Home

FOOD PRESERVATION

By

CANNING • SALTING

Compiled By

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Oregon State System of Higher Education
Federal Cooperative Extension Service
Oregon State College
Corvallis

Extension Bulletin 642

October 1944
PUBLICATIONS AVAILABLE ON SUBJECTS RELATED TO HOME FOOD PRESERVATION

Oregon State College Publications

Bottling Fruit Juices—Mimeograph Circular HE 748
Curing Meats and Fish—Extension Bulletin 600
Food Preservation by Freezing—Extension Bulletin 623
Fruit Jellies, Preserves, Jams, Marmalades, Conserves, and Butters—Mimeograph Circular HE 498
Home Fruit and Vegetable Dehydration—Station Circular 149
Homemade Pickles and Relishes—Mimeograph Circular HE 750
Preserving Eggs in Water-Glass Solution and Limewater—Mimeograph Circular HE 784
The Preservation of Seafoods—Station Circular 164
Tomato Recipes—Mimeograph Circular HE 208
Vegetable Storage—Extension Bulletin 601
Farm and Home Vegetable Garden—Extension Bulletin 614
Growing Fall and Early Winter Vegetables—Extension Bulletin 594
Vegetable Garden Insect-Pest Control—Extension Bulletin 551
Construction and Operation of a Home Electric Food Dehydrator—Station Circular 309
Homemade Evaporators—Mimeograph Circular HE 1754

U. S. Department of Agriculture Publications

Beef on the Farm, Slaughtering, Cutting, and Curing—Farmers' Bulletin 1415
Drying Food for Victory Meals—Farmers' Bulletin 1918
Freezing Meat and Poultry Products for Home Use—AWI-75
Home Canning of Fruits and Vegetables—AWI-93
Homemade Jellies, Jams and Preserves—Farmers' Bulletin 1800
Home Storage of Vegetables—Farmers' Bulletin 1939
Lamb and Mutton on the Farm—Farmers' Bulletin 1807
Making Butter on the Farm—Farmers' Bulletin 876
Making Fermented Pickles—Farmers' Bulletin 1438
Making Vinegar in the Home and on the Farm—Farmers' Bulletin 1424
Pork on the Farm—Farmers' Bulletin 1186
Preparing Home Grown Vegetables and Fruits for Freezing—AWI-63
Preservation of Vegetables by Salting and Brining—Farmers' Bulletin 1932

These publications and a list of other available bulletins on home economics subjects can be obtained free of charge from your County Extension Agent or by writing the Home Economics Extension Service, Oregon State College, Corvallis, Oregon.
A. Canning

I. WHY DO CANNING?

The preservation of surplus products at home for family use makes possible a variety in the diet, reduces the cost of living, and releases commercial food products for Victory purposes. Filling every glass jar at home will help to release tin cans for war needs. Canning may wisely be limited to those foods that cannot be preserved successfully by less expensive and less laborious methods. Winter gardens, winter storage, and preservation by freezing involve less labor than canning. Salting, curing, and drying are less expensive methods of preservation than canning. Home canned goods, however, have the advantage of being on hand, ready for use at short notice.

Good aims for canned products are: (1) safety for use; (2) freedom from spoilage; (3) retention of food values; (4) palatability and attractiveness; (5) amounts and choice of foods carefully planned so that the family is assured enough for a year-round supply and also a well-balanced selection for good nutrition.

II. TWO FUNDAMENTAL PRINCIPLES IN PRESERVATION OF FOOD BY CANNING

1. Application of adequate heat. In the air, water, and soil and on food and equipment are microscopic organisms that cause food to spoil. They must be destroyed by heat. Every particle of food within the jar or can must be brought to a sufficiently high temperature and held at that temperature sufficiently long time to destroy the bacteria and other organisms that cause spoilage. Processing is the term applied to this heating of food that brings about sterilization or conditions that prevent the growth of organisms. Incomplete processing is a common cause of spoilage of canned goods.

Nonacid and low acid foods, such as meat, fish, poultry, and all vegetables except tomatoes, are canned safely only in a pressure cooker. Processing under pressure is necessary because the Clostridium botulinum, a deadly bacterium found in the soil in many states, has been known to withstand the temperature of boiling water (212° F.) continuously for 6 hours at sea level. A temperature of 240° F. or higher is required to process these foods safely in a reasonable time. The only way to get these high temperatures is by use of a pressure cooker.

2. Airtight seal. Jars must be sealed so tightly after processing that air, which carries micro-organisms, cannot enter. Lack of airtight seal is very frequently the cause of spoilage in jars and cans. Never open jars after processing to add more food or liquid.
III. EQUIPMENT FOR CANNING

1. CONTAINERS

Know your jars and how to seal them. The two main types of jar tops or closures are handled by opposite methods, as follows:

a. The closure with a separate rubber ring seals when the top is screwed down tightly. Since glass jars might break if sealed before processing, the lid with this type of closure is screwed only partly down before processing. It is screwed completely down after processing. In the case of jars with a rubber ring and 2 wire bails, the smaller bail is left up before processing and is pushed down after processing.

b. The other main type of closure is called the self-seal. It has a metal lid edged with a sealing compound, held in place by a metal screw band or clamp. This type of closure seals as it cools after processing. Screw the band firmly tight or apply the clamp before processing. Do not tighten after processing.

The term “mason” refers to any jar with threads at the top that is closed by screwing down a cap or band.

2. JARS WITH SEPARATE RUBBER RINGS

Test jar for leakage before using by enclosing hot water, sealing, and inverting. Using 2 rubbers on a jar is not recommended.

a. Standard mason jar with porcelain lined cap, usually of zinc, has a rubber ring that fits shoulder and seals at the shoulder. Some of these jars have a broad flat top edge and can be sealed also at the top of the jar. Some have a narrow rounded top edge. Such jars may not seal except with the type of closure that seals at the shoulder. Lids that are slightly bent may often be bent back into shape by placing on the jar without rubber and pressing down with pliers. This jar should be opened by pulling out the rubber with pliers. Or invert the jar in warm water to loosen the lid. Do not pry up the lid and dent the edge.

Before processing, fit rubber down smoothly on shoulder of empty jar without unnecessary stretching. Pack jar, then screw cap down firmly and turn it back 1 inch, to assure a part seal.

After processing, complete the seal by screwing the cap down tightly as soon as you take the jar from the canner.

b. “Lightning” type jar has same size rubber ring as standard mason, but the ring fits the ledge at the top of the jar. It has a glass lid held in place by 2 wire bails, one fitting in a groove in the lid. If the lid is too loose or too tight, remove the larger bail and bend it down or up in the middle until adjusted for a firmly tight seal.
Before processing, fit rubber ring on the ledge of the empty jar. Pack jar, apply lid, push long bail into the groove on the top of the lid, and leave the short wire bail up in a loose position.

After processing, complete the seal by pushing the short bail down against the jar as soon as you take it from the canner.

c. Three-piece glass-top closure has a special rubber ring of smaller size than the standard mason. Seals at the top of the jar, which has a flat, smooth, broad surface for the glass lid. Has metal screw band to fit standard mason jar. Safest to use this glass lid only on jars with flat broad-top edge. Use this screw band only with glass lids. Does not produce seal with metal lids; is too deep. Do not use the screw band made for self-seal jar a. Do not use standard mason jar cap for these lids.

Before processing, pack jar, fit rubber ring onto glass lid and place lid on jar, rubber side down. Screw metal band down tight, then, using your thumb as a guide, turn band back almost a quarter turn. Caution: if band is not turned back far enough the jar may become sealed and may break or explode.

After processing, screw the metal band down tight as soon as you take the jar from the canner.

3. Self-Seal Jars

a. Self-seal jar has metal lid edged with sealing compound. Seals at top edge of jar when it starts to cool after processing. Lid held in place by shallow metal screw band that fits standard mason jars. Seal is assured only when lid is used on jars with flat, smooth, comparatively broad top edge. Screw band is too shallow to produce a seal when used over glass lids. Standard mason jar caps cannot be used with this lid.

