quantities of iron and copper in the food may result in a grayish or black discoloration. When hard water is used in canning, it may give some vegetables a tougher texture and also cause a sediment in the container. Sediments also may be produced when over-mature vegetables are canned.

The iodine in iodized salt may cause a black or purplish discoloration in foods contining starch such as canned corn, gravies, or puddings. Iodized salt is generally recommended as table salt, but for the reasons mentioned, it should be used in canning only when the quality of the food will not be adversely affected by the iodine.

Off-flavors from the development of rancidity in fats or oils may contribute to the deterioration of quality in certain canned seafood, meat, poultry, and vegetable products.

It has not been possible to develop a can that will not react chemically, at least slightly, with certain foods. The most common of these reactions is internal can corrosion. This is a process in which minute amounts of tin and iron dissolve from the can surface into the food. The main disadvantage of can corrosion is that the container or the food, or both, may become discolored, resulting in loss of product quality. In extreme cases of corrosion, the can may bulge because of pressure generated in the can by hydrogen gas, which is usually formed under these circumstances.

QUALITY DETERIORATION IN CANNED FOODS (CONTINUED)

Food technologists can differentiate between cans bulging by hydrogen pressure, and those which do so because of microbiological spoilage. Since consumers cannot make the differentiation, they are advised to discard, without opening, all swelled cans, although contents from cans bulged by hydrogen pressure are edible. Internal can corrosion is more common in fruit products than in vegetable, meat, or fishery products. Corrosion is not a problem with glass containers.

Can corrosion may also produce bleaching of the food color. This effect is sometimes considered advantageous, such as in the case of canned applesauce. Here, the slight amounts of tin that dissolve keep the product light in color, whereas the same product packed in glass containers tends to darken in color, which is usually considered a loss of quality. In other instances, bleaching of the food is decidedly objectionable, such as in the case of canned cherries.

When canned foods are packed in glass containers, light-instigated reactions may cause color changes in the product, as well as small vitamin losses.

Another type of deterioration of canned food quality takes place when foods with high content of the sulphur-bearing amino acids, cystine and cysteine, are canned using internally uncoated cans, or cans coated with enamels other than a C-enamel. Foods in this category are prone to give off hydrogen sulphide during heat processing in the can. The hydrogen sulphide combines with iron that has dissolved from the tinplate, forming black ferrous sulphide. Thus, black discoloration or black specks are found on the internal surface of the can, or in the product itself. Canned seafoods, meats, poultry, asparagus, corn, and peas are most susceptible to the formation of this harmless but unsightly substance.

Darkening of canned foods may also be caused by certain chemical reactions known as non-enzymatic browning. These reactions promoted by heat take place between sugars and their derivatives, and amino acids that are in the food. Browning reactions in canned fruits and vegetables are usually undesirable. Color and flavor changes take place when non-enzymatic browning occurs. On the other hand, desirable flavor and color develop in certain products like canned meat products.

QUINCE JELLY without added pectin

3 3/4 cups quince juice (about 3½ pounds quince and 7 cups water)
1/4 cup lemon juice
3 cups sugar

Select about one-fourth underripe and three-fourths fully ripe quince. Sort, wash, and remove stems and blossom ends; do not pare or core. Slice quince very thin or cut into small pieces. Add water, cover, and bring to boil on high heat. Reduce heat and simmer for 25 minutes. Extract juice.

Measure quince juice into a kettle. Add lemon juice and sugar and stir well. Boil over high heat to 8°F above the boiling point of water, or until jelly mixture sheets from a spoon.

Remove from heat; skim off foam quickly. Pour jelly immediately into hot jars. Adjust jar lids. Process for 5 minutes in a boiling water bath. Makes about 4 half-pints.

Both the Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes for other quince products.

You can use the fruit from flowering quinces in these recipes.

RAISINS

Raisins are commercially produced in California's San Joaquin Valley. Grapes are laid on brown paper trays between the vines where they dry into raisins in about 2-3 weeks. The moisture content has been reduced from 75 to 80% to 15%. It takes 4½ pounds of grapes to yield 1 pound of raisins.

To prepare at home: Use Muscat, Tokay, or any seedless grape. Leave whole. Grapes dry in less time if dipped in lye 10 seconds or if blanched, 1/2 to 1 minute. Grapes dry in 3 to 5 days in the sun or 12-20 hours in a dehydrator. When dry (cool before testing), will have raisin-like texture, no moist center.

To do lye dipping, stir 2 tablespoons lye into 1 gallon cold water. Use a wooden spoon for stirring. Bring to a boil. Dip the fruit in the boiling solution. Many small cracks should form in the skin when the fruit is rinsed in cold water. Rinse thoroughly to remove all traces of lye.

RASPBERRIES, CANNING

See "Berries, Canning"

RASPBERRIES, FREEZING

See "Berries, Freezing"

REPROCESSING

A frequent question is can food be reprocessed if it was incorrectly processed or if the lids failed to seal.

If no more than 24 hours have passed since the food was processed, do one of the following:

1) Refrigerate the food and use it in the next day or two.
2) Freeze the food. Drain vegetables before freezing.
3) Reprocess the food. Remove lids, empty food and liquid into a pan, heat to boiling, pack into clean hot jars, and put on new lids. Process again for the full time. Reprocessed food will be overcooked and consequently of lower quality.

If more than 24 hours have gone by, discard the food. It may already have started to spoil.

REUSE OF COMMERCIAL JARS

There are several reasons why reuse of commercial jars is not recommended:

1. Home canning jars are usually heavier and more durable than commercial jars designed for one filling.
2. All canning jars have been standardized to meet the same specifications. Packer's jars have been designed for particular products. From product to product, there may be a difference in the diameter of the mouth, the width of the sealing surface, and the glass lugs.
3. Commercial jars have been run through high speed filling lines and may have been scarred in the filling process. In addition, some are scarred by spoons and knives in the emptying process. These scars may lead to breakage when the jar is subjected to high temperatures.
4. The lid may not be reuseable if the sealing material has been damaged and it may not be possible to find another lid to fit.

Penn State is now saying that mayonnaise jars can be used for water bath canning as long as a 2-piece lid is used. There is a greater chance of jar breakage during processing. A study reported in Organic Gardening (August 1983) showed the probability of breakage to be as high as 6 out of 100 jars. The Organic Gardening article also reported that the mayonnaise jars had a greater diameter--only six would fit in a canner that would hold seven canning jars.

Some Virginians do use these jars with good success. I think we need to recognize that use but not endorse it. It seems to me that we should encourage measures which help to insure successful canning and the use of commercial jars is an "iffy" procedure.

RHUBARB, CANNING

Wash rhubarb and cut into 1/2-inch peices. Add 1/2 cup sugar for each quart of rhubarb. Let stand (the Ball Blue Book says 3 to 4 hours) to draw out juice. Bring to boil, stirring, if necessary, to prevent sticking.

Pack hot fruit into jars 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 (212°F).
Pint jars . . . . . 10 minutes
Quart jars . . . . 10 minutes

RHUBARB, FREEZING

Choose firm, tender, well-colored stalks with good flavor and few fibers. Wash, trim, and cut into 1- or 2-inch pieces or in lengths to fit the package. Heating rhubarb in boiling water for 1 minute and cooling promptly in cold water helps retain color and flavor.

Unsweetened pack. Pack either raw or preheated rhubarb tightly into containers without sugar. Leave needed headspace. Seal, label and freeze.

Sirup pack. Pack either raw or preheated rhubarb tightly into containers. Cover with cold 40% sirup. Leave needed headspace. Seal, label and freeze.

RHUBARB JAMS, JELLIES, ETC.

The USDA publication How to Make Jams, Jellies, and Preserves at Home has a recipe for Rhubarb-Strawberry Jam. The Ball Blue Book has a Strawberry-Rhubarb Conserve recipe and a Rhubarb-Strawberry-Orange Conserve recipe. The package insert in powdered pectin tells how to make Blueberry-Rhubarb Jelly. Putting Food By has recipes for Rhubarb-Orange Jelly and Rhubarb-Carrot Marmalade.

RUTABAGAS, FREEZING

Select young, tender, medium-size rutabagas with no tough fibers. Cut off tops, wash, and peel.

Cubed. Cut into 1/2-inch cubes. Heat in boiling water for 2 minutes. Cool promptly in cold water; drain. Pack into containers, leaving needed headspace. Seal and freeze. Store at 0°F or below.

Mashed. Cut rutabagas in pieces. Cook until tender in boiling water and drain. Mash or press through a sieve.

To cool, place pan containing rutabaga in cold water. Stir occasionally. Pack into containers leaving needed headspace. Seal and freeze. Store at 0°F or below.

RUTABAGAS, STORAGE

Rutabagas require a cool, moist atmosphere for prolonged storage. The storage life may be prolonged by covering with moist spagnum peat moss, placing in film lined boxes or crates, or in polyethylene bags with a few 1/4-inch holes for ventilation. Rutabagas do emit an odor so you may not want to store them in the home basement.

SALMON JERKY

Slice salmon filets into thin strips. Salt fish in a dish or enamelled pan using 2 tablespoons salt per pound. Place in a refrigerator for 12 hours. Remove from the refrigerator, and place strips on a rack in the oven to dry. Set the oven to 140°F and allow to dehydrate for 3 to 5 hours.

The salmon strips may also be dried in the sun or on the barbecue. This process takes about 3 days. The meat should be brought in at night to prevent moisture condensation.

SALMONELLOSIS

Salmonellosis is one of the most common foodborne illnesses. It is caused by the salmonellae bacteria which is widespread in nature and lives and grows in the intestinal tracts of human beings and animals. Eggs and egg products used to be the foods most often associated with salmonellosis but pasteurization of liquid, dried, and frozen egg products has done much to reduce the incidence of salmonellosis attributable to eggs. Poultry, meat, and milk are other foods implicated in salmonellosis. It has been estimated that 30% of processed poultry may contain salmonellae.

Symptoms of illness usually appear between 12 and 36 hours after contaminated food is consumed. The symptoms are diarrhea, abdominal pain, chills, fever, vomiting, headache, dehydration and prostration. The symptoms may persist for several days. The illness is rarely fatal except to those who are already weak or ill.

To cause illness, food when consumed must be contaminated with salmonella. Contamination can occur during processing (from machines, knives, hands, intestinal contents, or the cooling water), at the retail level (from machines, knives, and hands), or in the home (knives, hands, cutting boards).

Salmonella in food are destroyed by heating the food to 140°F and holding for 10 minutes or to higher temperatures for less time: for instance, 155°F for a few seconds. However, if contaminated foods are eaten without heating or without adequate heating, illness may result.

A few bacteria (too few to cause illness) may multiply very rapidly if the conditions are right. Growth is most rapid at temperatures between 95°-110°F. Chill foods rapidly to minimize growth or hold at 140°F or above. Refrigeration at 40°F inhibits the increase of salmonella but they remain alive in foods in the refrigerator or freezer, and even in dried foods. The pH of the food affects the growth rate with growth being most rapid at a pH between 6.5 and 7.5. Growth will occur over a pH range of 4.1 to 9.0.

SALT

A pure salt without additives (iodine or anticaking agents) is recommended for canning and pickling. However, iodized salt and salt which has additives to keep it free-flowing can be used. Iodized salt may result in a slightly darker color for pickles and canned vegetables but does not affect other properties.

The material used to keep salt free-flowing often settles out leaving a slightly cloudy liquid or a bit of white residue in the bottom of the jar.

This description of various salts marketed by the Morton Company should help you know more about different types of salt.

Morton Salt (plain and iodized). A fine vacuum salt (sodium chloride) with free-flowing agent added to insure that "when it rains it pours." Available in virtually every food store across the country. Used in baking, cooking, and at-the-table seasoning. Sold in the familiar 26-ounce blue package, shakers, miniatures and 5-pound bags.

Morton Lite Salt Mixture. A salt and potassium chloride mixture* with iodide and free-flowing agent, containing half the sodium of regular salt. Available in the salt section in an 11-ounce light blue round. Used in baking, cooking and at-the-table seasoning.
*Should not be used by persons on a sodium or potassium restricted diet unless approved by a physician.

Morton Salt Substitute (plain and seasoned). A potassium chloride product* designed for persons on a doctor-recommended sodium restricted diet. The seasoned product contains additional spices. Available in salt and/or special food sections of food stores. Used in baking, cooking and at-the-table seasoning.
*Remember to consult a physician before using any salt substitute.

Morton Nature's Seasons Seasoning Blend. A balanced blend including five of the most popular flavors, salt, pepper, onion, garlic and parsley. Can be used on everything from salads, vegetables, meats, casseroles, appetizers to desserts. Available in salt section in 7½ and 4-ounce jars.

Morton Popcorn Salt. A super-fine grained salt designed especially to adhere to popcorn and other snack items. Can also be used for french fries, corn-on-the-cob and in fresh salads. Normally available in the popcorn/snack and/or salt section in 26-ounce or 3¼-ounce round package.

Morton Kosher Salt. A coarse flake salt used by many homemakers in canning, making ice cream or preparing pareve meals. No preservatives or free-flowing agents are added. Available in 3-pound box in salt section.

Use 2 cups Kosher salt for every cup of regular salt.

Morton Cooking and Canning Salt. A pure fine vacuum salt, with no preservatives or free-flowing agents added. Used in cooking, canning and pickling for best results. Available in 5-pound bag in salt section of food stores in primarily rural and suburban areas.

SALT (CONTINUED)

Morton Ice Cream and Cooling Salt. A northern medium or southern coarse rock salt used in the preparation of ice cream. Some homemakers also use it during the winter to prevent slippery sidewalks and driveways. Available in food stores in 5- and 10-pound bags or 4-pound boxes.

Morton Sausage Seasoning. A complete mixture containing spices, salt and dextrose blended to exact proportions to make delicious pork sausage, meat loaf, poultry dressings and other meat specialities. Normally available in rural areas in a 4-ounce pouch.

Morton Tender Quick Product. A fast cure product that has been developed as a cure for fresh and frozen meats. A combination of meat salt and other curing ingredients, the Tender Quick product was perfected for the purpose of pumping along the bone area in hams and shoulders, for pumping extra large bacons and for pickle curing smaller pieces of meat. In normal years, it is available in rural food stores and feed outlets.

Morton Sugar Cure Product (regular and smoke flavor). Contains salt, sugar, saltpeter, sodium nitrite (a chemical preservative) and a combination of spices. Formulated for dry or sweet pickle curing of hams and bacons. Normally available in rural areas in 7½ pound bag.

Morton Safe-T-Salt Halite. A medium rock or coarse solar salt used to melt ice and snow. Available in food stores in 10-, 25-, and 50-pound bags.

SAUERKRAUT

Sauerkraut is a brined cabbage product. That is, enough salt is added to prevent the growth of spoilage organisms but not enough to stop the activity of lactic acid producing bacteria. Dry salt is added to cabbage in the making of sauerkraut. The salt draws liquid from the cabbage to make a brine. The weaker the brine the more rapid the production of lactic acid but if the brine is too weak, softening and/or darkening of the cabbage may occur. Lactic acid production is most efficient at temperatures between 70° and 75°F. At temperatures above 80°F or below 60°F, abnormal flavor or other undesirable characteristics may appear. Eventually enough lactic acid is produced to make the product so acid that the lactic acid producing bacteria stop working and other spoilage organisms cannot grow.

Some persons would describe the period of fermentation by saying it was "working." It is a good idea once the cabbage has stopped fermentation to pasteurize the product to insure that it stays at that point.