Wipe metal lids with clean damp cloth before using. Follow manufacturer’s directions for each brand. Some require boiling before using. Discs with sealing compound should be used only once.

Before processing, pack jar and set lid on jar with sealing composition next to glass. Screw metal band down firmly tight, but not so hard that you cut through the compound. This lid has enough “give” to let air escape during processing.

After processing, leave the jar as it is. Do not tighten the screw band. To do so may disturb the softened sealing substance and may prevent a seal. This jar seals itself. (Occasionally the screw band becomes obviously loose. If so, hold the lid firmly in place and carefully turn the band down slightly. The lid should not move even slightly.) After 24 hours take off screw band if you can without forcing. If it sticks, cover for a minute or two with a hot damp cloth. Removing screw band allows seal to be tested and prevents dete-
rioration of bands for reuse. Scrub inside of bands with brush and dry thoroughly to prevent rust.

b. Self-seal jar has special metal lid edged with sealing compound. Seals at top edge of jar when it starts to cool. Lid is held in place by 1 metal clamp. Lid can be used only on special jar for which it is made. Jar can be used only with this special lid. Lid can be used only once.

Before processing, pack jar and set lid on jar, being careful that it fits and is level. Place 1 clamp over center of lid. It should snap into place.

After processing, leave the jar as it is. This jar seals itself. After 24 hours, remove metal clamp.

c. Coffee or other commercial jars, according to the State Nutrition Committee’s recommendation, may be used only for such products as pickles, preserves, and relishes. Avoid use in pressure cooker or long hot water bath cook, because of quality of glass.

Top edges of these jars are usually narrow and rounded and seal cannot be assured. Many commercial jars are made for vacuum sealing and an airtight seal cannot be made by home methods. They are made in a large number of sizes of tops and some seem to be sealed when they really are not sealed. The “63” size coffee jars come with metal screw cap. Self-sealing one-piece “63” lids can be purchased to fit these jars.

Before processing, pack jar and set “63” lid on jar with sealing composition next to glass. Screw the band down tight. Be sure that food is very hot when jar is sealed.

After processing, leave jar as it is. It seals itself. To tighten the lid might prevent a seal.

4. RUBBER RINGS

Jar rings purchased for a period following 1943, were made of reworked and synthetic rubber and need special treatment in order to prevent off-flavor of the food. Expose rings to open air for 20 to 24 hours. Shortly before using, boil one dozen rings in a solution of 1 quart of water and 1 tablespoon of baking soda for not less than 15 minutes. Boil the rings in fresh water for an additional 5 minutes just before using. Use a fresh soda solution for each lot.

Wartime rings should not be stretched or bent any more than necessary. Place hot wet rings on jars before filling jars.

5. PROCESSING EQUIPMENT

The use of the oven or steamer for canning is not recommended. Heat distribution is uncertain and spoilage may result. Oven canning has caused serious accidents to persons and property by violent breakage.
Meat, fish, and nonacid vegetables. A pressure cooker is the only safe processing equipment for nonacid foods, which include meats, poultry, fish, and vegetables, except tomatoes.

Fruits and tomatoes. A hot water bath kettle or other tall kettle with rack is used for fruits and tomatoes. Any flat bottomed clean vessel of sufficient depth with a good lid may be used for a hot water bath. Height of vessel should be at least 8 inches for pint jars and 10 inches for quart jars, so that water comes an inch or more over the top of the jars. A rack with level surface is needed. It may be made of woven wire, wooden slats, or perforated metal. Wooden racks should be weighted to prevent upsetting jars. If pressure cooker is used as a hot water bath, be sure that petcock is wide open and lid is set on loosely.

6. GENERAL EQUIPMENT

General equipment includes pans, stainless-steel knives, fork, brush, cup, measuring cups, quart measure, measuring spoons, jar funnel, jar lifter, ladle, long-handled spoon, clean towels or cloths, hot-dish holders. Holders made from old inner tubes are convenient. Special devices are available for paring, coring, pitting, shelling, slicing, cubing, grinding, and sieving food.

IV. DIRECTIONS FOR USING A PRESSURE COOKER

1. THREE RULES FOR SAFE USE OF PRESSURE COOKER

(1) Clean safety valve and petcock each day that the cooker is used. Take apart, wash and dry parts. Use care not to damage the area of the safety valve where the ball sits, by contact with metal instruments or harsh cleansers. Spring tension must not be changed. Be careful that washcloth does not become entangled in spring and stretch it.

(2) Have 2 to 3 inches of water in bottom of cooker each time before using, so that it will not boil dry and cause damage. If using cooker with weight type of gauge use 3 quarts of water for 10 pounds pressure, and 4 quarts of water for 15 pounds pressure.

(3) At end of processing, allow pressure to return to zero before opening cooker.

2. STEPS IN USING THE PRESSURE COOKER WITH GLASS JARS

(1) Place the rack in the bottom of the cooker.

(2) Pour water in the pressure cooker until it reaches a depth of at least 2 inches each time used. Use hot water for hot jars. Use lukewarm water for cold jars.

(3) Prepare jars as described, pages 4-6.

(4) Place filled jars on rack in cooker. Do not let them touch or tip over.

(5) Open steam cock.

(6) Fasten cover in position, according to type.

(7) Apply heat under cooker.

(8) Heat until steam escapes steadily and vigorously from the open cock. Let steam escape freely for 10 minutes if cooker is size that holds 7 quart jars, to insure that all air has been driven out of the cooker. Otherwise the pressure gauge may indicate air pressure, not steam pressure within, and the temperature will be lower than the pressure gauge indicates. Steam pressure, not air pressure, is required to produce a high temperature.
(9) Close the petcock and continue heating until the desired pressure or temperature is reached. Bringing the pressure up quickly improves quality of the product. At altitudes of 2,000 feet or above, more pressure is needed. See Table I page 11.

(10) Begin to count cooking time when the gauge registers the correct pressure.

(11) When the correct pressure is reached, reduce the heat or move the cooker back on the stove. With electric stove, reduce heat slightly before proper pressure is reached. It is important that the pressure remain constant. Fluctuation of pressure draws juice from jars. In using a wood range, a mat or rack may be placed under the cooker to keep the heat even.

(12) When the cooking time is up, remove the cooker from the stove and let it cool slowly until the gauge reaches zero. Do not try to rush the cooling by fanning or pouring on cold water. To do so may crack the cooker. Slow cooling of the cooker aids retention of juice in jars at this stage of operation. When pressure returns to zero, wait a minute or two, then open the steam cock gradually. If steam comes out close it and wait until this does not occur. Do not confuse the hissing sound of air going into the cooker with the sound of steam coming out. If steam cock is opened wide immediately, liquid may be drawn from the jars.

(13) When the hissing has stopped, open the cooker, following directions for each type. Remove the cover, tilting the far side up so that the hot vapor escapes away from you. Remove jars as soon as violent bubbling within the jars stops, using a large dry cloth between you and jar, in case a defective jar should break. Avoid drafts when removing jars. Tighten the lids at once unless of self-seal type. Cool jars quickly, set apart, but avoid placing in drafts or on a cold wet surface. Test the seal before storing. In case of leakage, reprocess the full length of time, or use.

3. CARE OF PRESSURE COOKER

The dial type pressure gauge and safety valve should be tested each year for accuracy, also when first purchased and if dropped or out of order. (See County Extension Agent.) Remove gauge and safety valve with wrench. When replacing, plumber’s paste may be used on threads to assure a tight seal.

A rack is necessary in the bottom of the cooker. Wash and dry the cooker after using, but do not place lid in water. Avoid getting water or grease into the pressure gauge. Be sure that the edges of the lid and the cooker are clean at all times, in order to assure a steam tight seal. Avoid striking rim of cooker with any hard instrument. Clean the safety valve and petcock each day after using. If openings are not clean, clean with toothpick. Store cooker with lid upside down; tightly closed cookers may develop an off-flavor. Before inverting the cover on the cooker, cover the top of cooker with heavy paper to prevent marring or roughening the sealing surface.

If the cooker leaks steam at the edge of the lid, and the cooker has a sealing ring or gasket, probably the gasket needs to be stretched and turned over. Remove gasket. Stretch gently. Turn it upside down and replace carefully. If stretched too much to fit, it will usually fit all right the next day. After replacing the sealing ring, press it with the fingers to a horizontal position. When putting lid on the cooker the next time, press the lid down with the hand.
New gaskets are obtainable from manufacturer of cooker for a small charge. To avoid delay, keep a spare on hand.

To remove discoloration from cooker, add water up to line of discoloration. Add 1 tablespoon cream of tartar per quart. Raise pressure to 15 pounds. Let stand overnight. Empty next morning and scour with a good cleaner that does not contain alkali, potash, or lye.

4. PRECAUTIONS ABOUT VARIOUS TYPES OF PRESSURE COOKERS AND ACCESSORIES

**Pressure cooker with lugs or clamp fasteners for lid.** Be sure that all clamps are securely in place. Tighten evenly clamps on opposite sides of cooker until they begin to catch. Repeat with other opposite pairs of clamps until all have been turned part way down. Then turn all clamps tight without use of pliers. If cooker stands after pressure returns to zero, the lid may be hard to get off. To loosen it place a stick of wood against the lid and tap the other end of the stick. Have any defective clamps replaced before using the cooker.

**Pressure cooker with cover that slides into place.** Be sure that cooker is properly closed. To do so find words “Closed” and “Open” on top rim of cooker and turn this side toward you. Place lid in such a position that the arrow on lid points to the word “Open” on rim of cooker. Turn lid clockwise until arrow points to the middle of the word “Closed.” Never develop pressure until cover of cooker is in this exact position.

**1943 pressure cooker with weight type gauge.** Write to manufacturer and obtain instruction book No. 2. Destroy book No. 1. Use 3 quarts of water in cooker for 10 pounds pressure and 4 quarts of water for 15 pounds pressure. The weights need not spin. Pressure is up when a steady stream of steam hisses from opening near top of weights. Do not open cooker until the little pin at the top of the weights has gone entirely down. Remove weights before taking cover off cooker. For altitudes higher than 1,000 feet send to manufacturer for special attachments.

**1943 pressure cooker with firetester type of gauge.** As pressure rises in the cooker, a rod with figures for reading pressure, rises from the gauge. This rod, however, fails to go down steadily as the pressure goes down. To read the pressure, push the rod down firmly with the thumb. Lift the thumb gently, allowing the rod to rise. Read pressure where the rod stops. The rod must be depressed each time a pressure reading is to be taken.

When available a thermometer can be installed on any cooker and is desirable equipment because it indicates the degree of heat within the cooker. The pressure gauge does not register temperature.

V. HOW TO PRESERVE FOOD VALUE WHEN CANNING

Can foods very soon after they are gathered. Handle them in small lots at a time. Proceed rapidly with every step of the canning process. Keep food cool and ventilated before canning. Precook foods for a short time. Pack them hot. Process them in the containers rather than in the open kettle. Expose them as little as possible to the air, especially after peeling or cutting.

Use the liquid in which they were precooked to fill the container. Use this liquid when the can is opened. It is good food.
VI. DIRECTIONS FOR CANNING VEGETABLES

Safety insurance. All home-canned low-acid and nonacid foods should be removed from jar and brought to and maintained at a "rolling boil" for 10 minutes before tasting. Exceptions to the above recommendation are when the food is in large pieces or at high altitudes, in which case the boiling time should be increased to 15 minutes. Either cover the pan or stir the product to break up the lumps to insure even distribution of heat.

Procedure in canning vegetables (except tomatoes). See processing timetable 1, page 11.

1. Use not larger than quart jars. Pint size is recommended because of better heat penetration. Wash all jars in clean soapsuds and rinse. Let stand in hot water before packing so that jars will be hot when packed.

2. Gather vegetables when they are young and tender. Can as soon after picking as possible. Gather in shallow ventilated containers and keep cool and ventilated. Gather and can only small quantities at a time. Two hours from garden to can is a good rule. If you buy food to can, try to get local produce if available. Insist on freshness.

3. Prepare as for cooking. Wash thoroughly. Soil contains some of the bacteria that are hardest to kill, including botulinus organisms. Wash small lots at a time, in several waters if necessary. But do not soak food in water or bruise it. Lift food out of water, instead of pouring water off.

Cream style corn is prepared by cutting off tips of kernels and scraping out pulp. Peas may be shelled by dipping in hot water and running through wringer, stem end first. Pumpkin and squash may be baked or steamed until easily removed from the shell. Sieved spinach for infants should be packed in ½-pint jars. Asparagus scales are often trimmed off for greater cleanliness.

4. Precook food in boiling water until wilted and heated through. The quick heating shrinks food so that more will go into the jars. Also packing it hot assures better keeping quality. For corn, use half as much water as corn. Mushrooms should be peeled and dropped into cold water containing 1 tablespoon vinegar per quart; then precooked 3 to 4 minutes in boiling water that contains 1 tablespoon vinegar and 1 teaspoon salt per quart.

Pack hot into hot jars. Use an adequate amount of liquid in packing, as liquid aids heat penetration. Pack food fairly loose as it is hard for heat to get to the center of a tight pack, especially greens, pumpkin, corn, and other foods of compact or viscous character. Add liquid in which cooked. Leave 1 inch vacant space at top of jars and ½ to ¾ inch at top of tin cans. Add ½ teaspoon salt per pint. Remove any particles from the sealing surface of the jar with a clean cloth.

The addition of small quantities of acid, such as vinegar or lemon juice, to a nonacid food, such as vegetable or meat, does not change the acidity enough to prevent the growth of dangerous bacteria. Bacteria will not grow, however, if enough acid is added to pickle the food.

6. If self-seal lids are used, screw down firmly tight. If using jars with separate rubber bands, partly seal jars. See directions for each jar, pages 4-6.


8. At end of processing period, remove jars and seal, unless of self-seal type. See directions, page 8, for removing jars from cooker.
Table 1. Timetable for Canning Vegetables.

See page 10 for canning vegetables.

CAUTION. All home-canned low-acid and nonacid foods should be removed from jar and brought to and maintained at a "rolling boil" for 10 minutes before testing. Exceptions to the above recommendation are when the food is in large pieces or at high altitudes, in which case the boiling time should be increased to 15 minutes. Either cover the pan or stir the product to break up the lumps to insure even distribution of heat. Canned food showing any signs of spoilage should be burned, or mixed with 2 or 3 tablespoons of lye and buried. Avoid placing where animals can find it. Where 10 pounds pressure is indicated, temperature should be 240° F.; 15 pounds, 250° F.

<table>
<thead>
<tr>
<th>Product</th>
<th>Pressure</th>
<th>Time, pint jars</th>
<th>Time, quart jars</th>
<th>Time, No. 2 cans, No. 2½ cans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus, * hot</td>
<td>10</td>
<td>35 Minutes</td>
<td>40 Minutes</td>
<td>30 Minutes</td>
</tr>
<tr>
<td>Beans, snap, * hot</td>
<td>10</td>
<td>35 Minutes</td>
<td>40 Minutes</td>
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<tr>
<td>Beans, lima, * hot</td>
<td>10</td>
<td>55 Minutes</td>
<td>60 Minutes</td>
<td>50 Minutes</td>
</tr>
<tr>
<td>Beets, * baby, hot</td>
<td>10</td>
<td>40 Minutes</td>
<td>45 Minutes</td>
<td>35 Minutes</td>
</tr>
<tr>
<td>Carrots, * baby, hot</td>
<td>10</td>
<td>40 Minutes</td>
<td>45 Minutes</td>
<td>35 Minutes</td>
</tr>
<tr>
<td>Corn, whole grain, * hot</td>
<td>10</td>
<td>75 Minutes</td>
<td>80 Minutes</td>
<td>70 Minutes</td>
</tr>
<tr>
<td>Corn, cream style, * hot</td>
<td>10</td>
<td>105 Minutes</td>
<td>(No. 2 can)</td>
<td>190 Minutes</td>
</tr>
<tr>
<td>Greens, * hot, includes spinach, beet tops, chard, etc...</td>
<td>15</td>
<td>60 Minutes</td>
<td>55 (No. 2) (No. 2½)</td>
<td></td>
</tr>
</tbody>
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* See Caution at head of table.
† In using the pressure cooker above sea level, add 1 pound pressure for each 2,000 feet. Process for same length of time as given in the table.
‡ Containers larger than pint jars or No. 2 cans are not recommended.
§ Fill corn very hot and process immediately. Whole grain corn schedule requires that corn be washed after cutting to remove starch. Otherwise use cream style schedule.