SAUERKRAUT (CONTINUED)

Yield: 14 to 15 quarts

Cabbage . . . . . About 50 pounds
Salt, pure granulated . . . 1 pound (1½ cups)

Remove the outer leaves and any undesirable portions from firm, mature heads of cabbage; discard. Wash and drain remaining cabbage. 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 clean, 5-gallon crock or jar. Using a wooden spoon or tamper or your 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 or 4 inches from the top.

A 5-gallon crock will hold about 35 pounds of prepared, salted cabbage.

Cover cabbage with a heavy-weight, water-filled plastic bag that fits snugly against the cabbage and against the sides of the container to prevent exposure to air. The bag should be of heavyweight, water-tight plastic and intended for use with food. Store at room temperature (68° to 72°F) for 3 weeks while cabbage is fermenting.

To process: Heat sauerkraut to simmering (185° to 210°F). Do not boil. Pack hot sauerkraut into clean, hot jars and cover with hot juice to 1/2 inch from top of jar. Adjust jar lids. Process in boiling-water bath: 15 minutes for pints, 20 minutes for quarts (start to count processing time as soon as the hot jars are placed in the actively boiling water.)

Remove jars and complete seals if necessary. Set jars upright on a wire rack or folded towel to cool. Place them several inches apart.

SAUERKRAUT BY THE JAR

Some persons are interested in making sauerkraut in the glass jars in which it will ultimately be stored rather than making a large volume in a crock to be transferred to smaller jars for storage. It can be done but it is a messy, smelly procedure. (I guess you could say the same for making it in a crock!)

Wash the jars thoroughly. The jars of kraut (after fermentation) will be processed so select jars that are designed for canning.

SAUERKRAUT BY THE JAR (CONTINUED)

Wash the cabbage and remove damaged leaves. Cut the cabbage into halves or quarters and cut out the core. Shred to thickness of dime using a kraut cutter, or chop. Take out any coarse pieces.

Weigh the shredded cabbage. Measure out 1 tablespoon of table salt or 2 teaspoons of canning salt for each pound of shredded cabbage. Sprinkle the salt over the cabbage and mix until a brine begins to form. The kraut is then ready to pack.

Fill the jar half way, then pack cabbage down with a wooden spoon until the brine covers it. This drives out air as well as forcing the brine out. A word of caution--too much pressure can result in a broken jar.

Continue to add cabbage and press it down until the packed cabbage comes to the shoulder of the jar and the brine comes up in the neck of the jar.

Never add liquid. If the brine does not cover the cabbage, it needs to be packed more.

Use two small wooden strips or the cabbage core placed crisscross in the shoulder of the jar to keep the cabbage under the brine. Screw lid on loosely. (This would be a time you could use an old lid.)

Set the filled jars on a paper or in a pan as they will loose liquid during fermentation. A temperature of about 70°F is ideal for fermentation. Leave the jars for 10 days or two weeks until fermentation (bubbling) stops.

Cabbage that has fermented will be a light straw or cream color. If there are white spots on the cabbage, fermentation is not complete.

When fermentation stops, take out the wooden strips or core. If needed, add brine (1 tablespoon salt to 1 pint of water) to cover the kraut.

Clean the top of the jars. Put on new jar lids. Process in a boiling water bath canner--30 minutes for quarts.

SEAFOOD, FREEZING

This information from Seafood Products Course Lecture Guide, a Sea Grant publication should help in answering questions about freezing seafood.

Home freezing is not only an excellent method for preserving seafoods, but can be an added economy as well, since fresh seafoods may be purchased in season when prices are generally lower. Because some fresh seafoods are seasonal, it is important to learn the availability of seafoods during certain times of the year. The local fish dealer can provide this information and indicate which varieties are the most economical.

SEAFOOD, FREEZING (CONTINUED)

The selection of seafoods to put in a freezer is one of the most important phases of freezing food for the family. When purchasing seafoods for home freezing, be sure that they have not been previously frozen. Consult the dealer to be absolutely certain. When transporting seafoods to your home, keep them as cold as possible. A few hours at room temperature or in the trunk of a car on a warm day can completely spoil many seafoods.

Whenever in doubt as to the freshness of seafood, do not freeze it. If you have serious doubts, discard the seafood. Poor handling of fish prior to freezing will make it impossible to obtain good results, since freezing can only protect the quality of the fish as it is when frozen. Freezing cannot improve the quality; frozen foods can be no better than the material you start with.

Preparation of Seafood for the Freezer

When preparing seafoods for the freezer, eliminate all inedible material and debris. For example, scale fish and remove heads and entrails. Dehead and peel shrimp. Eliminating unwanted material will allow additional space in the freezer and lessen the work involved in preparing and serving the dish.

Packaging Materials

The object of packaging is to protect fish from dehydration, oxidation, and contamination. A good package has several characteristics:

A. Moisture proof. Loss of water during frozen storage results in a condition often referred to as freezer burn. The loss of water dries and toughens the food and promotes oxidation. Freezer burn and oxidation are always accompanied by off-flavor, off-odor, and off-color.
B. Low permeability. Permeability refers to the rate at which the packaging material permits vapors and gases to pass between the product and the surrounding atmosphere. There are large differences in the permeability of packaging materials and films.
C. Tightness of fit. A tight-fitting package is essential to prevent moisture loss inside the freezer package. In a loose-fitting package, moisture evaporates from the fish and condenses as ice crystals on the inside surface of the package. If the product is warmed slightly during defrosting or each time the freezer door is opened, the moisture may move from the package surface back to the food surface. When the package cools again, the cycle is repeated. This may continue until a large quantity of water is removed from the food, causing severe dehydration.
D. Other qualities. In addition to the important characteristics listed above, you should look for packaging materials that are strong, easy to apply and relatively inexpensive.

Unfortunately, it is difficult to find packaging material with all the desirable qualities listed. Each material has its advantages and drawbacks. Waxed paper, waxed cartons, cellophane, and polyethylene (the common plastic bag) offer little protection to seafood products. Bread wrappers (a kind of polyethylene bag) are widely used as a home freezer wrap. However, they should never be used because they are such a poor barrier to water vapor and air. Aluminum foil is a wrap to be used with caution. The foil itself is impermeable to gases, but it is

difficult to seal properly, thus allowing easy passage of water vapor and air. Additionally, aluminum foil is not a tight-fitting wrap and is easily punctured.

Of the plastic films, polyester, polyvinylindene chloride (saran) and polyvinyl chloride (P.V.C.) are all good barriers to oxygen, and also rank high in most other desirable characteristics of an ideal package. Both saran and P.V.C. will adhere to fresh fish and provide a good fit, if you are careful to crowd out air bubbles. However, saran is not strong at very low temperatures. It is a good idea to overwrap saran packages with a protective paper.

Polyester bags and sleeves are widely used for commercial packaging, but are not practical for home freezing, because air must be evacuated from the bags either by a vacuum pump or heat shrinking. Polyester is most suited for expensive, difficult to hold items such as cooked shrimp, salmon and crab, where the high value of the product offsets the relatively costly package.

Other Preparations for Freezing

In commercial cold storage, most whole fish are glazed with ice, because with proper equipment glazing is the least expensive method of packaging fish. Ice glazing is not easily done in the home, however, and the glaze will not stand up under continued handling. Some home freezer users do a form of glazing by packing fish in suitable containers and filling the containers with water. A good container for this purpose is a tin can such as a 2-lb. coffee can. When using such a container, be sure to have at least one-half inch of water over the fish.

Fish and shrimp are often frozen in ice cream and milk cartons filled with water. This practice is acceptable as long as the seafood is completely covered with an ice glaze and the cartons tightly sealed to prevent the transfer of moisture and oxygen out of the package. If the fish touch the sides of the cartons, as often happens, rancidity and "freezer burn" result.

A recommended technique for preserving the quality of seafood is to dip it in a precooked and cooled solution of 5 percent starch. This process will help exclude air from individual pieces when they are frozen. Use about 6 tablespoonsful of corn starch per gallon of water. Be sure to rinse away the starch after the item is thawed and before cooking.

The importance of excluding as much air as possible from the package cannot be overemphasized. Air not only causes oxidation, it also acts as an insulator, slowing the freezing process. While it is advisable to package seafoods under vacuum, most homemakers do not have access to the necessary equipment. The next best thing is to wrap the seafood to exclude as much oxygen as possible. The drug store wrap is suggested. This is done by placing the item on the sheet of wrapping material and bringing the ends together at the top. "Roll the fold" until it is snug against the food. The ends should be folded in a similar manner while pressing out as much air as possible. The wrapping material should then be secured with tape to prevent unfolding.

SEAFOOD, FREEZING (CONTINUED)

Another important consideration in packaging is the size of the pieces. Fish to be stored for periods greater than three months should be left whole or in quite large pieces. There is less dehydration per pound when the fish are frozen in this manner.

Trying to guess the age and contents of a frozen package of seafood can be frustrating and wasteful. Many times food is discarded because the storage age is unknown. Although it is unlikely that properly frozen and stored food can become harmful at any age, top quality demands that extended storage be avoided. Label each package with the date, type of seafood, weight, and number of servings or pieces. A crayon or grease pencil is ideal for this purpose. A record attached near the freezer will also be helpful and should carry the same information included on the packages as well as the location of each package in the freezer, the package size, and a current record of the number of packages put into or removed from the freezer. This prevents unnecessary searching for a particular package and the harmful warming of the contents while the freezer door is open.

Storage Temperatures

One of the most important factors controlling the quality of frozen seafood is the storage temperature. As storage temperature increases, the rate of quality loss also increases. A difference of 8 to 10 degrees can mean a great deal. You can safely assume that it is not possible to store fish at too low a temperature. Cold storage research shows that fish stored at 15°F for as little as two weeks show a significant loss of quality. Most home freezers are designed to hold temperatures between +4° and -4°F. Most of the older cold storage equipment operated at 0° to -4°F. Cold storage facilities for fisheries products are now being designed to hold temperatures from -10° to -20°F.

Storage Time

The length of time fish are held on ice or chilled storage greatly affects the storage time of the frozen product. Experiments have shown that several species of fish held two days on ice have a frozen storage life of twelve months, whereas the same fish held for seven days on ice have a frozen storage life of only two months. The need for rapid handling of fresh fish cannot be overemphasized. Storage life is also dependent on the species of fish. See the section below on the relationship between oil content and storage life.

Although commercial packaging may allow over a year of good shelf life, freezing methods available in the home generally will not permit seafood to be stored that long and still maintain its flavor and texture. Most home-frozen seafood should not be stored over 6 months, and salmon, crab and shrimp not over 3 months. Two to three months or less storage time is ideal for all seafood. A good rule for a continuous supply of high quality frozen food is "first in, first out." Seafood is delicate in flavor and deserves to be eaten at the peak of quality.

SEAFOOD, FREEZING (CONTINUED)

Rancidity and Oil Content

The biggest problem in spoilage of frozen fishery products is rancidity. Rancidity appears to be directly related to fat or oil content. Long ago, farm women learned to store their lard in crocks with as small a surface as possible exposed to the air and in a dark, cool place. Heat, light, oxygen and the presence of heavy metal ions, such as copper and iron, enhance the development of rancidity.

Fish oils differ considerably from other animal and plant oils. The oil in fish is long-chain fatty acids, which contain many double bonds. Consequently, fish oil becomes very susceptible to oxidation. It is at the double bonds that atmospheric oxygen combines with the oil molecule to produce a variety of compounds such as ketones, aldehydes, acids, and many others that have not been identified.

Fish may be classified into three categories according to their oil content:

A. Low (less than 5 percent): examples are halibut, cod, flounder, and red snapper.
B. Moderate (5-10 percent): examples are mullet, croaker, and salmon.
C. High (more than 10 percent): examples are herring, mackerel, and lake trout.

Normally, fish of high oil content are more susceptible to oxidation and, therefore, rancidity. Fish possessing a high oil content will become rancid in three months in a freezer unless precautions are taken. Moderately oily fish become rancid in from 9 to 12 months. There are, however, exceptions. King salmon have a fat content of about 15 percent and pink salmon contain 6 percent fat or less. Even though the pink salmon have much less fat than king salmon, they develop a rancid odor and flavor much more quickly than the king salmon do. Some species of fish are extremely difficult to preserve in the frozen form in a home freezer. Herring is a fat fish which is particularly susceptible to rancidity; it should be held at -20°F or lower. Smelt are another group difficult to store for extended periods.

Freezing alone will not prevent rancidity but will slow down the reaction considerably. Treating fish with an antioxidant coupled with vacuum packaging will increase the shelf life. Antioxidants which have displayed excellent results in experiments are butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), ethylenediaminetetraacetic acid (EDTA), 3', 3-thiodipropionic acid (TDP), and propyl gallate. Other good antioxidants which can be purchased at the grocery store are ascorbic acid and citric acid.

For those who glaze fish and wish to use an antioxidant, we recommend ascorbic acid. The fish should be soaked in a 0.1 percent solution for about 1 to 2 minutes, frozen, and then glazed with this solution. A second glazing is advisable. The fish may then be wrapped as previously described.

SEAFOOD, FREEZING (CONTINUED)

Other Causes of Spoilage

Besides rancidity, the two major causes of spoilage in frozen foods are protein degradation and brown discoloration. Protein degradation is caused mainly by autolytic and bacterial enzymes which are quite active above 40°F. This spoilage is characterized by ammonia and amine-like odors often experienced in spoiled meats and seafoods. These enzymes are protein in nature, and mobilization or activity decreases as the temperature is reduced. Some enzymes remain active (though activity is low) even at 0°F. A prime example occurs in the freezing of corn on the cob without first blanching; heating inactivates the enzymes. In fishery products there is very little or no enzymatic degradation at 0° to -10°F and these products may remain palatable for many months, all other factors being equal.

Brown discoloration is also known as the browning reaction or the Maillard reaction. This reaction is particularly prevalent when white fleshed fish are cut into steaks or fillets. Extensive research has shown that the reaction is non-enzymatic and is caused by a combining of certain amino acids with reducing sugars. Pentoses (5 carbon sugars) react readily with amino acids which contain sulfur, those amino acids being methionine, cysteine, and cystine. Lysine is also involved. The reaction is characterized by the presence of a brown color much like that of brown wrapping paper. The reaction is inhibited by treatment with antioxidants such as ascorbic acid and TDP.

Proper Use of the Frozen Product

The method of thawing seafood is almost as important as proper freezing. Schedule thawing so that seafood will be cooked soon after it is thawed. Usually the more quickly a product is thawed the better, but never in hot water. Surface spoilage can take place quickly when thawing at room temperature or in warm water if the surface of the package remains at that temperature for several hours.

Place the package of frozen seafood in the refrigerator to thaw. Allow from 18 to 24 hours for thawing a 1-pound package. If quicker thawing is desired, place the packages of frozen seafood under cold running water. Allow 2 hours for thawing a 1-pound package. Thawed fish may be held safely for a day in the refrigerator before cooking. Thawed seafoods should not be refrozen.

Some frozen seafood may be cooked without thawing. Breaded, frozen fish should be cooked this way. In addition, frozen fillets may be cooked without thawing if additional cooking time is allowed. If the fillets are to be breaded or stuffed, however, they should be thawed before cooking.

A warning is in order about thawing smoked or kippered fish. Never leave smoked or kippered fish in a tightly wrapped package after it has thawed. Some smoking methods do not ensure complete destruction of *Clostridium botulinum* spores. Smoked fish stored unfrozen over a few weeks in an airtight container may be harmful.