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VII. DIRECTIONS FOR CANNING MEAT AND POULTRY

DIRECTIONS FOR CANNING MEAT

Meat is safely processed only in a pressure cooker.

1. Wash jars and used lids thoroughly in warm soapsuds and rinse well.
2. Cut meat into pieces of suitable size for serving and to fit the jar. Trim off excess fat. Remove large bones. Allow about 1.5 pounds of meat for each pint jar or No. 2 can.
3. Two methods of packing meat: hot and cold.
   A. Packing meat hot assures better heat penetration, shrinks the meat, and results in fuller jars.
      a. Make a broth by placing bones in cold water and simmering 1 hour. Place cut meat in broth and simmer until thoroughly heated through, about 12 to 20 minutes. Instead of simmering, meat may be seared, roasted, made into cakes or sausage and fried, stewed, or made into soup. Avoid starchy coating.
      b. Pack the hot precooked meat in clean hot jars. Pack loosely. Add hot broth to 1 inch from top of jars and to 10 inches from top of tin cans. In case of roasting or searing, add hot diluted pan drippings instead of broth. Run knife inside walls of jar to release air.
      c. Add 1 teaspoon salt to each pint jar.
      d. Remove grease or other food from sealing surfaces. Partly seal. (See directions for each jar, pages 4-6.)
      f. Seal after processing, all types of closures except self-sealing.
   B. Packing meat cold takes less time, but spoilage is more apt to occur.
      a. Place cut meat into clean cold jars to top of jar. Add salt in middle of jar, 1 teaspoon salt per pint.
      b. Add no liquid. Partly seal. (See directions for each jar, pages 4-6.)
      d. Seal jar after processing, all types of closures except self-sealing.

DIRECTIONS FOR CANNING POULTRY

1. Wash jars and used tops thoroughly in warm soapsuds and rinse well.
2. Cut cleaned chicken into pieces as for frying. Remove flesh from breast, back, and shoulders. Retain other bones. Use neck, wing tips, and breastbones for broth. Heart and gizzard may be canned with the rest, but not the liver and kidneys. The latter may be canned separately.
3. Chicken may be canned raw, precooked 8 to 10 minutes, fried, or roasted. Pan drippings may be used. Avoid use of thickened gravies. To pack chicken, place a drumstick in a jar, then place the thigh next to the drumstick, and two wings next to the thigh, fitting the elbow of one wing into the elbow of the other. Fit in remaining pieces to fill lower part of jar. Cover with breast meat.
4. Follow directions for canning meat given above.

The steam pressure cooker is the only method recommended for canning poultry.
Table 2. Timetable for Canning Meats, Poultry, and Fish.

See pages 12, 14 for canning meat, poultry, and fish.

The timetables given below for "packed hot" require that the jars and contents be hot, as near boiling as possible, when put into the pressure cooker.

**CAUTION.** All home-canned low-acid and nonacid foods should be removed from jar and brought to and maintained at a "rolling boil" for 10 minutes before tasting. Exceptions to the above recommendation are when the food is in large pieces or at high altitudes, in which case the boiling time should be increased to 15 minutes. Either cover the pan or stir the product to break up the lumps to insure even distribution of heat. Canned food showing any signs of spoilage should be burned, or mixed with 2 or 3 tablespoons of lye and buried. Avoid placing where animals can find it.

<table>
<thead>
<tr>
<th>Product</th>
<th>Pressure</th>
<th>Time, pint jars</th>
<th>Time, quart jars</th>
<th>Time, No. 2 cans</th>
<th>Time, No. 2 cans, No. 28 cans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef, veal, lamb, mutton, venison, <strong>t</strong> raw</td>
<td>15</td>
<td>110</td>
<td>130</td>
<td>110 (No. 2)</td>
<td>120 (No. 2)</td>
</tr>
<tr>
<td>Packed hot</td>
<td>15</td>
<td>85</td>
<td>120</td>
<td>55 (No. 2)</td>
<td>65 (No. 28)</td>
</tr>
<tr>
<td>Chicken, with bone, <strong>t</strong> raw</td>
<td>15</td>
<td>90</td>
<td>100</td>
<td>60 (No. 2)</td>
<td>70 (No. 28)</td>
</tr>
<tr>
<td>Packed hot</td>
<td>15</td>
<td>65</td>
<td>75</td>
<td>60 (No. 2)</td>
<td>70 (No. 28)</td>
</tr>
<tr>
<td>Chicken, boned <strong>t</strong>, hot or cold</td>
<td>15</td>
<td>100</td>
<td>110</td>
<td>100 (No. 2)</td>
<td>110 (No. 2)</td>
</tr>
<tr>
<td>Pork, <strong>t</strong> raw</td>
<td>15</td>
<td>110</td>
<td>130</td>
<td>110 (No. 2)</td>
<td>120 (No. 2)</td>
</tr>
<tr>
<td>Packed hot</td>
<td>15</td>
<td>110</td>
<td>130</td>
<td>110 (No. 2)</td>
<td>120 (No. 2)</td>
</tr>
<tr>
<td>Pork sausage, raw</td>
<td>15</td>
<td>110</td>
<td>130</td>
<td>110 (No. 2)</td>
<td>120 (No. 2)</td>
</tr>
<tr>
<td>Packed hot</td>
<td>15</td>
<td>90</td>
<td>120</td>
<td>90 (No. 2)</td>
<td>110 (No. 2)</td>
</tr>
<tr>
<td>Rabbit <strong>t</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Same as chicken)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* See Caution at head of table.
† The following modification for altitude is recommended. For each 2,000 feet above sea level, add 1 pound pressure. Process the food for the same length of time given in this table.
‡ Containers larger than pint jars or No. 2 cans are not recommended.
§ See Station Circular 164, *Preservation of Seafoods.*
CAUTION

All home-canned low-acid and nonacid foods should be removed from jar and brought to and maintained at a “rolling boil” for 10 minutes before tasting. Exceptions to the above recommendation are when the food is in large pieces or at high altitudes, in which case the boiling time should be increased to 15 minutes. Either cover the pan or stir the product to break up the lumps to insure even distribution of heat.

Rabbit may be skinned and canned. Follow same directions as for meat, page 12.

VIII. DIRECTIONS FOR CANNING FISH

1. Wash jars and used tops thoroughly in warm soapsuds and rinse well.
2. Can only absolutely fresh fish. Remove head, tail, scales, entrails, and any dark membrane. Better quality product results if salmon is eviscerated as soon as caught. Scales may be loosened by pouring boiling water over them and scraping backwards. Retain the skin and bones of salmon for flavor, color, and food value. Tuna skin is usually discarded for better appearance. In commercial canning the fat of tuna is removed by baking or steaming 2 to 4 hours until the natural oil has separated from the muscle. Tuna oil is discarded as it imparts a strong flavor. Cooking and cooling allows easy removal of bones.
3. Cut large fish into convenient sized pieces for serving and for packing into jars. Pack raw or cooked to top of jar. Trout and smelt may be browned in hot fat and packed in diluted pan drippings. Pack small fish in an up-and-down direction.
4. Add salt in the middle of the jar, 1 teaspoon per pint. If desired, add 2 tablespoons salad oil or a piece of fat flesh from near neck of salmon to each pint jar. Add no other liquid. Olive or high grade salad oil should be added to precooked tuna, using 2 tablespoons per pint.
5. Thoroughly clean sealing surfaces of jars. Partly seal jars of all types of closures except self-sealing. (See directions for each type of jar, pages 4-6.)