SEAFOOD, FREEZING (CONTINUED)

Comments

Seafood is tasty, nutritious, easy to prepare, and economical. It commands high priority on a list of preferences for any family meal. Consequently, these delicacies of the sea deserve to be served at their peak of quality. We say to the commercial processor, "Keep the product clean, keep it moving, keep it cold, and keep it stored at a temperature sufficient for proper preservation of the product." This is good advice to the homemaker freezing seafood for her family in the home.

SEALING RINGS

Last year, PRESTO heard from several County Extension Home Economists who had the same question from consumers regarding sealing rings for PRESTO canner/cookers. Our Service Department, also, has had consumer inquiries about the "short life" of replacement sealing rings. Through the winter PRESTO completed a survey to determine the cause of this sealing ring problem. Data collected and compiled indicates that there is a misunderstanding about when and how often sealing rings should be oiled.

Sealing rings for newer model canner/cookers are prelubricated before packaging and these rings need only occasional relubrication. Frequent oiling is not necessary and may cause the sealing ring to swell, thus making the canner/cooker cover difficult to close or open.

Replacement sealing rings for older model canner/cookers are not prelubricated and should be lubricated with cooking oil when first installed in canner/cooker. Frequent oiling is not necessary and may cause swelling of the sealing ring.

Many consumers are taking such good care of their canner/cookers that they are oiling the sealing rings every time the canner/cooker is used. Too much oil seems to deteriorate the sealing ring very rapidly. A prelubricated sealing ring requires oiling only if the cover becomes hard to open and close. The sealing rings which are not prelubricated require initial oiling and then only if the cover becomes hard to open and close.

Printed material which accompanies PRESTO canner/cookers and replacement sealing rings contain information on the care and use of that particular sealing ring or canner/cooker model.

SIRUP COST

Cost of Sugar per Quart of Food Canned

Cost for 5 lbs. of sugar	Cost per Quart* Light Sirup	Medium Sirup	Heavy Sirup
$0.70	3.0¢	4.0¢	5.5¢
0.80	3.5	5.0	6.5
0.90	4.0	5.5	7.5
1.00	4.5	6.0	8.0
1.10	5.0	6.5	9.0
1.20	5.5	7.5	9.5
1.30	6.0	8.0	10.5
1.40	6.0	8.5	11.5
1.50	6.5	9.0	12.0
1.60	7.0	9.5	13.0
1.70	7.5	10.5	14.0
1.80	8.0	11.0	14.5
1.90	8.5	11.5	15.5
2.00	9.0	12.0	16.0
2.10	9.5	13.0	17.0
2.20	10.0	13.5	18.0
2.30	10.0	14.0	18.5
2.40	10.5	14.5	19.5
2.50	11.0	15.0	20.5
2.60	11.5	16.0	21.0
2.70	12.0	16.5	22.0
2.80	12.5	17.0	23.0
2.90	13.0	17.5	23.5
3.00	13.5	18.0	24.5

*Using 1¼ cups sirup per quart.
Factors used in calculating the cost were: 0.0445 for light sirup; 0.0606 for medium sirup; 0.0812 for heavy sirup. These numbers were multiplied by the cost of five pounds of sugar to obtain the cost per quart. Costs are estimated to the nearest one-half cent.

SIRUP STRENGTH

Fruits can be canned and frozen without added sugar but most will have better texture, flavor and color if some sugar is added.

A sugar sirup is frequently used. To make, dissolve sugar in water or in juice extracted from some of the fruit. The mixture will usually have to be heated to get the sugar to dissolve.

Strength of Sirup		Sugar Cups	Water Cups	Yield of Sirup Cups
Thin	30% sirup	2	4	5
	35% sirup	2 1/2	4	5 1/3
Medium	40% sirup	3	4	5 1/2
Heavy	50% sirup	4 3/4	4	6 1/2
	60% sirup	7	4	7 3/4
	65% sirup	8 3/4	4	8 2/3

SLIM-SET is a jelling mix sold by MCP Foods, Inc., Anaheim, CA 92803. It can be used with artificial sweetener and fruit juice to make a jelly-like product. It is not pectin but contains vegetable gums which cause the product to set up.

SNAP BEANS See GREEN BEANS

SOUP STOCK, CANNING

Hot pack. Make a fairly concentrated meat stock by covering bony pieces of meat or chicken with lightly salted water. Simmer until tender.

Skim off fat. Remove all bones. Leave meat and sediment in stock.

Pour boiling soup stock into jars, leaving 1 inch of headspace. Adjust jar lids. Process in a pressure canner at 10 pounds pressure (240°F).

Pint jars . . . . . 20 minutes
Quart jars . . . . 25 minutes

SOYBEANS, GREEN, FREEZING

Select firm, well-filled, bright-green pods. Wash. Heat beans in pods 5 minutes in boiling water, and cool promptly in cold water. Squeeze soybeans out of pods.

Pack soybeans into containers, leaving headspace in rigid containers. Seal, freeze, and store at 0°F or below.

SPAGHETTI SAUCE

See Ball Blue Book for Meat Sauce Recipe

SPAGHETTI SQUASH

Spaghetti squash is a relatively new member of the cucurbitaceae family which also includes cucumbers, watermelons, pumpkins, and summer squash. It has a hard shell like other winter squash and can be stored in the same way.

Dry storage is the preferred method of preserving. To freeze, follow directions for Squash, Winter.

Spaghetti squash does resemble spaghetti when cooked. It has a delicate flavor (some would say no flavor) and chewy texture. The calorie content is lower than spaghetti--30 calories for 100 grams of cooked spaghetti squash as compared to 110 calories in 100 grams of cooked spaghetti.

SPAGHETTI SQUASH (CONTINUED)

To prepare for eating, split squash using heavy knife. Scoop out seeds. Place cut side down in wide pan with 2-3 inches of water. Cover, steam about 20 minutes. Or bake split squash about 45 minutes at 350°F. Or microwave 8-15 minutes, cut side up, in a dish with a few tablespoons of water. Pull out cooked strands with a fork. Serve buttered and seasoned, or with a zesty tomato sauce.

SPORE

Spore is a stage in the life cycle of some microorganisms. It is produced within the vegetative cell by the development of a thick and relatively impervious cell wall which results in its being much more resistant to heat, cold, or antibacterial agents than the usual bacterial cell.

SQUASH

Squash are usually classified as summer squash or winter squash. However, both grow in the summer and both are available in the winter. So what's the difference? A summer squash is eaten skin and all, including seeds. They should be picked a few days after they develop while they are still young, tender, crisp, fresh, and fairly heavy in relation to size.

Winter squash varieties are allowed to fully mature on the vines and are picked just before frost. You don't eat the rind or seeds of winter squash.

SQUASH, SUMMER, CANNING

Wash squash and trim ends but do not pare. Cut squash into 1/2-inch slices; halve or quarter to make pieces of uniform size.

Raw pack. Pack raw squash tightly into clean jars leaving 1-inch of headspace. Add 1/2 teaspoon of salt to pints; 1 teaspoon to quarts. Fill jar 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°F).

Pint jars . . . . . 25 minutes
Quart jars . . . . 30 minutes

Hot pack. Put squash in saucepan and add just enough water to cover. Bring to a boil.

Pack hot squash loosely to 1/2-inch of top. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with boiling cooking liquid or 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°F).

Pint jars . . . . . 30 minutes
Quart jars . . . . 40 minutes

According to Presto, cubed squash can be processed at 15 pounds for 20 minutes.

SQUASH, SUMMER, FREEZING

Select young squash with small seeds and tender rind. Wash, cut in 1/2-inch slices. Heat in boiling water for 3 minutes. Cool in cold water and drain. Pack into containers leaving 1/2-inch headspace. Seal and freeze.

SQUASH, WINTER, CANNING

Zottola and Wolf of the University of Minnesota have evaluated the recommended processing procedures and times for a number of food products. The one procedure which they questioned was the one for canning mashed squash or pumpkin. The thickness or viscosity of this product affects the rate of heat penetration. The thicker the product, the slower the rate of heat penetration. Since the home canner does not have a method to measure and standardize the thickness, the heat treatment may be inadequate. It would be best to can the product in a cubed form and mash or strain just prior to use. Or freeze the mashed product.

The USDA bulletin Home Canning of Fruits and Vegetables has directions for canning cubed squash. I would suggest we encourage homemakers to can cubed squash and freeze strained squash.

SQUASH, WINTER, CANNING, CUBED

Wash squash, remove seeds and pare. Cut into 1-inch cubes. Add just enough water to cover; bring to boil.

Pack hot cubes to 1/2 inch of top of jars. Add 1/2 teaspoon salt to pints; 1 teaspoon to quarts. Cover with hot cooking liquid, 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°F).
Pint jars . . . . . 55 minutes
Quart jars . . . . 90 minutes

SQUASH, WINTER, DRY STORAGE

Allow the squash to fully ripen on the vine and cure in the sun to form a hard rind. Harvest before frost, and leave a piece of stem on each when they are cut from the vine. Place squash or shelves in a cool, medium dry basement, garage, or tool shed. The best storage temperature is about 60°F.

SQUASH, WINTER, FREEZING

Select firm, mature squash. Wash, cut into pieces, and remove seeds. Cook pieces until soft in boiling water, in steam, in a pressure cooker, or in the oven. Remove pulp from rind and mash or press through a sieve.

To cool, place pan containing squash in cold water and stir squash occasionally.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

STAPHYLOCOCCAL POISONING

Staphylococcal food poisoning is the most common foodborne illness. The actual number of cases occurring each year is unknown since the majority go unreported.

Staphylococci enter foods from two sources, humans and animals. The body openings of a human, particularly the nasal passages, are loaded with staphylococci. Boils, pimples, acne, and skin infections are important sources of these organisms.

Staphylococci produce an enterotoxin which causes inflammation and irritation of the lining of the stomach and intestinal tract. Symptoms of staphylococcal food poisoning usually appear within 2 to 4 hours and include explosive diarrhea, vomiting, prostration and abdominal cramps. Recovery occurs as soon as the toxin is removed from the system--usually within 24 hours.

Foods involved with staphylococcal poisoning are usually foods rich in protein as the organism needs certain amino acids, thiamin, and niacin for growth. Foods often implicated are cooked ham and other meat products; poultry and dressings; sauces and gravies; cream-filled pastry, potato, ham, poultry, and fish salads; milk and cheese; Hollandaise sauce; and bread pudding.

Growth occurs at temperatures between 50° and 120°F but optimum growth occurs at approximately 98°F. The organism is killed by heating to 155°F. Growth occurs at a range of pHs from 4.8 to 7.6. The organism is not inhibited by salt or sugar.

You'll note that many of the foods are cooked foods. Cooking kills the bacteria but the food is recontaminated usually by the person handling the food (from a sneeze, cough, boil, pimple, or infected cut). Unclean equipment can be the source of contamination. It is practically impossible to produce food for consumption that will not contain some staphylococci. However, proper storage--below 45°F--will prevent toxin production.

The toxin is very heat resistant. And many of the foods implicated are not heated for serving. The best control is prevention.

Mayonnaise is sometimes blamed for the vulnerability of main dish salads but it is not the culprit. It does contribute moisture but the pH of mayonnaise is below 4.0 and toxin would not be produced at that pH.

The foods to which mayonnaise is added are good sources of the nutrients the organism needs to grow, are handled (taking off the bone, chopping, etc.) which allows ample opportunties for contamination, and the finished product is stored for several hours prior to serving. The foods themselves are not as acid as mayonnaise so the pH of the salad may be such that toxin production can occur.

STEAM CANNER

The steam canner has come on the market in recent years. The first one I heard about was the Ideal Fruit Canner and Steam Cooker marketed by KBL Enterprises in Salt Lake City, Utah. Advertising claims for the canner include: "Cuts canning time in half - Keeps kitchen cooler - Saves energy - A much shorter overall processing time destroys the fruit enzymes more quickly, stopping chemical deterioration which saves the natural fresh fruit flavor and texture - It heats with steam, which has a heat transfer coefficient many times greater than boiling water."

Instructions for using the canner do not make it sound quite so wonderful. They suggest following the instructions for preparing and processing fruits, tomatoes, and other acid foods that are given in acceptable canning guides.

The principal difference between The Ideal Canner and a boiling water bath canner is the amount of water used. A small amount of water (about 1½ quarts) is heated in the bottom of The Ideal Canner to produce steam. Jars of food are set on a rack above the water so that they are heated by steam. Processing time is counted from the time steam flows from the escape vents. A larger amount of water (approximately 2 gallons) is heated in the water bath method. Jars of food are immersed in the boiling water.

Kuhn, et al. at Penn State tested two products which are frequently canned at home in a boiling water bath--tomato juice and applesauce. These products were chosen because they represent two types of heat transfer--convection heating for the tomato juice and conduction heating for the applesauce. Both pint and quart jars were filled at temperatures typical of cold (130°F) and hot pack (170°F). They used the times recommended for boiling water bath processing.

They found that less energy was consumed when using the steam canner than with the boiling water bath method of canning. However, none of the jars of food processed in the steam canner reached the temperature achieved in the boiling water bath canner. This meant the foods were underprocessed and subject to yeast and mold spoilage.

Reruns were conducted using the hot-pack fill temperature of 170°F in the steam canner to determine processing times which would equal the boiling water bath system. As much as 19 additional minutes was required.

They concluded that steam canner processing should not be recommended at present pending further studies to establish processing times.

STEAM LOSS FROM CANNER

Moisture lodged inside handle or between gasket and cover may appear as a "leak." If moisture does escape, wait a few minutes for pressure to build up. The "leak" will usually disappear. If a true leak, it may be difficult or even impossible to get the pressure up in the cooker or canner. In that case, cool the cooker or canner and open. Check vent tube to be sure it is open. Remove gasket and stretch slightly.

Repeated lubrication of a gasket causes it to "swell" and stretch.

If cover is hard to open and close, press down on cover to compress the gasket while sliding the lid into a locked or open position.

STERILIZING JARS

It is not necessary to sterilize jars for foods which will be processed in either a boiling water bath canner or a pressure canner. Processing sterilizes both the containers and their contents.

Jars should be thoroughly clean. You can accomplish this by hand or machine washing.

If you do need to sterilize jars for some reason, leave in boiling water for 10 minutes.

STRAWBERRIES

Select strawberries with a full red color and a bright luster, firm flesh, and the cap stem still attached. The berries should be dry and clean. Medium and small sized berries may have better eating quality than large ones. Select fully ripe berries for freezing and for jams. Strawberries for preserves should be firm.

Wash berries in cold water a few at a time before removing cap stems.

A quart of strawberries weighs about 1 1/2 pounds.

STRAWBERRIES, CANNING

Canning is not a very satisfactory method for preserving strawberries as they tend to fade and lose flavor during storage. The USDA publication does not have a procedure for canning strawberries but Putting Food By, the Ball Blue Book, and the Kerr Home Freezing and Canning Book do. The procedures are slightly different so all three follow.

Putting Food By

Wash and hull perfect berries that are red-ripe, firm, and without white or hollow centers. Measure berries. Using 1/2 to 1 cup sugar for each 4 cups of berries, spread the berries and sugar in shallow pans in thin alternating layers. Cover with waxed paper or foil if necessary

STRAWBERRIES, CANNING (CONTINUED)

as a protection against insects, and let stand at room temperature for 2 to 4 hours. Then turn into a kettle and simmer for 5 minutes in their own juice. Have some boiling thin sirup on hand if there's not enough juice for packing.

Fill jars leaving 1/2-inch of headspace. Add a bit of hot sirup if needed. Remove air bubbles by running a spatula or knife between jar and food. Adjust jar lids.

Process in a boiling water bath (212°F).
Pints . . . . . 10 minutes
Quarts . . . . 15 minutes

Ball Blue Book

Use firm, red-ripe berries, which have neither white nor hollow centers. Hull, wash, drain, and measure berries. Use 1/2 to 3/4 cup sugar to each quart of berries. Gently mix sugar with berries. Let stand 5 to 6 hours in a cool place. Heat slowly until sugar dissolves and berries are hot. Pack, hot, into jars, leaving 1/2-inch headspace. Adjust jar lids.

Process in a boiling water bath (212°F).
Pints . . . . . 10 minutes
Quarts . . . . 15 minutes

Kerr Home Freezing and Canning Book

Boil together 1 cup sugar and 1/2 cup strawberry juice. This juice may be obtained by crushing and heating some of the softer berries. Cool and add 6 cups whole strawberries, then boil 3 minutes. Cover the vessel and set aside for at least 4 hours. Pack into jars leaving 1/2 inch headspace. Adjust jar lids.

Process in a boiling water bath (212°F).
Pints . . . . . 15 minutes
Quarts . . . . 15 minutes

STRAWBERRIES, FREEZING

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--3/4 cup sugar to each quart of sliced berries. Turn berries over and over until sugar is dissolved and some juice is formed.

Pack berries in containers, leaving 1/2-inch headspace in rigid containers. Seal. Freeze; then store at 0°F or below.

Strawberries can be packed in sirup or unsweetened.

STRAWBERRY JAM with liquid pectin Yield: 4 pints

4 cups crushed strawberries (about 2 quarts fresh berries)
7 cups sugar
1/2 bottle (3 fl. oz.) liquid pectin

Crush berries and measure into a large kettle. Add the sugar and stir well. Place on high heat and, stirring constantly, bring quickly to a full boil. Boil hard for 1 minute, stirring constantly.

Remove from heat and stir in the pectin. Skim off foam. Stir gently at frequent intervals for 5 minutes. This will help prevent floating fruit.

Pour into half-pint or pint home canning jars leaving 1/8-inch headspace. Screw new lid on and place in a boiling water bath canner. Process for 5 minutes after water returns to a boil. This short processing time designed to kill mold will not affect the quality of the jam. Store in a cool, dry place.

An older method is to pour jam into hot, sterile glass containers and cover with melted paraffin. A lid will further reduce the possibility of mold growth.

STRAWBERRY JAM with powdered pectin Yield: 4½ pints

5½ cups crushed strawberries (about 3 quarts fresh berries)
1 package powdered pectin
8 cups sugar

Crush berries and measure into a large kettle. Add the pectin and stir well. Place on high heat, and, stirring constantly, bring quickly to a full boil.

Add the sugar, continue stirring, and heat again to a full rolling boil. Boil hard for 1 minute, stirring constantly. Remove from heat; skim off foam.

Pour into containers, seal and process in boiling water bath canner for 5 minutes. Store in a cool, dry place.

STRAWBERRY JELLY is not as common as Strawberry Jam or Preserves but you'll find recipes in the USDA publication How to Make Jams, Jellies and Preserves at Home, in the Ball Blue Book, in the Kerr Home Canning and Freezing Book, and on the recipe sheet which comes with pectin products.

STRAWBERRY, OTHER FRUIT COMBINATIONS

Strawberry and rhubarb seem to be the most usual combinations. I'm not sure whether that's because they are both spring fruits or because their flavors are complimentary. You'll find recipes in the USDA publication How to Make Jams, Jellies and Preserves at Home, in the Ball Blue Book, and in the Kerr Home Canning and Freezing Book.

STRAWBERRY PRESERVES Yield: 2 pints

6 cups prepared strawberries (about 2 quart boxes strawberries)
4½ cups sugar

Select large, firm tart strawberries. Wash and drain berries. Remove caps.

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

Then bring the mixture to a boil stirring gently to avoid crushing strawberries. Boil rapidly, stirring as needed to prevent sticking, until the sirup is somewhat thick (about 15 to 20 minutes) or until temperature is 9°F above the boiling point of water. Remove from heat; skim. Pour into hot, clean jars leaving 1/8 inch headspace. Adjust jar lids. Process in a boiling water bath canner for 5 minutes.

STRAWBERRY PRESERVES, COLOR

Loss of the bright red color of the freshly made product may be due to a number of factors.

1. A high storage temperature (storage at refrigerator temperature increases storage life 6 fold over storage at room temperature)
2. A high pH
3. Oxygen in the headspace
4. The presence of sugar, especially fructose
5. The presence of ascorbic acid

The color change does not affect the safety of the product but does affect palatability.

STORAGE LIFE OF FROZEN FOODS AT 0°F. OR BELOW:
The following provides information on the approximate storage life of many types of frozen foods when properly stored at 0 degrees F. Figures were developed by the U.S. Army Natick (Mass.) Research and Development Command, with information provided by the American Frozen Food Institute.

	APPROXIMATE STORAGE LIFE (MONTHS)
Apples	18
Apple juice, concentrated	30
Asparagus	12
Bacon: /2,/3	
green, unsmoked	2-4
slab, type I	5½
slab, type II	12
sliced, type I	1½
sliced, type I, vacuum packed	3
sliced, type II	2¼
sliced, type II, vacuum packed	4½
Beans:	
green	12
lima	14
wax	12
Beef: /2	
boneless, fabricated (without ground meat)	10
boneless, fabricated (with ground meat)	8
carcass, wholesale cuts	10
corned	6
dried, sliced	12
ground	4
ground, patties	3
liver, whole or portion cut	4
tongue, fresh	4
tongue, cured or smoked, type I	6
tongue, cured or smoked, type 2	4
Blackberries	18
Blueberries	18
Bologna: /2, /3	
Lebanon	8
50% beef	3-4
60% beef	3-4
75% beef	6
Boysenberries	18
Bread dough: /2	6
Bread yeast raised (and rolls fresh): /2	6
Broccoli	14
Brussels sprouts	12
Butter prints and patties: /2	18
Cakes, coffee, layer, loaf, cheese	12
Carrots	24

	APPROXIMATE STORAGE LIFE (MONTHS)
Cauliflower	14
Cervelat: /2, /3	
dry	6
soft (thuringer)	3-4
Cherries, RTP	24
Chicken: /2	
parts, cut up, ready-to-cook	8
whole, ready-to-cook	10
Clams, shucked: /2	9
Corn	24
Corn on the cob	9
Cream: /2	8
Dates	12
Duck: /2	10
Eggs:	
whole (including table grade): /2	9
whites: /2	12
yolks, sugared or salt added: /2	12
Fish, fillets, portions, steaks	
fatty	4
lean	8
flat	10
Frankfurters - 50 percent beef, 50 percent pork: /2, /3	
type I, carton	½
type I, flexible package	1
type II, carton	2½
type II, flexible package	6
type III, flexible package	12
type III, can with thaw indicator	15
Grape juice, concentrated	24
Grapefruit juice, concentrated	24
Grapefruit-orange juice, concentrated	24
Grapefruit sections	12
Greens, leafy	14
Hams: /2	
boneless, cooked	6
smoked, bone in	6
Ice cream, sherbets or ices: /2	9
Lamb: /2	
boneless, fabricated	6
carcass, wholesale cuts	8
slices, chops	6
telescoped	8
Lemon juice, concentrated	18
Lime juice, concentrated	18
Lime juice, single strength	18

	APPROXIMATE STORAGE LIFE (MONTHS)
Lobster tail: /2	8
Lobster, whole: /2	8
Luncheon loaf: /2, /3	3-4
Margarine, prints and patties: /2	12
Meal, precooked (frozen dinners, pot pies, entrees): /1, /6	9
Milk, fat anhydrous: /2	12
Milk, pasteurized, homogenized: /2	1
Milk, pasteurized, homogenized, sterilized: /2	3
Milk, whole, concentrated: /2, /4	9
Okra	18
Onion rings, French fried	14
Orange juice, concentrated	24
Oysters: /2	9
Peaches	18
Peas:	
black-eyed	12
dehydrofrozen	14
green	14
Peas and carrots	14
Peppers	14
Pies, fruit filled	18
Pies, cream filled	6
Pineapple	12
Pineapple juice, concentrated	24
Pizza	6
Pizza shells: /2	6
Pork: /2	
diced	4
loin, boneless, fabricated	4
slices, chops	4
wholesale, cuts	6
Potatoes, white, French fries	12
Potatoes, white, hash brown	12
Rabbit: /2	
ready-to-cook	6
ready-to-cook, cut up	5
Raspberries	24
Rhubarb	24
Salami:/2, /3	
cooked	3-4
dry	5
Sausage: /2, /3	
liver	3-4
New England style	4

	APPROXIMATE STORAGE LIFE (MONTHS)
Sausage, *continued*	
pork, bulk style	3
Pork Links:	
type I, carton	¾
type II, carton	2
type III, carton	3
type III, can	9
pork, precooked	3-4
pork and beef, precooked	6
Scallops: /2	8
Shrimp: /2, /7	
raw, peeled/unpeeled	8
raw, breaded, molded	8
Soups: /5	12
Spinach	14
chopped	10
Squash, summer	24
Strawberries	15
Succotash	12
Sweet goods, yeast raised: /2	2
Topping, dessert	24
Tortillas, corn or wheat	18
Turkey: /2	
boneless, cooked	9
boneless, raw	8
whole, ready-to-cook	10
Veal: /2	
diced	6
boneless, fabricated	6
carcass, wholesale cuts	8
semi-boneless	8
Vegetables, mixed	12
Waffles: /2	1

/1 Any evidence that meal has been thawed is reason for discarding.

/2 Many of the products listed herein are also storable under chill conditions (above 32 degrees F).

/3 These products suffer deteriorative changes as a result of freezing. If frozen storage is necessary, storage times indicated will tend to minimize rancidity development.

/4 Storage life above 0 degrees F. is 4 months.

/5 Cream style soups which have broken down during freezing will be satisfactory when heated.

/6 These meals may be used for their intended purpose up to twelve months after date of pack provided surveillance inspections performed at least every 30 days subsequent to the 6 month period result in the product being accepted for consumption.

/7 The quality of frozen shrimp will deteriorate within 30 days if held between 14 degrees and 18 degrees F.

SUGAR

To most of us "sugar" is the granulated substance we buy for household use. Yet this product is only one of many naturally occurring sugars used by humans. And there are substances other than sugar which make things taste sweet.

Any sweetener which provides calories, or food energy, is considered a nutritive sweetener. Thus, sugars, sirups, molasses, sugar alcohols, and honey are all classed as nutritive sweeteners, and all provide approximately the same number of calories gram for gram.

Sugars are the building blocks of carbohydrates. All carbohydrates must be broken down to simple sugars before they can be utilized in the body.

The sugar we are most familiar with is sucrose. It is a double sugar composed of two simple sugars, glucose and fructose, chemically bound together. Sucrose is produced by concentrating sugar cane or sugar beet juice.

Glucose was marketed a few years ago. Glucose (also known as dextrose) is a simple sugar and the main form into which other sugars and carbohydrates are converted in the body. Glucose is less sweet than sucrose so more is needed to make an equally sweet product and that more adds to the calorie content.

Fructose is now available in some markets. It is sweeter than sucrose so less is needed and by using less, the calorie content is reduced.

Lactose or milk sugar is a double sugar composed of the two simple sugars, glucose and galactose.

What about other sweeteners? Honey is a double sugar containing nearly equal parts of glucose and fructose (just like sugar). Brown sugar is sucrose crystals with a film of molasses sirup that gives the characteristic color and flavor. Confectioner's or powdered sugar is another form of sucrose made by grinding the sugar crystals. Some cornstarch (about 3%) is added to prevent clumping. Corn sirup is a sweetener derived from corn starch. It is composed of glucose and a variety of other sugars. Maple sirup is almost exclusively sucrose.

If one compares the sweetness of other sugars to sucrose (sucrose has a value of 100), then fructose would be rated 115, glucose 64, and lactose 30. Saccharin, a nonnutritive sweetener, would have a rating of 30600. No wonder such a little saccharin is needed.

A high concentration of sugar acts as a preservation. The sugar "ties up" the moisture making it unavailable to spoilage organisms. However jams, jellies, and preserves are the only foods in which the sugar concentration is high enough to have a preservative effect. Sugar also combines with pectin to form a gel. Without sugar, there is no gel.

SUGAR (CONTINUED)

Sugar certainly adds flavor to preserved products. Canned fruits packed in a sugar sirup will have better texture than those canned in water.

Sugar lowers the freezing point of foods. That's why ice cream may be soft when vegetables and meats appear to be solidly frozen. It also raises the boiling point of foods. We measure the sugar concentration of a candy by taking its temperature.

SUGAR SNAP PEAS

The crunchy texture of edible podded peas is a prized characteristic. Canning would cause a softening of the pod which would be undesirable. To freeze, wash and string. Break into pieces of desired size or if small, leave whole. Blanch in boiling water for 2 minutes. Chill. Drain, package, label, and freeze as you would other vegetables.

SULFURING

Sulfuring fruit (exposing it to sulfur fumes) is a pre-drying treatment for light colored fruits.

In Drying Foods at Home, the recommendation is to use elemental sulfur also called Sulfur Flowers (U.S.P. standard) or flowers of sulfur as it is free of impurities, burns readily, and may be purchased at most pharmacies. The authors state that sulfur preparations for garden dusting may be used if they are 95% sulfur with only 5% impurities. They note that these preparations are more difficult to ignite.

This is how they say to sulfur food. They start with this caution, Always sulfur outdoors away from close contact with plants, shrubs, and trees.

Step 1. Spread fruits in a single layer, pit cavity side or cut surfaces up, on slatted wooden trays. Do not use aluminum or galvanized screening material, as sulfur fumes corrode most metals. Pieces of fruit should not touch each other.

Step 2. Stack trays on fire bricks to allow space to set container containing sulfur under bottom tray.

Step 3. Cover the stacked trays with a large heavy cardboard box or wooden box. The box should be solid (no cracks or openings) and large enough to allow 1 to 1½ inches of space between the trays and sides of the box. Make a slash at the bottom of the box and another slash at the upper edge of the opposite side. Open slashes when necessary to permit circulation of sulfur fumes.

Step 4. Measure the sulfur and place in a clean, metal container. The amount needed varies with the length of time the fruit is to be sulfured, weight of the fruit, and the dimensions of the box. The more air-tight the box, the less sulfur is needed. As a rule of thumb, use 1½ teaspoons of sulfur per pound of fruit (weight before drying) in a relatively air-tight wooden box; 1 tablespoon in a cardboard box.

SULPHURING (CONTINUED)

Step 5. Place the container of sulfur near the edge of the trays and light the sulfur. Do not leave burned matches in the container.

Step 6. Lower the box over the stack with the slash near the container of sulfur and seal the bottom edges with dirt. Start timing. Sulfur fumes do the work not the burning. Sulfuring is complete when fruit appears bright and glistening, and a small amount of juice appears in the pit cavity.

When sulfur is burning well, close openings in box. The burning time will vary with the ventilation, shape of container, and weather conditions.

Sulfuring does not prevent insect infestation. If dried fruits are packed in metal containers or in containers with metal lids, the metal will corrode.

Because of the rather special conditions required for sulfuring, we have been reluctant to recommend it. Blanching in steam or water or use of an antidarkening agent are alternative but less effective pretreatment methods.

SUNFLOWER SEEDS Food and Home Notes, USDA

Sunflower seeds can be eaten in a variety of ways--dehulled and eaten without processing, dehulled and roasted in oil and salted, or salted in the shell.