IX. DIRECTIONS FOR CANNING FRUIT AND TOMATOES

For equipment, see pages 4-7. Timetable 3 for different fruits is given on pages 16-17.

1. PROCEDURE IN CANNING FRUIT

   a. Use firm sound fruits that are well ripened. Freshness means improved food value, flavor, appearance, and keeping qualities. Tree-ripened peaches and box-ripened pears are best. To prevent crushing soft varieties such as berries, gather in shallow containers. Soft but sound fruit may be set aside for juice or jam.
   b. Most fruit should be carefully washed. Prepare as for the table. Fruits that are peeled, such as pears, apples, and peaches, may be dipped in a weak salt solution after peeling to prevent discoloration at this stage. Use approximately 4 level teaspoons of salt to 1 gallon of cold water. Addition of 2 tablespoons of vinegar to this water may further aid in color retention. Rinse in cold water before canning if desired.
   Fruits that shrink a great deal in the jar, such as apples and apricots, may be precooked about 5 minutes in sirup, packed hot, and processed in hot water
bath for a shorter period. Each quart jar of fruit requires about 1 cup of sirup.

Some fruits when heated yield enough juice of their own without adding liquid. Adding sugar before heating will draw out juice. Adding sirup made with water produces a milder flavor.

2. STEPS IN CANNING BY HOT WATER BATH METHOD

By this method food is cooked in the jar.

Cooking in the jars results in less contact with air and conserves vitamins better than the open kettle method. This method also results in less spoilage than the open kettle method. Products tend to be firmer, more palatable, and more attractive by the hot water bath method.

a. Fill hot water bath cooker with enough water to come 1 inch over tops of jars. Start heating so that water will be boiling when jars are packed.

b. Shortly before they are needed, thoroughly wash jars and used lids in clean soapy water and rinse well. If jars have rubber rings, prepare as described on page 6 and attach them. Let jars lie on a rack or perforated tin covers in hot water so that they will be hot when packed.

c. Prepare sirup.* Add sugar to water, stir to dissolve, and bring to a boil.

   Light sirup (25 per cent): 1 cup of sugar to 3 cups of water.
   Medium sirup (33 per cent): 1 cup of sugar to 2 cups of water.
   Heavy sirup (50 per cent): 1 cup of sugar to 1 cup of water.

Table 3, pages 16-17, suggests type of sirup for each fruit. Strength of sirup may vary according to taste or circumstances. In order to conserve sugar, it is suggested that thinner sirups be used for sweet fruits such as apples, ripe pears, and ripe peaches, in order to allow thicker sirups in canning berries, apricots, rhubarb, and sour cherries. Too much sugar tends to draw juice from fruit, causing more shrinking and floating in jar.

Honey may replace half of the sugar but may impart a strong honey flavor. Corn sirup or corn sugar (dextrose) may replace one-third of the sugar (½ in jams and jellies). Avoid brown sugar and sirups with strong flavors.

Sugar is not necessary to keep fruit from spoiling but it helps retain shape, color, and flavor of fruit. Unsweetened fruit may be canned the same as sweetened fruit, adding water or fruit juice or heating slowly to form its own juice. It may be sweetened to taste when served, but is not as satisfactory as when canned with sugar.

d. Place fresh or precooked fruit in hot jar while jar is standing in hot water. Jar may be jolted gently on a wooden surface or the palm of hand to help make a full tight pack. Avoid mashing fruit. Fill jars to top with fruit. Pour boiling hot sirup over fruit. Allow ½ inches head space for sirup with raw fruit and 1 inch head space with partly cooked fruit. Allow ½ to ⅔ inch head space in tin cans. Run knife inside walls of jar to release air. Remove any particles from sealing surface of jar.

e. Place hot lids on jars. If self-seal type, screw lids down tight. If wire-clamp type, snap the larger clamp into place and leave the smaller clamp up, to seal jar partly. If using screw top with rubber ring, screw lid down, then back ⅛ turn to seal jar partly. Process promptly.

* For further suggestions on wartime canning and a sirup table, see Circular HE 1687, Sugar Saving Methods of Canning and Freezing, available free of charge from County Extension offices, or Oregon State College, Corvallis.
Table 3. Timetable for Canning Fruits and Tomatoes in Hot Water Bath.

Hot pack of fruits, or precooking a few minutes is recommended for better keeping qualities and for shrinking the fruit and producing fuller containers than with the cold pack. Place hot jars in boiling water on rack. Water should come 1 inch over top of jars. Seal jars immediately after processing, unless self-seal. Keep water boiling continuously the required time. For each 1,000 feet above sea level, add 1 minute to processing time given in table below, if time called for is 20 minutes or less. If table calls for more than 20 minutes, add 2 minutes for each 1,000 feet. For half gallon jars, add 5 minutes.

Syrups: light—1 cup sugar, 3 cups water; medium—1 cup sugar, 2 cups water; heavy—1 cup sugar, 1 cup water.

See pages 14-15, 18 for canning fruits and tomatoes, and open kettle canning; and pages 20-21 for canning in tin.