To roast, cover unshelled seeds with salted water (1/4 to 1/2 cups salt to 2 quarts water). Bring water to a boil and simmer for 2 hours. Drain and dry on absorbent paper. Place sunflower seeds in a shallow pan in a 300°F oven for 30 to 40 minutes or until golden brown. Stir occasionally. Take out of oven and add 1 teaspoon of melted butter or margarine for each cup of seeds. Stir to coat. Place on absorbent towel. Salt to taste.

SWEET POTATOES, CANNING

Wash sweetpotatoes. Sort for size. Boil or steam just until skins slip easily. Skin and cut in pieces.

Pack hot sweetpotatoes into jars. Add 1/2 teaspoon salt to pint jars; 1 teaspoon to quarts. Cover with boiling water or medium sirup (3 cups sugar dissolved in 4 cups water), leaving 1-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°F).
Pint jars . . . . . 55 minutes
Quart jars . . . . 90 minutes

According to Presto, sweet potatoes in pint or quart jars can be processed for 50 minutes at 15 pounds pressure.

SWEET POTATOES, FREEZING

Choose medium to large mature sweet potatoes that have been cured. Sort according to size and wash.

Cook until almost tender in water, in steam, in a pressure cooker, or in the oven. Let stand at room temperature until cool. Peel sweet potatoes; cut in halves, slice, or mash.

To prevent darkening, use an ascorbic acid mixture or orange or lemon juice.

Pack into containers, leaving 1/2-inch headspace. Seal. Freeze; store at 0°F or below.

SWEET POTATOES, STORING

Sweet potatoes that are well matured, carefully handled, and properly cured can be kept for several months at 55° to 60°F.

Harvest after light frost but before injured by severe frost, preferably when the soil is dry. Cure at 80° to 90°F and below 70% relative humidity for 10 to 20 days.

Store in a warm, dry cellar or other room. Pack in crates, baskets, or slatted bins with 4 inches air space on all sides.

Sweet potatoes are subject to damage by chilling at temperatures of 50°F or below.

TEMPERATURE

Temperature affects the activity of most microorganisms. Activity is greatest at temperatures between 60° and 120°F. Activity may be seen as changes in color, flavor or texture, or as an increase in the number of microorganisms, or as the production of a toxin (poison) by a microorganism.

Lowering the temperature will slow activity. This is what happens when food is refrigerated. The impact of refrigerated storage and refrigerator temperature can be seen in these figures on the average shelf life of pasteurized milk.

Temperature	Shelf-life
80°F	1/2 day
50°F	2 days
45°F	5 days
40°F	10 days

Freezing food slows activity even more but does not destroy the microorganisms. Thus when food is thawed, activity resumes.

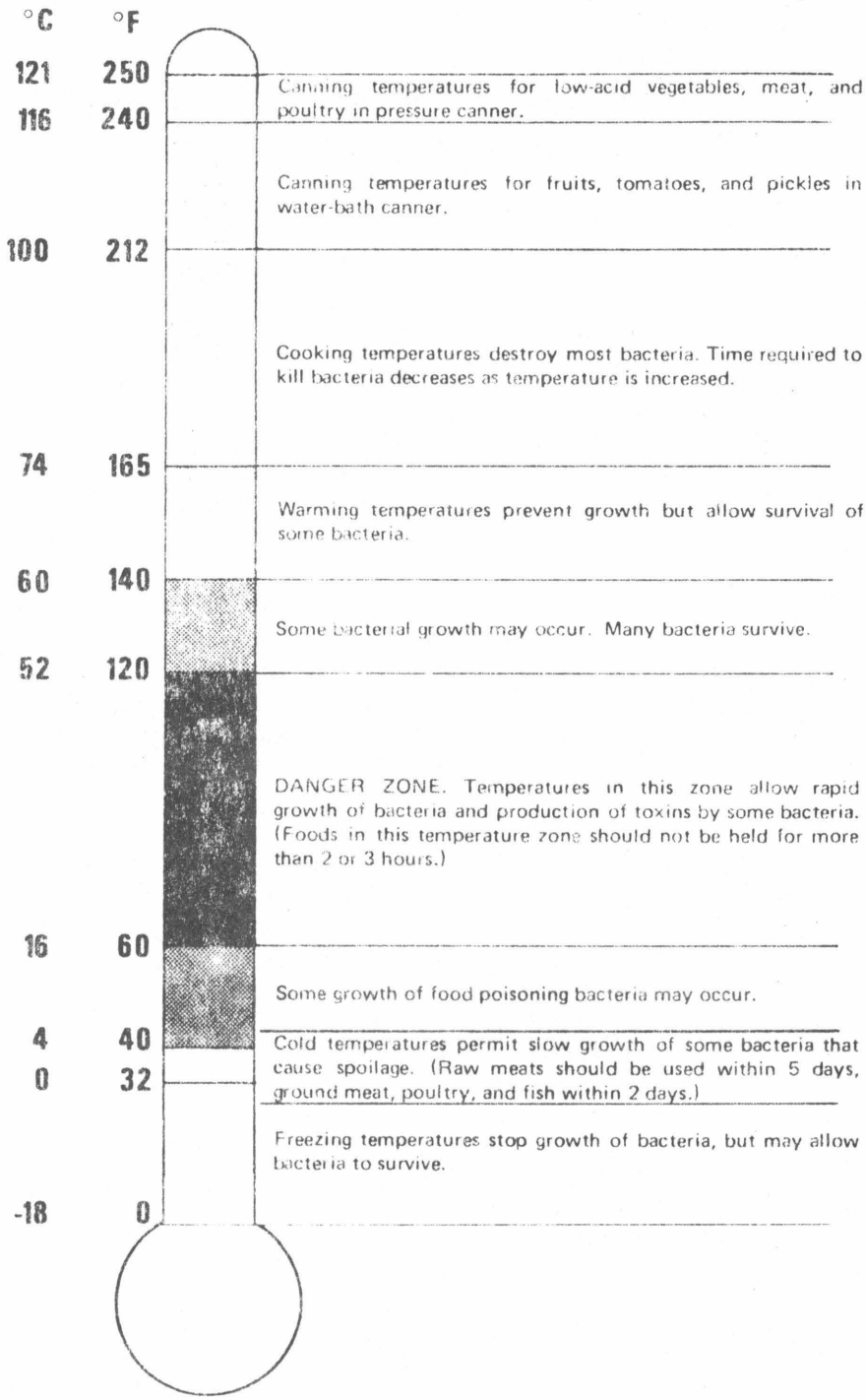
Raising the temperature above 120°F also slows activity. If the temperature is raised sufficiently, microorganisms are killed. Yeasts, molds, enzymes and some bacteria are destroyed at temperatures between 160° and 212°F.

One exception is the spore of Clostridium botulinum. It has a great tolerance for heat and some spores can survive even after the food has been boiled a long time. A temperature higher than 212°F is required to destroy botulinum spores. This can only be achieved through the use of a pressure canner. At 5 pounds pressure, the temperature inside the canner is 228°F; at 10 pounds pressure 240°F; and at 15 pounds pressure 250°F.

The temperature reached by the food in the jars is important. Each food heats at its own rate; that's why processing times are different for each food. Generally, heat travels faster in a loosely packed product than in a tightly packed one. For example, heat travels faster in a jar of green beans packed in water than in a jar of solidly packed greens, whole kernel corn packed in water heats much faster than cream-style corn. And it obviously takes longer for heat to reach the center of a large jar than of a small one.

Ten pounds pressure (240°F) has been used for canning. In recent years, there has been interest in using 15 pounds (250°F) on the assumption that processing times would be shorter at the higher temperature. Read the section "Fifteen Pounds Pressure, Processing" for additional information.

TEMPERATURE OF FOOD FOR CONTROL OF BACTERIA



TEMPERATURE, METRIC

Temperatures under the metric system will be in degrees Celsius. Water freezes at 0°C and boils at 100°C. That's a more compact scale than the current Fahrenheit one. One of the first points of reference which will need to be changed is that of storing food at 0°F or below. The setting at Celsius will be minus 18°(-18°). Jelly will be done when the temperature reaches 105°C (221°F).

Since we use pressure as an indicator of temperature in the pressure canner, it probably won't occur to most of us that 10 pounds pressure is equal to 116°C (240°F).

THREE BEAN RELISH SALAD

Lelia Mayton of Montgomery County clipped this recipe for 3-Bean Relish from the Roanoke paper.

2 8-3/4 cans deep red, firm kidney beans
2 cups fresh wax beans, in 1 1/2-inch lengths
2 cups fresh snap beans, in 1 1/2-inch lengths
1 cup diced celery
1 small green pepper, cut in 1/4 to 1/2-inch wide strips
1 small sweet red pepper, cut in 1/4 to 1/2-inch wide strips
6 to 8 scallions, sliced 1/4-inch crosswise
2 cups cider vinegar
1 cup light corn syrup
1/2 cup sugar
1 tablespoon plain salt
1 teaspoon ground ginger
1/8 teaspoon ground cayenne pepper

Drain and rinse kidney beans. Add wax or snap beans to enough rapidly boiling water to cover them; boil 2 minutes. Drain, rinse in cold water and drain again. Add celery, green and red pepper, and scallions to rapidly boiling water; boil 2 minutes. Drain, rinse in cold water and drain again. Measure vinegar, corn sirup, sugar, salt, ginger and cayenne pepper into a large stainless steel or enamel saucepan. Bring to a boil over medium heat and boil gently for about 5 minutes. Add vegetables and return to boiling. Boil gently for 3 minutes. Ladle hot vegetables into clean hot pint jars, leaving 1/2-inch headspace. Pour boiling liquid over the vegetables leaving 1/4-inch headspace. Release air bubbles. Adjust jar lids. Process in a boiling water bath for 10 minutes. Cool. Before serving, chill and drain. Makes about 4 pints.

I counted a total of 22 minutes of boiling at 5 different steps. It seems it would be more efficient to can the beans (20 minutes at 10 pounds pressure for pint jars) and make the salad as needed.

Note that the dressing does not contain oil.

TIN CANS

Discoloration of plain tin cans (internal can corrosion) is caused by reaction of acid in the food with the metal of the can. Speed of the reaction is increased if oxygen is trapped in the cans. Eliminate oxygen by exhausting cans before sealing. Or use an "R" or "F" lined can (also called "Fruit Enamel").

Tin plate has been used for more than a century for canning foods. Coating the can with enamel improves it for certain groups of food by (1) increasing the attractiveness of the food, (2) improving the appearance of the container, and (3) making the container more resistant to internal corrosion.

In the manufacture of enamel-lined cans, the enamel is ordinarily coated on flat sheets of tin plate before the can is shaped. A narrow strip is left bare to allow for the soldering of side seams. The enamel is baked on leaving an insoluble, inert, resinous film on the tin plate.

Two types of enameled cans are most widely used: fruit enamel, also known as "R" or sanitary enamel, and C-enamel. Fruit enameled cans are used for all acid foods, such as fruits and tomatoes. Beets and carrots are also canned in fruit enameled cans to preserve color.

If plain tin cans are not available, green beans, greens, and asparagus can also be canned in fruit enameled cans.

Vegetables such as corn, peas, lima beans, dried beans, and mixed vegetables which contain sulfur compounds should be canned in C-enameled cans. Zinc oxide which is in the C-enamel lining reacts with the sulfur to form zinc sulfide, a white substance which is harmless. In the absence of zinc oxide, the sulfur would react with the iron in the tin plate to form a black precipitate, iron sulfide, which would cause the food to darken. Iron sulfide in small quantities is not harmful.

Meat should be canned in meat-enameled cans. Fruit-enameled and C-enameled cans can be used but the product will have a shorter shelf life. Poultry and seafood require a different meat-enamel than beef, pork, lamb and game animals.

I do not know of a source of tin cans other than the community cannery.

The USDA publications have times for home processing in tin cans should you need this information.

TIN CANS, SWOLLEN

Gas formation may accompany several types of spoilage, but substances in some fruits, such as prunes, apples, and berries, react, particularly during storage at warm temperatures with the metal of the can to form hydrogen gas. The food is not adversely affected in cans that swell from hydrogen gas unless the can becomes punctured, thus permitting the entrance of bacteria from the outside. Bulging cans of fruits should be examined for signs of spoilage. If none are found, the fruit is safe to use. Bulging cans of meats and low acid vegetables should always be discarded.

TOMATO CATSUP

A thick, semiliquid tomato sauce used as a condiment. Seasonings and consistency vary from recipe to recipe.

The Ball Blue Book has 2 recipes for tomato catsup one starting with tomato puree; the other with whole tomatoes. Putting Food By has a tomato ketchup recipe. The suggested processing times for these products is 10 or 15 minutes for pints in a boiling water bath.

You may wonder why these products with ingredients which are low in acid are processed for a shorter time than the base ingredient--tomatoes. These products are concentrated by cooking long enough to reduce the volume by about half. The same amount of acid remains in the concentrated product making the mixture more acid than before cooking.

TOMATO CHILI SAUCE

5 medium onions
3 medium green peppers
6 pounds tomatoes
3 cups vinegar
2¼ cups packed brown sugar
1½ tablespoons salt
1 tablespoon dry mustard

Grind onion and green pepper together through coarse blade of food grinder or blender.

Remove skins from tomatoes. Cut tomatoes into eighths to make 3 quarts.

Combine all ingredients. Bring to a boil and boil gently, stirring frequently, for 3 hours or until mixture is reduced one-half in volume.

Pack hot chili sauce into clean, hot pint jars. Leave 1/2-inch headspace. Adjust jar lids. Process in boiling water for 15 minutes.

TOMATO CHILI SAUCE (CONTINUED)

Putting Food By has a similar recipe for Chili Sauce but it has a greater variety of seasonings--celery seed, ground ginger, nutmeg, and peppercorns. The authors describe the consistency of the product as "a little thicker than ketchup but not so thick as jam." They also remind the reader that the mixture will scorch easily near the end of the cooking time so it needs to be stirred frequently. The Spicy Chili Sauce recipe in the Ball Blue Book is very similar. The Chili Sauce recipe in the Ball Blue Book is not very different. All three of these recipes call for processing pint jars for 15 minutes in a boiling water bath canner.

TOMATO JUICE, CANNING

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 1/2-inch headspace. Adjust jar lids.

Process in boiling water bath canner (212°F).
Pint jars . . . . . 35 minutes
Quart jars . . . . 35 minutes

TOMATO JUICE, SEPARATION

Naturally occuring pectin acts as a stabilizer for juices as it helps to keep particles in suspension. Tomatoes also contain an enzyme which degrades or breaks down the pectin when tomatoes are cut and allowed to stand for even a few minutes. If much of the pectin is degraded, there may be separation. This can be a real problem when juice is extracted in a blender or food processor without heating the tomatoes.

To avoid, work with small quantities of juice and heat quickly to boiling to inactivate the enzyme.

TOMATO MIXTURE

This product is similar to the commercially canned stewed tomato products. The addition of celery, onion, and pepper (low-acid foods) to a food which is near the breaking point for being classified as an acid food is of concern.

Researchers at the University of Minnesota have developed a formula for such a product which remains acid enough to be processed as tomatoes are processed. You can use smaller amounts of celery, onion, or pepper, or omit one of them but do not use larger amounts. Their formula calls for 12 cups tomatoes, peeled and quartered, 1 cup chopped celery, 1/2 1/2 cup chopped onion, 1/2 cup chopped pepper, and 1 tablespoon salt. Simmer the vegetables for 10 minutes. Pack into clean, hot canning jars and process as directed for tomatoes.