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Preparation for Canning</th>
<th>Timetable for Canning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hot water bath (Boiling water, 212° F.)</td>
<td>Pint or quart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>Apples</td>
<td>Wash, pare, core, or quarter (not more than 1 inch thick) into cold salt solution (4 teaspoons salt to 1 gallon water). (See page 14.) Drain, boil 5 minutes in sirup, pack hot into hot jars, add boiling sirup to 1 inch from top of jar, or ½ to ½ inch from top of tin can.</td>
<td>10</td>
</tr>
<tr>
<td>Apricots</td>
<td>Treat same as peaches. Or wipe with damp cloth, do not peel.</td>
<td>10</td>
</tr>
<tr>
<td>Berries, firm</td>
<td>Sort, stem, wash, and drain. Add 1 to 2 cup sugar per quart. Bring to a boil. Shake pan or stir gently to prevent sticking. Pack hot, adding juice to ½ inch from top of jar or ½ to ½ inch from top of can. Add more sugar to gooseberries if desired. Fresh gooseberries may be preserved raw in cold water. See last line under Rhubarb.</td>
<td>15</td>
</tr>
<tr>
<td>Blackberries</td>
<td>Or bring berries to boil in 1 cup sirup per quart, pack hot into hot jars to ½ inch from top of jar or ⅔ to ⅔ inch from top of can.</td>
<td>15</td>
</tr>
<tr>
<td>Gooseberries</td>
<td>Sort, wash, and drain. Pack raw into hot jars standing in hot water. Shake or jolt jar for a fuller pack. Avoid mashing. Add boiling sirup to ½ inches from top of jar or ½ to ½ inch from top of can. Place packed jars directly into boiling water if of modern standard glass.</td>
<td>20</td>
</tr>
<tr>
<td>Loganberries</td>
<td>Wash, stem, pack, add boiling sirup to ⅔ inches from top of jar or ¾ to ¾ inch from top of tin can. Jolt down in jar for full pack when filling jars.</td>
<td>25</td>
</tr>
<tr>
<td>Cherries</td>
<td>Select tree-ripened peaches, cut in half on suture, remove pit, immerse in boiling water 1 minute or until skins slip easily, plunge into cold water or spray for few seconds, peel. Slice if desired, simmer 4 to 8 minutes in sirup, pack with pitted sides down in overlapping layers, add boiling sirup to ½ inch from top of jar or ½ to ½ inch from top of tin can. May add one cracked pit for flavor to each quart sirup.</td>
<td>15</td>
</tr>
<tr>
<td>Peaches</td>
<td>Can pears when in good eating condition. Pare, cut into halves or quarters, core, drop immediately into cold salt bath (4 level teaspoons salt and 2 tablespoons vinegar to 1 gallon water), wash. Cook 4 to 8 minutes in hot sirup, pack hot, add boiling sirup to 1 inch from top of jar or ½ to ½ inch from top of tin can.</td>
<td>25-35</td>
</tr>
<tr>
<td>Pears</td>
<td>Or pack washed halves with skin raw into hot jars and proceed as directly above.</td>
<td>25-35</td>
</tr>
<tr>
<td></td>
<td>Or bake, pack hot, add hot sirup and process in jars.</td>
<td>10</td>
</tr>
<tr>
<td>Fruit</td>
<td>Preparation for Canning</td>
<td>Hot water bath (Boiling water, 212° F)</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pint or quart jars</td>
</tr>
<tr>
<td>Prunes or Plums</td>
<td>Wash, pack, cover with boiling medium sirup to 1½ inches from top of jar or ½ to ¾ inch from top of can. Fricking skins prevents bursting. Or add sugar or sirup as desired. Boil 3 to 5 minutes, pack hot.</td>
<td>Minutes</td>
</tr>
<tr>
<td>Rhubarb</td>
<td>Trim, wash carefully, cut into 4-inch lengths. Make excess quantity of medium sirup and bring to a boil. Place cut rhubarb in boiling sirup. After 1 minute, turn over with long-handled spoon. When rhubarb boils but is not broken, remove from heat. Dip solid fruit with slatted spoon into hot jars to make a solid pack. Add sirup to 1 inch from top. Partly seal and process in hot water bath 10 minutes. Use remaining sirup for next batch. At end, can excess sirup for beverage purposes. This method produces full pack and helps keep shape of fruit. Or cut into 4-inch lengths, add ½ cup sugar for each quart rhubarb, bake in covered dish until tender. Pack hot. Or cut into 4-inch lengths, pack in sterilized jars, fill to overflowing with cold water, seal and store without processing, in a very cool place. Use this method only if rhubarb is very fresh and not overripe. Cook after opening jars.</td>
<td>10</td>
</tr>
<tr>
<td>Sauerkraut</td>
<td>Bring to simmering point, 190° F.-200° F. Pack hot into hot jars to ¼ inch from top of jar and ½ to ⅔ inch from top of can. Use firm, ripe tomatoes. Wash, place in thin cloth or preferably wire basket, dip into boiling water 1 minute or until skins slip easily, plunge into cold water for an instant, core (be sure to remove all white core), peel, trim well, quarter. Bring to a boil. Pack hot into hot jars to ¼ inch from top of jar or ½ to ¾ inch from top of can. Add 1 teaspoon salt per quart if desired. Avoid all contact with iron. Or quarter and pack raw into hot jars. Add hot juice to ¼ inches from top of jar or ½ to ¾ inch from top of can.</td>
<td>25 pts</td>
</tr>
<tr>
<td>Strawberries</td>
<td>Wash, stem, place in preserving kettle with sugar, using ½ to ¾ cup sugar to 1 quart raw berries. Boil 1 to 3 minutes and let stand overnight, at least 12 hours. Boil 1 minute, pack in hot jars to ½ inch from top of jar or ¾ to ⅔ inch from top of can. This method helps to prevent shrinkage, and usually to produce even distribution of berries in jar.</td>
<td>10</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>Use sound, ripe tomatoes, wash, place in thin cloth or preferably wire basket, dip into boiling water 1 minute or until skins slip easily, plunge into cold water for an instant, core (be sure to remove all white core), peel, trim well, quarter. Bring to a boil. Pack hot into hot jars to ¼ inch from top of jar or ½ to ¾ inch from top of can. Add 1 teaspoon salt per quart if desired. Avoid all contact with iron. Or quarter and pack raw into hot jars. Add hot juice to ¼ inches from top of jar or ½ to ¾ inch from top of can.</td>
<td>10</td>
</tr>
<tr>
<td>Tomato juice</td>
<td>Use sound, ripe tomatoes, wash well, remove stems, cut into sections. Simmer until softened, stirring occasionally to prevent burning, put through sieve, add 1 teaspoon salt to each quart if desired, bring to boil, pour into containers to ½ inch from top of jar or bottle, or ¾ to ⅔ inch from top of tin can. Avoid all contact with iron, which causes discoloration. Wash fruit, crush, heat slowly to simmering point, about 190-200° F., strain through thick clean cloth, add ½ cup sugar to each quart fruit juice, bring to simmering point, pour into containers to ½ inch from top of jar or ¼ inch from top of tin can. Avoid all contact with iron.</td>
<td>20</td>
</tr>
<tr>
<td>Fruit juice†</td>
<td>Wash fruit, crush, heat slowly to simmering point, about 190-200° F., strain through thick clean cloth, add ½ cup sugar to each quart fruit juice, bring to simmering point, pour into containers to ½ inch from top of jar or ¼ inch from top of tin can. Avoid all contact with iron.</td>
<td>30 at simmering point</td>
</tr>
<tr>
<td>Fruit purées</td>
<td>Proceed as for tomato juice, except add water. Avoid all contact with iron.</td>
<td>20</td>
</tr>
</tbody>
</table>

* Use fruit enamal cans for dark and red cherries. Use plain cans for light cherries.
† Note: Before using berry juice, a good general rule is to first dilute ¹/₃ to ¹/₂ with cold water and add sugar to taste. Use 1 part of loganberry juice to 6 or 7 parts of cold water and add sugar to taste.
f. Lower hot jars into boiling hot water with jar lifter or rack. Jars should be ½ inch or more apart and rack underneath should raise them off the bottom. Water level should be 1 inch or more above tops of jars. Cover cooker. Record time when water comes to a rolling boil again.

g. Keep water boiling actively for required period, counting from time water boils again. Add boiling water if needed to keep jar tops covered. Add time for altitude of 1,000 feet and more. (See Table 3, pages 16-17.)

h. Remove jars from hot water bath at end of processing period and seal unless self-seal type.

3. CANNING TOMATOES BY HOT WATER BATH METHOD

Blanch tomatoes in boiling water to loosen skins; then dip in cold water. Peel and remove all of green and white core.

Cut into quarters, heat just to boiling, and pack hot to 1 inch from top. Add 1 teaspoon salt per quart. Process in hot water bath. This method has been recommended by the State Nutrition Conference.

Or cut into quarters and pack raw, making sure to press tomatoes firmly into hot jar to top. Fill jar with hot tomato juice to 1½ inches from top. Add 1 teaspoon salt per quart. Lower hot jars into boiling water. Process according to Table 3, page 16-17.

4. CANNING TOMATO JUICE BY HOT WATER BATH

Work with small batches at a time to save food value. Heat washed and cut tomatoes enough to loosen juice (180° F.). Do not boil. Avoid use of copper, brass, and iron utensils. Sieve quickly to avoid undue exposure to air and consequent reduction of vitamin content. Reheat only to boiling point. Immediately fill hot jars or bottles to ½ inch from top. Add ½ to 1 teaspoon salt per quart. Process in hot water bath 20 minutes. Seal unless self-seal jars.

5. CANNING FRUIT BY THE OPEN KETTLE METHOD

By the open kettle method, the food is cooked in an ordinary kettle, then packed into sterilized jars and sealed. No other processing is done. Bacteria, molds, and yeasts can get into the jars when they are being filled and may cause spoilage. For this reason the federal and state nutrition committees recommend that the open kettle method be used only for such products as jams, jellies, preserves, and pickles.

X. COOLING, TESTING SEAL, LABELING, AND STORING CANNED FOODS

Set jars in upright position out of draft several inches apart to cool rapidly. Do not tighten lids after cooling; to do so may break the seal. Lift jar by the body, not the top. Avoid pressure against rubber or any part of the seal.