For combinations of food like squash and tomatoes or corn and tomatoes, process as directed for the low-acid food.

TOMATO PASTE

An extremely thick, paste-like tomato concentrate. No seasoning is added except salt.

The Ball Blue Book has a recipe for Tomato Paste. I guess I should change my description of the product as their recipe has sweet red peppers, bay leaves, and garlic in addition to tomatoes and salt. The paste is cooked for 3½ hours before being put into canning jars. Then it is processed for 45 minutes in a boiling water bath.

TOMATO PUREE

An unseasoned, strained tomato concentrate that is more liquid in consistency than is tomato paste.

The Ball Blue Book has a recipe for Tomato Puree which fits this description. They also have a Seasoned Tomato Puree Recipe.

TOMATO SAUCE

Pureed tomatoes to which seasonings have been added. The seasonings include salt, pepper, herbs and spices.

TOMATOES

How to can tomatoes and, even whether to can tomatoes, are questions which have been raised frequently in recent years. A little background information may help to understand why these questions have been raised.

We have traditionally used a pH of 4.5 as the breaking point for deciding how a food should be processed--foods with a pH of 4.5 or below were to be processed in a boiling water bath canner; those with a pH higher than 4.5 in a pressure canner. This distinction was made because clostridium botulinum spores do not grow and produce a toxin in foods with a pH of 4.5 or lower. Actually, botulinum toxin is not produced at a pH of 4.8. Tomatoes are close to the breaking point with a pH of 4.2 to 4.4

Then companies started describing tomato vaieties as being "low-acid" which implied that they were less acid than other varieties. A few cases of botulism were traced to home-canned tomato products. These few cases received a great deal of publicity so the concern became widespread.

A number of studies have been done to determine the acidity of various tomato varieties and to determine whether the recommended method (water bath processing) is a safe one.

One of the largest studies of tomato varieties was conducted by the ARS Eastern Regional Research Center in 1975. Fifty-eight (58) varieties were tested including standard, white, yellow, orange, and pear-shaped varieties. Some of the varieties have been described as being "low-acid" or "mild." See Tables 1 and 2 at the end of this section.

TOMATOES (CONTINUED)

None of the varieties in the first sampling had pHs high enough to support growth of C. botulinum. Varieties tending toward high pH were generally standard or pear types--not the white or yellow tomatoes often alleged to be low-acid varieties.

A second aspect of this study was to gather information about tomato varieties from state agricultural experiment stations and USDA laboratories. Information was received on 356 varieties and 212 current breeding lines from 57 locations in 23 states.

Analysis of this information showed that tomatoes of the small and light-colored varieties tend to be higher in acid than other types. Pear and elongated tomatoes developed for commercial processing tend to be somewhat lower in acid than many other types. New varieties were not found to be less acid than old varieties.

Nineteen varieties, most with high pH measurements, were selected for additional studies during the summer of 1976. Based on the 1976 data, four (4) varieties--Ace, Ace 55 VF, Cal Ace, and Garden State--were found to have a high pH and consequently were not suitable for home canning. Some individual fruits of these varieties had a pH in excess of 4.8. The study results indicate that any tomato variety having a pH consistently above 4.5 is likely to have some fruits with a pH of 4.8.

The study also confirmed the change in pH when tomatoes become overripe. The ERRC scientists stated that this decrease in acidity was a greater risk for home canners than the so-called low-acid varieties. Environmental conditions can also affect acidity. Tomatoes harvested from diseased plants or dead plants may also be less acid. Decayed tomatoes were found to be exceptionally low in acid.

Variety	Ripeness	Mean pH	Percent of Sample pH 4.6	pH 4.8
Ace	Ripe	4.52	47	10
Ace 55 VF	Ripe	4.50	40	2
	Decayed	4.9	-	-
Cal Ace	Ripe	4.52	38	2
	Overripe	4.57	47	16
Garden State	Ripe	4.58	63	20
	Overripe	4.70	93	29
	Decayed	5.2	-	-

Commercial canneries adjust the acidity of batches of tomatoes but that is more difficult for the home canner. It is easy to add acid but testing the acidity (before or after) level is virtually impossible.

Nevertheless there have been recommendations for adding acid to home canned tomatoes as a kind of insurance. Vinegar, lemon juice, and citric acid are the acids commonly used. The ERRC study also tested the effectiveness of these acids. They found vinegar less effective than citric acid or bottled lemon juice in changing the acidity and it also adversely affected the flavor of the tomatoes. One-fourth teaspoon crystalline citric acid monohydrate or 1 tablespoon of bottled lemon juice per pint did lower the pH without affecting the flavor. (Bottled lemon juice was used because its pH is controlled.)

TOMATOES (CONTINUED)

Conclusion: High quality tomatoes (except for the four varieties Ace, Ace 55 VF, Garden State, and Cal Ace) are acid enough to be home canned using the boiling water bath canner following the procedures in the USDA publication Home Canning of Fruits and Vegetables.

How do we account for the rare occurrence of botulism toxin in home canned tomatoes if the pH is too acid to allow toxin production? And it is a rare occurrence. Five cases of botulism were traced to home-canned tomato products between 1950 and 1974; none since 1974.

A probable cause is the persistence of other microorganisms through the canning operation. As these microorganisms grow, they change the acidity of the food enough to allow the botulism spore to germinate, grow, and produce a toxin. These microorganisms would ordinarily be destroyed by boiling water bath processing. However, many persons still use the open kettle method for canning tomatoes. Or if moldy or decayed tomatoes are used, the number of microorganisms may be so great that not all will be destroyed during processing.

The addition of water in canning tomatoes or tomato juice would dilute the acidity of the product.

The persistence of other organisms is the major reason the recommendation for canning tomatoes by the raw-pack method was dropped by USDA. The particular organism is Bacillus licheniformis. A study conducted by Fields et al. found spores of B. licheniformis in 30% of the home-canned tomatoes sampled. These spores had survived despite the tomatoes having been processed as recommended for raw-pack by USDA. B. licheniformis is capable of elevating the pH to 5.2 if oxygen is present. Botulism toxin could be produced at that pH.

Note that B. licheniformis requires oxygen for growth so should become a problem only when jars have faulty seals or too much air is trapped in the jar. At first reading it would appear that B. licheniformis and C. botulinum would not grow in the same jar as one requires oxygen and the other does not. Tests have shown that anaerobic (absence of oxygen) conditions may exist down in the jar even when some oxygen is present at the top of the jar.

The occurrence of botulism in tomatoes had led to an interest in canning tomatoes in the pressure canner to insure destruction of botulism spores. Unfortunately, most of the timetables for canning tomatoes under pressure are merely alternatives to water bath processing. The processing time is sufficient to kill molds, yeast, and some bacteria but not to kill botulinum spores.

A research project conducted at Virginia Tech by Zimmerman, Phillips, Wood, and Marable and reported in the November 1978 issue of the Home Economics Research Journal compared the effects of varying processing times and temperatures on the quality of home canned tomatoes. Whole tomatoes were raw packed in pint and quart jars and processed in a boiling-water bath and at 5, 10, and 15 pounds pressure to a minimum internal end-point temperature of 180°F (the temperature used by USDA in establishing

TOMATOES (CONTINUED)

the 45 minute processing time for raw-pack tomatoes in a water bath canner). It took 35 minutes of processing at 5 pounds pressure to reach the desired temperature, 25 minutes at 10 pounds pressure, and 15 minutes at 15 pounds pressure. This would mean that recommendations to process tomatoes by bringing pressure up to 5, 10, or even 15 pounds probably result in an inadequate heat treatment even to destroy molds and yeast, never mind botulism spores. Such processing is better than no processing at all but I would recommend the processing times used by Zimmerman et al.

Pressure	Pints	Quarts
5 pounds	20	35
10 pounds	15	25
15 pounds	5	15

Processing under pressure saved time and energy (kilowatt hours) and did not appear to affect the quality and acceptability of these products.

Zottola et al. at the University of Minnesota who conducted the research on which Presto bases its recommendation for bringing pressure up to 15 pounds and then setting the canner off the heat, used an end-point temperature of 165°F.

So What Are We To Do

We will support the USDA recommendation for canning tomatoes and tomato juice by the hot-pack method in a boiling water bath canner. I have no doubts about the safety of this recommendation although the product may be overcooked.

An alternative would be to recommend the processing times for pressure canning of tomatoes from the study by Zimmerman et al. These processing times were designed to achieve an end-point temperature of 180°F. which should assure safety. Again the product may be overcooked.

I am sure that many persons will continue to use the raw-pack method. I think it is reasonably safe if good canning techniques are used. These include the use of high quality tomatoes, following recommended processing times to the letter, and being sure jars are covered with boiling water during processing. If a good seal is achieved (all oxygen excluded and a good vacuum formed), then neither mold nor B. licheniformis will grow so there should not be a change in pH which would allow botulism toxin production.

Highly suspect are the recommendations for processing in a pressure canner in which the canner is brought up to pressure and then turned off. I have been reluctant to recommend this in the past and am even more reluctant now.

Table 1
pH of Tomato Varieties Screened by ERRC

Variety	Number Analyzed	Mean pH	Variety	Number Analyzed	Mean pH
Ace	15	4.47*	Jet Star	15	4.35
Ace 55VF	18	4.54*	Jubilee	10	4.22
Avalanch	16	4.34	Manalucie	15	4.25
Beefmaster	7	4.19	Marion	15	4.30
Beefmaster Hybrid	13	4.47*	Marglobe	15	4.18
Beefsteak	15	4.23	New Snowball	15	4.16
Belgian Giant	8	4.33	Orange Queen	15	4.30
Better Boy	15	4.28	Oxheart	5	4.30
Big Boy	15	4.37	Pearson Improved	15	4.19
Big Early Hybrid	15	4.53*	Ponderosa	6	4.32
Big Girl	15	4.54*	Ponderosa Pink	15	4.37*
Big Set	16	4.50*	Ramapo	15	4.16
Burpeanna	15	4.37	Roma VF	15	4.34
Burpee VF Hybrid	16	4.50*	Royal Chico	15	4.58*
Campbell 17	15	4.15	Rutgers	15	4.29
Campbell 28	18	4.37	San Marzano	15	4.68*
Campbell 1327**	15	4.27	Spring Giant	14	4.18
Campbell 1327***	16	4.39	Spring Set	13	4.40
Delicious	13	4.54*	Stokes Alaska	12	4.06
Early Giant	15	4.15	Sunnybrook Earliana	13	4.37*
Early Girl	16	4.14	Sunray	15	4.21
Fantastic	12	4.26	Supersonic	15	4.25
Fireball	13	4.50	Tropic	15	4.28
Gardener's Delight	15	4.18	Valiant	15	4.37*
Garden State	15	4.48*	Walter	15	4.16
Globemaster Hybrid	15	4.42	White Queen	16	4.21
Golden Boy	15	4.17	Wonder Boy	15	4.41
Golden Queen	15	4.26	Yellow Pear	15	4.40*
Heinz 1350	15	4.20	Yellow Plum	15	4.31
Homestead	15	4.20			

*Larger sample analyzed subsequently to verify result.
**Obtained from Beltsville, MD.
***Obtained from Doylestown, PA.

Table 2

pH of Different Tomato Types

Type	Number of Varieties	pH Mean	pH Range
Cherry	12	4.24	4.15-4.46
Patio	1	4.25	4.2 -4.3
White	3	4.22	4.16-4.3
Yellow	5	4.23	4.09-4.33
Orange	6	4.32	4.20-4.45
Pear	14	4.42	4.3 -4.70
Long	7	4.46	4.27-4.6
Standard red	248	4.34	4.02-4.90

TOMATOES, CANNED, PROBLEMS

Black spots often occur on the underside of lids on canned tomatoes. These black spots are due to hydrogen sulfide which is released during the heating of tomatoes. The citric acid in tomatoes "eats through" the enameled surface of lids and the hydrogen sulfide is deposited on the eaten through places causing a dark spot.

It is not harmful unless, of course, the acid has eaten all the way through the lid. That would mean the jar is no longer sealed and there are likely to be more serious problems.

Some brands of lids seem more resistant to citric acid than others.

TOMATOES, CANNING

These are the directions for canning tomatoes found in the USDA bulletin Home Canning of Fruits and Vegetables. I feel quite comfortable in recommending them for use with high quality tomatoes of all varieties except Ace, Ace 55 VF, Cal Ace, and Garden State.

Hot pack. Bring tomatoes to a boil; stir to keep from sticking. Pack boiling hot tomatoes in jars leaving 1/2-inch headspace. Add 1/2 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°F).
Pint jars . . . . . 35 minutes
Quart jars . . . . 45 minutes

TOMATOES, "FRESH"

The July-August 1978 Popular Science magazine had an article describing a new development which they said enabled you to have garden-fresh tomatoes all year long. The process was developed at Auburn University by Rymal and McCaskey and used acid, a mild heat treatment, and refrigeration to keep the tomatoes fresh. Keeping any quantity of canned tomatoes under refrigeration would be a problem for most families.

The process as described in the article goes like this:

1. Select tomatoes that are firm-ripe. Make sure they have no soft spots.
2. Wash fruit in mild detergent solution and rinse.
3. Scald in boiling water for 15 seconds; cool in running water.
4. Cut off any green shoulders or hard stem ends, and peel.
5. Slice about 3/8-inch thick with sharp knife.
6. Using a colander or wire strainer, dip slices in a 5% solution of calcium chloride for 5 minutes. (Calcium chloride can be purchased from a feed store or druggist.) One cup (8 ounces) powdered calcium chloride to 6 quarts warm water is about the right mix. It is a convenient quantity to prepare slices for 7 or 8 pint jars, and enough to prepare a bushel of tomatoes. Separate slices during the dipping to allow firming solution to reach all of them.

TOMATOES, "FRESH" (CONTINUED)

7. Drain off all the calcium chloride solution and pack slices carefully in pint jars that contain 2 ounces hot water, 1/2 teaspoon salt, 1/2 teaspoon sugar, 2 teaspoons lemon juice or 1/4 teaspoon powdered citric acid.
8. Fill jars with boiling water, leaving 1/2-inch headspace. Seal lids and heat jars in boiling water for 10 minutes (15 minutes for quarts).
9. Allow jars to stand until cool enough to handle; complete cooling in running water.
10. Refrigerate at least 24 hours.
11. Store in refrigerator or cool area.

TOMATOES, FREEZING

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. Leave 1/2 to 1½ inches headspace--the smaller amount for wide topped pint containers; the larger amount for narrow topped quart containers.

Seal. Freeze; store at 0°F or below.

To freeze tomato juice. Prepare juice as for canning. Add 1 teaspoon salt for each quart juice. Pour into containers leaving headspace as above. Seal. Freeze; store at 0°F or below.

TRICHINOSIS

Trichinosis is caused by the roundworm *Trichinella spiralis*. It is entirely foodborne so far as is known.

The symptoms of trichinosis are variable and vary with the number of larvae cysts ingested. If large numbers of cysts are eaten, the patient will develop symptoms of nausea, vomiting, and diarrhea one to four days after ingestion. On the seventh day after eating, the larvae migrate from the intestines to the muscles; and this usually produces muscular stiffness and pain accompanied by remittent fever which may reach temperatures as high as 104°F (40°C). Occasionally, transient skin rashes occur. Edema is a common symptom. The eyes and the eyelids are the most frequent sites of edema although it may occur in other areas.