Remove screw bands from self-seal jars after 24 hours. Test seal by gently tapping lids with spoon. Sealed lids usually have a ringing sound. Test seal of any that sound dull, applying a slight pull up on the lid. Scrub inside of screw bands with brush. Dry thoroughly and use again. Any jars not sealed should be reprocessed for full time or the food used.

Wipe good jars clean, label with name, date, type of processing, and period of processing. Store in cool, dark, dry, frostproof place with temperature of 45° to 60° F. if possible.
XI. DISCOLORATION OF CANNED FOODS

Pink pears may be due to overcooking or to cooling too slowly due to placing too close together or in too warm a room. Overripe pears and some varieties pink more than others.

Tan or brown color of peaches, pears, apples, and apricots may be due to oxidation or too high temperature. Force the air out of these fruits by boiling in sirup a few minutes before processing. Avoid pressure cooker and oven canning. Underheating may also cause a dark color. As soon as peeled, dip light colored fruits in cold brine. See page 14.

Cloudy peas or beans are often due to the presence of a few starchy overripe specimens, or to overcooking. (Bacteria may also cause cloudiness.) Yellowish flakes or crystals in asparagus, turnip greens, and spinach are caused by natural ingredients in the vegetables and are harmless.

White sediment in tomatoes may be of two types, a harmless material, or bacteria causing spoilage.

Vegetables are sometimes discolored and toughened by the use of hard water.

Dark color in corn or meat may be caused by contact with copper or iron utensils. Corn is darkened sometimes by 15 pounds pressure cooking. Too much head space may cause oxidation and discoloration.

XII. ON GUARD AGAINST SPOILAGE

Look closely at every jar of canned food before opening and when opened. Although food may be spoiled and give no indications, the following signs of spoilage are usually readily apparent:

1. Poor seal of jar. A leak.
2. Off-odor of food or off-color of food.
3. Change in texture of product: slippery, slimy, mushy, moldy.
5. Swelling or bulging jar tops and ends of tin cans.
6. Cloudiness of liquid. Overmature peas and beans, however, may be cloudy although not spoiled.
7. Off-flavor of food. Do not taste nonacid home-canned foods before boiling them 10 to 15 minutes. See caution at top of pages 11 and 13.

It is possible for canned food to contain the poison that causes botulism without showing it. Some foods that have this poison develop a bad odor when boiled. Absence of odor does not necessarily indicate freedom from botulinus poison.

When in doubt as to the wholesomeness of food, burn or bury it. Before burying, stir several tablespoons of lye into a jar of spoiled canned food with a stick and let it stand 24 hours out of reach of children or animals. Then bury it deep, —-jar, cover, stick, and all.

Remember safety first. Don't expose people, poultry, or other animals to even one chance of tasting spoiled canned food.

Caution: All home-canned low-acid and nonacid foods should be removed from jar and brought to and maintained at a "rolling boil" for 10 minutes before tasting. Exceptions to the above recommendations are when the food is in large pieces or at high altitudes, in which case the boiling time should be increased to 15 minutes. Either cover the pan or stir the product to break up the lumps to insure even distribution of heat.

Do not use galvanized container. Metal poisoning may result.
XIII. COMMON DIFFICULTIES IN CANNING

Most spoilage of canned food can be traced either to lack of adequate heat in processing, or to lack of airtight seal. Sometimes the food has spoiled before canning. The following precautions are emphasized:

1. Use sound fresh food of right maturity. Handle only enough for one cannerful at a time. Handle rapidly. Keep food cool and ventilated while waiting.

2. Examine jars before canning. Discard cracked jars and those with defects on sealing surface. Test jars with separate rubber ring by enclosing water and inverting. Thoroughly wash and rinse jars and tops.

3. Use only standard jars for canning if possible. Limit packers or commercial jars to such things as preserves and relishes. See page 6.


5. Use the closure that was intended for each jar. See pages 4-6. Different kinds of closures are handled very differently. In general, follow the directions that come with each type of jar and each type of closure. Only partly seal jars with separate rubber rings before processing and tighten after processing. Avoid tightening self-seal jars after processing. Read and study directions for all canning equipment.

6. Have pressure cooker gauge and safety valve tested when new, annually, and at any time that they show any irregularity. Follow the safety rules for pressure cookers. See page 7. Be sure that the lid is securely fastened on pressure cooker before developing pressure. Allow adequate exhaust of air from pressure cooker. Stay in the kitchen when using the pressure cooker and keep the pressure steady.

7. When operating a canner, write down the time for start and finish of exhaust time and of processing time. If the temperature is not maintained at the specific point recommended in the tables for nonacid foods, there is always danger of food poisoning from botulism. Be sure to process for the full time according to the table, or the food may spoil. At altitudes of 1,000 feet or higher, add time to hot water bath schedules. At altitudes of 2,000 feet and higher, add pressure to pressure cooker schedules. See pages 11 and 13.

8. Use pint jars for most nonacid foods in order to assure adequate heat penetration. Use a loose wet pack for vegetables to help heat penetration.

9. Leave adequate headspace so the food will not boil onto the sealing surfaces. Clean sealing surfaces well before closing jars.

10. Do not open jars after processing to fill them more completely. Avoid tightening lids after jars are cool. Cool jars in upright position.

11. Losses can often be prevented if the seals of jars are tested 24 hours after canning.

12. Know the operation and adjustment of tin can sealers if they are to be used. Test the seams frequently for airtight seal.

XIV. CANNING IN TIN

Tin cans and sealers are available during wartime for home canning. Tin cans have several advantages over other types of containers. The first cost is lower, the tin permits foods to be heated and cooled quickly, producing better flavor, and there is no loss from breakage. On the other hand, canning in tin necessitates investment in a good sealer, and tin cans are used safely only once for canned fruits, meats, and vegetables. The coating of tin on cans is thinner during wartime. Use food in tin before that preserved in glass.
1. KINDS OF TIN CANS

Tin cans are sold by hundred lots or thousand lots in standard sizes. Three kinds of cans are obtainable as follows:

Plain. Safe for all purposes so far as food value is concerned but unsatisfactory for certain foods, especially the highly colored foods. Plain cans are satisfactory for tomatoes, meat, and all white, green, and yellow products.

Inside Enamel. (also called R-enamel, Regular, and Fruit enamel). Bright gold color. Preserves the color of such highly colored products as red berries, cherries, prunes, and beets. Use Inside Enamel cans for all fruits and vegetables of red, blue, or purple color except tomatoes. Re-enamel cans are Inside Enamel cans with an extra layer of enamel.

C-Enamel. Dull gold color. Prevents discoloration of products containing sulphur, such as corn, peas, succotash, hominy, crab meat, clams, fish, and chicken. Never used for acid products.

2. CAN SIZES

Common sizes for home canning are No. 2 and No. 2½ (See table). The sealer can be adjusted to different sizes. To make an airtight seam, very close adjustment is necessary when changing sizes. It is best practice to use only one size can on home sealers.

<table>
<thead>
<tr>
<th>COMMON SIZES OF TIN CANS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approximate weight</strong></td>
</tr>
<tr>
<td>Ounces</td>
</tr>
<tr>
<td>No. 1</td>
</tr>
<tr>
<td>No. 1 (tall)</td>
</tr>
<tr>
<td>No. 2</td>
</tr>
<tr>
<td>No. 2½</td>
</tr>
<tr>
<td>No. 10</td>
</tr>
</tbody>
</table>

3. TESTING THE TIN CAN SEALER

Once the sealer has been tested and adjusted, a test should not be necessary until several hundred cans have been sealed or until a readjustment has been made to accommodate a can of a different size.

To test sealer, place 2 tablespoonfuls of cold water in an empty can and seal. Have on hand a pan of boiling water sufficient to cover the can. Reduce heat to stop boiling and immerse the can until it is entirely surrounded by the hot water. This heats the water in the can and creates pressure within the can. Can ends will bulge. Keep the can under the surface for 5 minutes and if by that time no bubbles arise from the can seam, the can has been sealed air tight.