Trichinae can infect a wide variety of animals both carnivorous and herbivorous. Pork is the most common carrier for humans although other meat such as bear meat has been implicated.

Adequate cooking of meats is probably the most effective control. Trichinae are destroyed at a temperature of 137°F (58.3°C).

TRICHINOSIS (CONTINUED)

Other control measures include freezing. (Freezing does kill trichinae.) The time required to destroy the trichinae is dependent on the freezer temperature and the thickness of the package of meat. Packages less than 6 inches thick would need to be stored at 5°F for 20 days, or at -10°F for 10 days, or at -20°F for 6 days. Packages over 6" thick would need to be stored an additional 10 days.

A third control measure involved the addition of curing agents and holding the meat for at least 40 days at a temperature not lower than 45°F.

TUNA, CANNING Seafood Memorandum 5

During the past year there have been many requests for information on the home canning of tuna. There are several methods that are recommended by various canning books. The method recommended in this memorandum is preferred because of the long precook and the use of 1/2 pint jars. Tuna is a low acid food and incidences of Clostridium botulinum food poisoning have occurred in both the home and the commercially canned product. Consequently, caution cannot be overemphasized.

1. Clean and gut tuna
2. Cut tuna in portions that can be placed in pressure cooker
3. Cook tuna 2 hours at 10 lbs. pressure
4. Cool, tuna should flake easily from bone
5. Pack in 1/2 pint jars with hot oil and 1/2 teaspoon salt in each jar
6. Cook 80 minutes at 15 pounds pressure

TUNA, CRYSTALS IN CANNED Seafood Memorandum 6

Struvite crystals are occasionally found in both home and commercially canned tuna. Although harmless and readily digested by digestive juices, their glass-like appearance is alarming to consumers. If in doubt as to whether you in fact have struvite crystals or glass, simply add one drop of vinegar to the objects in question. Struvite crystals will immediately dissolve in vinegar. Struvite crystals are actually a complex of magnesium ammonium phosphate hexahydrate. Many commercial packers have eliminated struvite by the addition of additives which sequester the magnesium ion.

TURNIPS, CANNING

I can't imagine anyone wanting to can turnips but if they must, Putting Food By says to do it this way, "Wash, peel, cube; pack in jars leaving 1-inch of headspace. Add salt--1/2 teaspoon to pints; 1 teaspoon to quarts. Add boiling water, leaving 1-inch of headspace. Adjust jar lids. Process at 10 pounds pressure--30 minutes for pints and 35 minutes for quarts."

TURNIPS, FREEZING

Select small to medium, firm turnips that are tender and have a mild flavor. Wash, peel, and cut into 1/2-inch cubes. Heat in boiling water for 2 minutes. Cool promptly in cold water and drain.

Pack into containers, leaving 1/2-inch headspace. Seal and freeze.

TURNIPS, STORING

Select smooth, small to medium size turnips, Remove the tops. Store in an outdoor pit, in a cold cellar in covered crocks, discarded milk cans, or similar containers with lid on or covered with moist sand or soil. Temperature of 32°F; relative humidity of 95%.

VACUUM PUMP

A piece of equipment known as Vacuum Fresh, distributed by the Everfresh Company of San Francisco, has been offered to home canners at a cost of $200-250. Promotional claims made for this piece of equipment are that (1) It automatically removes trapped air bubbles in jars that have been packed with food; (2) It automatically seals jars of food that have been processed; (3) The Vacuum Fresh will seal canning jars in 45 seconds without using heat and will achieve a full vacuum when using regular canning methods; (4) By removing all of the air out of the canning jars, you retain all the natural flavor and nutritional value in all your canned foods.

Dr. Milton Baldauf of USDA says "As you know, the removal of most of the oxygen will not inhibit all microbial growth. One very important organism that will grow in this environment is Clostridium botulinum. There are several other spoilage organisms that will grow as well. Vacuum packaging is not a substitute for the established heat processes for home canned foods. I see no reason whatsoever for the use of this pump in home canning. The vacuums attained through water bath and pressure canning processes are sufficient for safe, stable storage."

VINEGAR

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

Either a white or cider vinegar of 4- to 6-percent acidity can be used. 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.

Acetic acid is an organic acid formed when a microorganism called acteobacter aceti acts on ethyl alcohol in the presence of oxygen. The fermenting process is perpetuated by using "mother of vinegar," a growth of acetic acid bacteria that forms on the surface of an acetic-fermenting liquid. Air bubbles are pumped into the mash to supply the needed oxygen and to accelerate the fermentation. Once the liquid has reached the right acidic level, the vinegar is pasteurized to retard any further "mother of vinegar" film formation. Thus, vinegar purchased in the supermarket rarely forms a "mother of vinegar."

The acid level of vinegar is sometimes referred to as grain. The grain is 10 times the percent acetic acid. Thus vinegar with an acetic acid content of 5 to 6% would be 50 to 60 grain.

Homemade vinegar often results from wine that has gone "bad." If air reaches the wine for several weeks, there is a good chance that bacterial action will begin to convert the alcohol in the wine to acetic acid. Once the presence of acetic acid can be detected (a vinegar-like odor) the wine will lose its appeal.

VINEGAR (CONTINUED)

Vinegar produced from a undiluted wine will be overly strong so an equal volume of water should be added.

We do not recommend the use of homemade vinegar for pickling. The acidity may vary a good bit from one batch to the next and it is not possible for the homemaker to determine the acidity.

VITAMIN LOSSES DURING STORAGE

Vitamin Losses During Food Processing and Storage

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Processing is a vital and integral part of the food supply system in the United States. In fact, approximately 70 percent of the foods that we consume in this country are processed in one manner or another (Chichester, 1974). However, this should not imply a danger to our health but a positive contribution towards a well-fed society. One of the major problems in our overpopulated-underenergized world is starvation due to lack of food. This deficiency could be alleviated to a great extent if perishable foods in all parts of the world could be processed in order to achieve a year-round supply. Estimates of food wasted in the world due to spoilage range as high as 50 percent. Processing could reduce this figure significantly.

Processing is a rather simple notion, but one whose function is often misunderstood and misrepresented. For instance, when a food material is cut, cooked, cooled, refrigerated or handled in the kitchen, it is being processed. Simply, processing is a method to maintain food in an acceptable, safe and nutritious form for an extended period of time.

Without processing and the judicious use of chemicals, we would have only fat and lean years without an assured food supply. Certainly, there are few among us who would argue that freshly-picked, rushed-to-the-kitchen, eaten-immediately food is not the most nutritious food. However, try to grow a vine-ripened tomato in New England or Minnesota in January.

There are some losses in processing. However, the aim of technology should be to decrease losses while increasing quality. Nevertheless, there is a trade-off involved. In order to make foods available year-round, we must accept a slight decrease in nutritional value. However, this decrease will not create a situation of malnutrition if a varied diet, which should include fortified or restored foods, is eaten. The alternative is food in season only. This means periods of plenty along with periods of starvation. This has been documented in the Developing Countries many times.

VITAMIN LOSSES DURING STORAGE (CONTINUED)

One of the concerns that many consumers have is the reduction in vitamin content due to industrial processing procedures. Certainly, losses occur but the consumer, unfortunately, forgets that such losses are generally less than those which occur in his own kitchen. Hein and Hutchings (1974) clearly point out this fact. "Because of these sensitivities, cooking losses of some essential nutrients may be in excess of 75 percent. In modern commercial food processing operations, however, losses are seldom in excess of 25 percent."

Since vitamins are sensitive to a number of variables such as pH, air, oxygen, light and heat, it is understandable that processing procedures, which include these variables, must have some effect. For example, during processing operations such as heating, drying, mixing, fermenting, aerating, washing and freezing, conditions unsuitable to vitamin stability are produced.

When newly-harvested, potatoes contain about 30 mg of ascorbic acid/100 g, a value which falls to 8 mg/100 g after storage for nine months. Prepeeled potatoes and chips were found to contain at most 10 mg of vitamin C/100 g, a value similar to that found in potatoes stored for seven months. (Table 1)

Table 1. Vitamin C Content of Commercially Peeled and Chipped Potatoes.

	Moisture (%)	Sulphur dioxide (ppm)	Vitamin C (mg/100g) Total[a]	Reduced[b]
Chipped potatoes	82	320	7.5	7.4
Peeled potatoes (small)	78	415	7.3	7.5
Peeled potatoes (large)	-	-	7.6	7.0

a-Ascorbic, dehydroascrobic and dioxogulonic acids
b-Ascorbic acid
Modified from Hubbard (1973).

On the other hand, losses of vitamin C from potatoes that had been harvested, processed and canned on the same day were small. In addition, little change occurred on storage of the canned product for 30 months (Hubbard, 1973). These results make apparent a need for defining "fresh" when recommending "fresh" food over processed foods. Certainly, storage of fresh commodities can have equally or more damaging results on nutrient content than processing. In particular, if a high quality, freshly-harvested commodity is processed with good manufacturing procedures, it will often have a greater nutrient content than a fresh-stored product. Therefore, care must be taken in generalizing recommendations and the question--Where does a definition of "fresh" lie?--must be asked. Does it lie in immediately picked and eaten; does it lie in a food material being two days old; or does it exist with a food material sitting in the sun for a half day, then being shipped by truck for three days and sitting in a store for a week? In the latter case, such a food, if called "fresh," would often be of low quality and have few nutrients left.

VITAMIN LOSSES DURING STORAGE (CONTINUED)

Table 2 shows the stability of several vitamins subjected to various environments.

Table 2. Stability of Nutrients*

Nutrient	pH 7	Acid	Alkaline	Air	Light	Heat	Cooking Losses, Range %
Vitamins	Stability**						
Vitamin A	S	U	S	U	U	U	0-40
Ascorbic Acid (C)	U	S	U	U	U	U	0-100
Carotenes (pro-A)	S	U	S	U	U	U	0-30
Cobalamin (B_{12})	S	S	S	U	U	S	0-10
Vitamin D	S	U	U	U	U	U	0-40
Niacin	S	S	S	S	S	S	0-75
Vitamin B_6	S	S	S	S	U	U	0-40
Riboflavin (B_2)	S	S	U	S	U	U	0-75
Thiamin (B_1)	U	S	U	U	S	U	0-80
Tocopherols (E)	S	S	S	U	U	U	0-55

*Source--Harris and Loesecke, 1960. (Modified)
**S=Stable; U=Unstable.

It should be noted that Vitamin C is relatively unstable, especially in the presence of occluded air and heat. Vitamin B_2 is very sensitive to light. Its rate of destruction increases as the pH and temperature increase (Hein and Hutchings, 1974).

Blanching is a form of heat processing, which is common to several types of food preservation techniques. It is a form of processing whereby foods are subjected to hot water or steam. This is done prior to freezing, dehydration and canning. In freezing and dehydration, it is essential to destroy enzymes, which might cause quality or nutrient degradation in the frozen or dehydrated product. In canning, it is necessary for washing and wilting in order to allow bulky vegetables, such as spinach, to be packed in a container.

As in other forms of heat processing, the destruction of nutrients is based on the time and temperature of the blanching process. A higher temperature requires a shorter time in order to destroy enzymes. This is known as a high-temperature short-time (HTST) blanch. Lower temperatures require longer times.

In the processing of raw products, HTST blanches are most likely to retain the water soluble nutrients and to minimize the loss of heat labile vitamins such as C and thiamin (B_1). (Table 3)

VITAMIN LOSSES DURING STORAGE (CONTINUED)

Table 3. Retention of Vitamins in Vegetables Blanched for Commercial Canning*

Vitamins	Product	No. of Tests	% Retention Max.	Min.	Mean
Ascorbic Acid	Asparagus	26	100	74	95
	Green Beans	38	90	50	74
	Lima Beans	12	83	54	72
	Peas	60	90	60	76
	Spinach	41	99	6	67
Niacin	Asparagus	8	100	77	94
	Green Beans	29	100	60	95
	Lima Beans	8	98	68	81
	Peas	39	96	59	73
	Spinach	34	100	63	83
Riboflavin	Asparagus	12	100	72	90
	Green Beans	29	100	70	95
	Lima Beans	8	100	59	76
	Peas	37	87	67	75
	Spinach	37	100	78	88
Thiamin	Asparagus	12	100	79	92
	Green Beans	34	100	82	91
	Lima Beans	12	77	36	58
	Peas	60	100	63	83
	Spinach	35	100	67	85

*Source--Harris and Loesecke, 1960.

Steam blanching (HTST) of spinach for 2 to 2 3/4 minutes permitted retention of the four vitamins listed ranging from 88 to 100 percent. Water blanching at lower temperatures and longer times resulted in a retention of these four vitamins ranging from 64 to 95 percent with the greatest effect on vitamin C. With other factors being equal, steam (HTST) blanching extracts about half as much vitamin C as hot water blanching. This is demonstrated by the fact that an immersion blanch for 45 minutes of 160°F resulted in a 6 percent vitamin C retention.

Therefore, from the point of view of both oxidation and leaching, the HTST method seems to be most appropriate.

Canning or bottling is the process most often associated with heat. As in blanching, a HTST process (ca. 300°F) retains more vitamins than a lower temperature retort process (ca. 240°F). However, there are technological problems which preclude the use of HTST treatment for all products. In these processes, heat is used for the destruction of bacteria. The reason for the lesser loss of nutrients with a HTST process is due to the fact that every 10°C (18°F) increase in processing temperature may result in about a tenfold increase in the rate of bacterial while only doubling the rate of nutrient destruction. This means that at higher temperatures more bacteria and less nutrients will be destroyed in a given time.

VITAMIN LOSSES DURING STORAGE (CONTINUED)

The destruction of nutrients by heat is also dependent upon other factors such as the presence of oxygen and certain trace metals, such as copper. For this reason, an attempt is made to exclude or at least minimize these factors in a heat processed product.

There are such a vast array of products canned and stored for the marketplace that it is virtually impossible to discuss the nutritional changes in each of them. The National Canners Association and the Can Manufacturers Institute sponsored an intensive study on these products, which began in 1942, and generated 42 publications. The results have appeared in two reviews (Anon., 1949).

Fruits and vegetables are complex biological systems. For this reason, it is difficult to generalize on nutrient retention. However, a rough guide may be found in the principle that chemical reactions increase in rate 2-3 times with every 10°C (18°F) rise in temperature. However, extrapolation of this rule to storage temperatures above 85°F to 90°F is not supported by experimental evidence (Somers et al., 1974).

Frozen Foods:

The process of freezing itself does not greatly affect the vitamin content of a food. However, blanching prior to freezing and storage will create changes dependent on both the time and temperature at which the food is held. The frozen food industry utilizes the premise that most frozen products retain high quality for a year when held at 0°F or below. This premise is based on studies conducted by the U.S.D.A.'s Western Regional Research Laboratory, Albany, Calif.

Vitamin C seems to be the vitamin most susceptible to fluctuation in temperature and/or poor frozen storage conditions. As a result, it is utilized as an index of nutrient stability. Carotene retention is in the range of 80-100 percent during one year's storage at 4°F and B vitamins tend to be stable under conditions favorable to vitamin C retention.

Somers et al. (1974) have pointed out U.S.D.A. studies illustrating the excellent retention of vitamin C in frozen peas during one year's storage at 0°F and the progressively rapid and significant losses as the storage temperature was raised to 10°, 20° or 30°F. At a normal storage temperature of -4°F, losses of vitamin C from frozen food approximate 5 to 15 percent during 12 months.

In fruit juices, where acidity confers a greater degree of stability to vitamin C, the changes in frozen storage temperature are less likely to have an effect upon retention.

Dehydration

Losses of vitamins A and C may be avoided in drying foods if appropriate blanching procedures are undertaken prior to dehydration in order to inactivate enzymes.

It has been pointed out by Hein and Hutchings (1974) that the dehydration process itself and subsequent storage cause only moderate losses of thiamin, riboflavin, niacin and pantothenic acid. Vacuum puff drying and freeze drying generally preserve the vitamin content to a large degree. In fact, fresh varieties of foods are likely to lose more nutrients by wilting and bruising than by freeze drying or by freezing soon after harvest.

Milling of Grain:

Grain is milled for several reasons. One of these is that throughout history there has been a consumer demand for both white flour and white rice. The other is that milling removes the fatty portion of the grain and thus prevents future rancidity of the flour, which would create a product completely unacceptable.

It is recognized that milling does remove certain nutrients, which are known to be essential to human health. In this case, such nutrients are added back to the product either in their original amount or often in amounts greater than the original. In the case of removal of compounds, which have not yet been shown to be essential in the human diet, no addition is made after milling. This is, of course, consistent with good scientific practice. Until essentiality is shown, fortification should not occur. Indeed, in a mixed dietary, enriched grains are at least as nutritious as whole grains.

There are, of course, other types of processes, which might be considered, but a great deal of the concern in the nutrient loss centers around the processes described.

Technological Advantages for Nutrient Retention:

Generally, there is so much concern about the negative nutritional effects of processing that some very real advantages are completely overlooked. Aside from providing a variety of food all year long and increasingly contributing to world feeding, processing has other attributes.

Table 4 shows some of the nutritional sidebenefits which processing has to offer. These benefits, although important, are often taken for granted and not seen as a direct result of processing procedures.

Table 4. Foods Processed to Meet Nutritional Concerns*

-Elimination of compounds that destroy or bind vitamins
- Ascorbic acid oxidase in tomato juice
- Thiaminase in clams
- Avidin in egg white
- Peroxides in vegetable oils

-Elimination of anti-enzymes that interfere with digestion
- Anti-tryptic factor in beans, in egg white also

-Addition of essential nutrients
- Enriched flour; margarine

-Addition of protective minerals
- Iodide to salt
- Flouride to drinking water

-Change in basic composition
- Polyunsaturated vegetable oils in margarine
- Liquid vegetable oils replacing more saturated fats in animal products (milk, meats)
- Reduction in cholesterol intake; low cholesterol egg products

*Source--Meinick, 1974.

Fortification of food with nutrients has come about as a result of processing procedures and, indeed, is a success story for world health.

The concept of fortifying food and/or water with nutritional chemicals may be said to have its beginning in 1833 in South America when the French chemist, Boussingault, recommended the addition of iodine to table salt to prevent goiter. Since that time, this practice has been adopted widely in Europe and North America with tremendous success. The history of fortification is impressive; margarine fortification with vitamin A, vitamin D fortification of milk and enrichment of bakery-produced white bread and family-used white flour by the addition of thiamin, riboflavin, niacin and iron. The enrichment of degerminated corn meal, corn grits, whole grain corn meal, rice, pasta products and, of course, fortification of cereals. Vitamin C fortification of many, but not all, fruit beverages and non-citrus juices is proceeding. More recently, addition of vitamins A and D to fluid skim milk, fluid low-fat milk and non-fat dry milk has been initiated.

There can be no question as to the beneficial effects of this technology. Most gross deficiency diseases have been eradicated. We don't even think or hear about them in North America today, or for that matter, in many other parts of the world.

Through the technology which has led to the manipulation and creation of food materials, it is possible to add vitamins at certain stages of the process in order to maximize retention.

For example, Borenstein (1975) has pointed out that it is desirable to make additions of vitamins after processing operations involving heat, aeration and washing. This, of course, maximizes the conditions for nutrient stability, which in the end means more nutritious food for the consumer.

Many individual food processes are discussed by Borenstein (1974). It is interesting to note that one of the positive aspects of presweetened cereals is that the added sugars apparently coat the vitamin A and act as an oxygen barrier, thus greatly increasing stability.

Processing must be viewed from an objective vantage point. It is hoped that this short paper has in some ways indicated the need for processing and the subsequent trade-offs that occur in our search for a continued, healthy food supply. Even in the home we often promote nutrient losses when we choose to eat only part of a food. As Deutsch (1976) has pointed out, "We eat 'refined eggs.' For most of us throw away the shell during 'home processing.' Yet the shell is very high in calcium. Shall we crush it into our scrambled eggs?"

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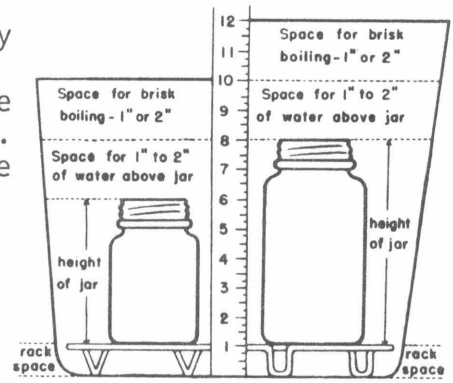
WATER BATH CANNERS



Water bath canners are available in a variety of sizes and materials. If you're buying one, be sure it has a lid and rack. Test the depth before buying by setting a jar on the rack in the canner. The canner should be 3 to 4 inches taller than the jars to allow water to cover the jars and boil freely.

There's no need to buy a special utensil for water bath canning, however. Any deep, flat bottomed utensil which can be fitted with a lid and rack can be used. A blancher or the bottom of a spaghetti cooker is a good size for canning small quantities of food.

The pressure canner may be used for water bath canning. Leave the petcock open or the weighted gauge off to allow steam to escape.

WATER BATH CANNER, OPERATING

Fill the water bath canner half full of water and heat it while you are packing food into jars. The filled jars will raise the water level so there's no need to fill the canner with water. It is a good idea to heat some additional water in case more is needed to bring the water level to 2 inches above the tops of the jars.

Jars of food which have been hot-packed can be set into boiling water. Start jars which have been raw-packed in water that is just below the boiling point (180° to 190°F).

Cover the canner and bring water to a full boil. Start counting processing time when the water comes to a boil. Keep the water boiling all during the processing period. Add boiling water, if needed, to keep water level 2 inches above jars. Remove jars as soon as the processing time is up. You'll need tongs or a jar lifter to get the jars out of the boiling water. Set the jars top side up to cool.

WATERMELON, FREEZING

Select firm-fleshed, well-colored, ripe melon. Cut in half, remove seeds, and peel. Cut melons into slices, cubes, or balls. Pack into containers and cover with cold 30% sirup. Leave needed headspace. Seal and freeze. Store at 0°F or below.

WATERMELON PICKLES

This seems to be a Virginia speciality. Many old recipes call for lime or alum so you might popularize the one from the USDA publication Making Pickles and Relishes at Home. The Ball Blue Book and the Kerr Home Canning and Freezing Book have recipes for both Watermelon Rind Pickles and Preserves. There's not much difference between pickles and preserves except for the vinegar used in the pickles.

WEIGHTED GAUGE, USE

The Mirro Company says that the weight should jiggle 1 to 4 times a minute for cooking or about 4 times a minute for canning. The hissing sound and the slight escape of steam around the control which is noticeable between jiggles are additional assurances that proper pressure is being maintained. They feel that the most common mistake in using a weighted-gauge cooker or canner is the use of too much heat which results in excessive loss of moisture due to the control jiggling too often. Too much heat may be the most common mistake but too little heat is a more serious problem in canning.

To test for presence of steam when cooling the canner, nudge the control and if steam spurts out, pressure is not yet down; if no steam spurts out, remove control. The important thing is to see the steam, not hear it.

WINE MAKING

The 1977 Yearbook of Agriculture Gardening for Food and Fun has a rather technical chapter on wine making (pages 350-355). It is also in the excerpt AIB 410 Canning, Freezing, Storing Garden Produce.

Dr. F. W. Cooler, Extension Specialist in Food Science and Technology, will also provide information about wine making.

YEASTS

Yeasts are microscopic in size and usually have but one cell. They require water and an energy source for growth. Sugar is the usual energy source. Sugar may be present naturally in the food, or added, or result from the breakdown of carbohydrates in the food. Many yeasts grow best in an acid medium and in the presence of ample oxygen. Yeasts also require a source of nitrogen and certain other nutrients.

Yeasts convert sugar into carbon dioxide and ethyl alcohol. The carbon dioxide is what leavens yeast breads. Yeasts are also used to make alcoholic beverages.

Yeast growth is most rapid between 77° to 86°F (25 to 30°C). Growth is very slow or nonexistent at temperatures of 95° to 116°F (35 to 47°C). Yeasts are readily destroyed by boiling. Most varieties can be destroyed by keeping the food at 122° to 136°F (50 to 58°C) for ten to fifteen minutes.

Foods are often contaminated with yeast from the air.

YELLOW CRYSTALS

Bright-yellow crystals occasionally observed in canned asparagus are deposits of a flavonol, rutin, which is a 3-rhamnoglucoside of quercetin. Rutin has limited solubility in water at room temperature At the elevated temperature used for processing and particularly if the concentration of rutin in the raw asparagus is high, sufficient rutin will dissolve so that the packing liquid is supersaturated at room temperature. Rutin then precipitates. It is more often seen in food packed in glass containers as some metal from a tinned container will react with rutin to make it more soluble. This complex gives the liquid around the asparagus a bright yellow color, but no precipitate forms.

Paul and Palmer

ZUCCHINI

Zucchini is a summer squash and can be canned or frozen by following the directions for "Squash, Summer, Canning" and "Squash, Summer, Freezing."

Many people want recipes for Zucchini or Squash Pickle and Relish. Zucchini can be substituted for cucumbers (no special recipe needed) or you may seek out recipes specifying Zucchini. The Ball Blue Book has recipes for Zucchini Pickle and Dilled Fresh Zucchini. Zucchini could also be used in the Squash Pickles in that publication.

ZUCCHINI PINEAPPLE

A recipe for making an imitation pineapple product from zucchini surfaced in the summer of 1981. I suppose it is natural for persons to look for ways of using an overabundant zucchini crop but imitation pineapple!

I saw at least 2 recipes for the product. Anna Crabtree from Smyth county sent one recipe; Skip Henderson from Chesterfield county sent the other. Both recipes contained grated zucchini, lemon juice, pineapple juice, and sugar. The Chesterfield recipe also had pineapple extract. The major difference in the recipes was the ratio of lemon juice to grated zucchini. The Smyth county recipe had 1 1/3 cups of lemon juice to 1 gallon of zucchini while the Chesterfield recipe had just 1/2 cup lemon juice per gallon of zucchini. Both products were processed at 5 pounds pressure for 10 minutes.

The safety of this product has been questioned. As you know, zucchini is a low-acid food which requires pressure processing--25 to 30 minutes at 10 pounds pressure. The addition of lemon and pineapple juices would increase the acidity of the product but the question is whether the product would be acid enough to protect against botulism toxin production.

ZUCCHINI PINEAPPLE (CONTINUED)

Dr. Jerry Cash of Michigan State University made up a large batch of the product using a recipe similar to the Chesterfield one. He tested the pH at the time the product was made and found it to be between 3.6 and 3.85--well within the range to be classified as an acid food. He continued to test the product after storage. After 3 months he found the pH in some jars of the product to be 4.5, the breaking point for classifying a food as acid or low-acid. However, botulinum toxin is not produced until the pH reaches 4.8. This finding prompted a warning from the Michigan Extension Service that the product might be unsafe. That warning was picked up by other Extension Services and consumers were advised to discard the product or at least not to use it pending additional study. For some reason, the "warners" never bothered to say that boiling the product would destroy botulinum toxin should any be present, making it safe for use or that care should be taken in discarding the product.

The Indiana Extension Service tested 443 jars of the fake pineapple product prepared by homemakers in all sections of the state. Each homemaker was asked to supply information about the amounts and kinds of ingredients used, the method of processing, length of cooking time and processing time, and date of processing. All samples were subjected to pH determinations. Readings were taken at 3 levels in each jar.

Only 3 individuals were advised to discard their products. One consumer submitted two samples of the same recipe yet one jar had the highest pH value and the other jar the lowest of all samples in that group. (Probable cause--inadequate mixing.) The other two products were made without lemon juice.

The testing was done in late fall so most of the products had been stored less than 4 months but there were a few that had been stored a year. The amount of lemon juice used was more significant in determining the pH of the product than was the storage time.

Effect of Lemon Juice on pH Values

Amount of Lemon Juice Per Gallon of Zucchini	Mean pH± Standard Deviation
cup	
1.50	3.61±0.21
1.20	3.60±0.16
1.00	3.69±0.17
0.75	3.71±0.15
0.47	3.86±0.21
0.00	4.22±0.40

Fifty selected samples were allowed to spoil. When signs of spoilage first appeared, ie. mold growth and/or discoloration about the size of a quarter, no pH changes were noted. However, after film or discoloration spread across the surface of the jar some pH values changed drastically. Differences in ph values as high as 0.9 unit among the three levels of the same sample were then observed.

ZUCCHINI PINEAPPLE (CONTINUED)

The Indiana Extension Service has tested and is recommending the following recipe for Fake Pineapple.

4 quarts grated or diced zucchini
1 1/2 cups bottled lemon juice
1 can (46 oz.) unsweetened pineapple juice
3 cups sugar

Remove peeling and seeds from zucchini. Grate or dice, mix all ingredients thoroughly and simmer for 20 minutes. Stir frequently. Pour hot zucchini mixture into clean, hot jars, leaving 1/2 inch headspace. Process 30 minutes in boiling water bath.

I'm not anxious to promote the making of Fake Pineapple but if consumers want to make it let's use the recipe from Indiana.

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	24	5 to 10	6	7 to 11	19
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
bunched	Western crate	70	19 to 32	24		
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, without tops	Bushel	50	17 to 20	18	16 to 20	20
bunched	Western crate	75	26 to 33	27		
Cauliflower		20			7 to 12	10
Cherries, as picked	Bushel	56	22 to 32 (unpitted)	28	18 to 22	18
Corn, in husks	Bushel	35	6 to 10 (kernels)	8	7 to 9 (kernels)	8
Cranberries	Box	25				25
Grapes	Bushel	48	12 to 20	16		
	12-qt basket	18	5 to 7	6		
	Lug box	28	7 to 8	9		
	4-basket crate	20	5 to 7	7		
Greens	Bushel	18	3 to 8	6	6 to 9	6
Okra	Bushel	26		17		
Peaches	Bushel	48	16 to 24	18	16 to 24	20
	Lug box	20	7 to 10	8	6 to 10	8
Pears	Bushel	50	17 to 25	20	20 to 25	22
	Western box	46	15 to 28	18	18 to 23	20
Peas, green, in pod	Bushel	30	5 to 10	7	6 to 8	7
Pineapple	Crate	70	12 to 16	14	28 to 35	30
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
winter		11				4
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		
	Lug box	32	8 to 13	11		

* Containers listed in this table are not intended as a complete listing of all types of containers used by the fruit and vegetable industries. For information on inside dimensions of containers see the following:

Agricultural Statistics (published annually) U. S. Department of Agriculture, Washington 25, D. C.

Containers in Common Use for Fresh Fruits and Vegetables, Farmers' Bulletin 2013, U. S. Department of Agriculture, Production and Marketing Administration, Washington 25, D. C. [out of print]

† Legal weight of a bushel of fruit or vegetable varies in different states.

From the Handbook of Food Preparation published by the American Home Economics Association, 1963.