If bubbles arise from the can, the seam is not sufficiently tight, and one or both of the seaming rolls need adjusting. Leaks are most apt to be at the side seam. Usually the second roll needs adjusting. To adjust, follow manufacturer's directions.

4. STEPS IN USING THE PRESSURE COOKER WHEN CANNING IN TIN CANS

(a) Clean and prepare product.

(b) Examine can. Straighten any cans that have dented rims. Discard cans with torn side seams.
(c) Mark can with soft or china marking pencil, sharp instrument or tin can ink, with name, date, method, and processing batch.

(d) Pack product in the marked cans. Pack cold or hot according to directions given below under (e) and (f). Fruit, tomatoes, meat, and fish may be packed cold or hot. Nonacid vegetables should be packed hot.

(e) Cold Pack. May be used with fruit, tomatoes, meat, and fish.
   (1) Fill the cans with food. Avoid a tight dry solid pack. Use plenty of sirup on fruits. Tomato juice may be added to tomatoes.
   (2) Add boiling sirup to fruits to within ½ to ¾ inch of the top of the cans. Add only salt to fish and meat.
   (3) Exhaust or preheat the can. To exhaust, heat the filled cans in a pan of boiling water reaching to within 1 to 1½ inches of the top of the cans, until the temperature of the center of the cans is approximately 180° F. Keep the exhausting pan covered. The purpose of this preheating is to expand the contents of the can so that expansion after sealing will not be sufficient to strain the seams or buckle the ends of the cans; also to expel the air from the product, and to prevent corrosion of the tin.
   (4) When the cans are sufficiently heated, or exhausted, seal them promptly on the tin can sealer. Follow manufacturer's directions with the sealer.

(f) Hot Pack
   (1) Pack all nonacid vegetables boiling hot. Pack precooked meat hot. Fill cans to within ½ to ¾ inch of the top.
   (2) Add boiling water in which they were cooked, to within ½ to ¾ inch of the top of the can. Headspace should not exceed ½ inch. Excessive headspace may cause darkening of some foods and corrosion of cans. Add salt in the proportion of ½ teaspoon per pint of vegetables.
   (3) Seal each can directly after filling. Follow directions with sealer.

(g) When a batch of cans is sealed, place the cans in the pressure cooker immediately. Have the cooker ready with the hot water 2 to 3 inches deep in cookers of 7-quart-jar capacity and dial gauge.

Heat penetration to center of can is aided by placing cans so that layers of food within the cans are vertical. Tin cans of spinach should be laid on their sides; cans of asparagus stalks and whole beans should stand upright.

(h) Place the cover on the cooker. Follow directions for each type of cooker.

(i) As soon as the desired pressure is reached write down the time when the processing is to be finished. Process at the necessary temperature for the required length of time. (See Tables 1 and 2, pages 11 and 13.)

(j) When the cooking time is up, open the steam cock wide except under the following three conditions when a sudden release of pressure might result in buckling of the cans: (1) When
pumpkin, corn, or spinach is being cooked. (2) If cans are larger than No. 2. (3) When the cans were sealed at too low a temperature. Under the conditions indicated, lower the pressure gradually.

(k) When the gauge indicates zero, open the cooker and remove the cans.

(l) Cool the cans completely and quickly by placing them under cold running water. Watch for leakage from poor seams.

(m) Observe cans for at least 2 weeks to see if bulges or leaks appear. If any spoilage develops, examine all the cans that were processed in the same batch.

(n) Label and store in the coolest place available, above freezing. The storage place should be dry enough to prevent rusting of cans.

**B. Salting Vegetables**

**Preservation of Vegetables by Salting**

Salt draws water from vegetables by the process of osmosis, forming a brine that inhibits the growth of spoilage organisms. Vegetables may be salted in two ways: with a small proportion of salt that allows desirable fermentation, and with a larger proportion of salt that prevents fermentation. By either method some food value is lost.

*Salt equivalents*, level measurement: 1 tablespoon + 2 teaspoons = 1 ounce; \( \frac{1}{2} \) cup = 5 ounces; 1 cup = 10 ounces; \( \frac{3}{4} \) cups = approximately 1 pound.

1. **Dry Salting with Fermentation**

Cabbage, cucumbers, snap beans, beet tops, and turnip tops are the vegetables most frequently preserved by dry salting with fermentation.

**Sauerkraut**. Equipment needed: (1) A stoneware crock, a hardwood keg free from undesirable flavors and odors, or glass jars. (2) A good grade of dairy salt. (3) Scales. (4) Knives or kraut cutter. Boards to cut on. (5) Containers for weighing the cut cabbage. (6) A wooden head or round piece of hardwood board about 1 inch thick and just small enough to slip in and out of the keg easily. Allow for swelling. A plate of suitable size is even better than a board. (7) Clean stones or bricks to weight the cabbage down in the brine (not limestone). A 5-gallon keg of kraut requires approximately a 10-pound weight. Increase weight with size of container. (8) White muslin or several thicknesses of cheesecloth cut 6 inches larger than the crock or keg, to cover the cabbage after it is packed.

**Procedure in making sauerkraut.** Use only sound cabbage. Trim off any undesirable parts. Wash cabbage. Shred fine, retaining core if desired. Weigh shredded cabbage and weigh \( 2\frac{1}{2} \) to 3 per cent as much salt as cabbage. That is, use from \( 2\frac{1}{2} \) to 3 pounds of salt to 100 pounds of shredded cabbage. Two and a half per cent of salt is the same as 1 pound of salt to 40 pounds of cabbage or four ounces of salt, a scant half cup, to 10 pounds of cabbage. The smaller amount of salt may be used with very clean cabbage, very clean utensils, and the right temperature. The more salt, the less risk of spoilage. More than 3 per cent salt, however, will taste very salty.

*For other methods of preservation by salting ask Extension Service office for Farmer's Bulletin 1932, "Preservation of Vegetables by Salting and Brining."
Place a 3-inch layer of shredded cabbage in the container and pack down with the hands or with a tamper. Sprinkle with some of the salt. Add more cabbage, pack in firmly, and add more salt. Continue placing alternate layers of cabbage and salt and pack down each layer firmly, until container is \( \frac{1}{2} \) full. The weighed salt should be evenly distributed throughout the cabbage, but in case extra salt is left, sprinkle it on the top layer. Several layers of large outer cabbage leaves are desirable. This will later facilitate opening the container without mixing the scum with any of the kraut. Spread the cloth over the mixture, tucking it down at the sides. On the cloth place the board or plate and on the board place the stone. The weight should be heavy enough to cause a brine to come up to the cover in a day or two. Leave in a warm clean place, preferably at 65° to 75° F. until bubbling or fermentation stops. The time needed for fermentation varies from 2 to 4 weeks. If scum or mold appears, remove it at about 2-day intervals, or it may completely spoil the kraut. Lift cloth carefully so that as much scum as possible sticks to it. Skim top of brine. Do not disturb leaves. Wash and replace cloth, cover, and weight. After fermentation stops, seal the kraut in one of various ways. A common method used is to move the container to a cool place, remove the cloth and any scum or mold, adjust the amount of brine and weight so that the brine comes up to, but not over the cover, and pour very hot melted paraffin over the surface of the brine that is exposed. Do not move the container after pouring in the paraffin. After kraut is taken from the container, cover soon again with paraffin. If the kraut is to keep a considerable length of time, scum and mold must be prevented from forming.

Small amounts of sauerkraut may be conveniently made by thoroughly mixing 4 ounces of salt to 10 pounds of finely shredded cabbage in a dishpan. This may be tightly packed in fruit jars. Try to pack tight enough to bring juice to the top or refill next day. Place lid but do not quite seal (loosen mason type jars about \( \frac{1}{2} \) turn). As fermentation (bubbling) proceeds gas will escape. When fermentation ceases seal the jars tight.

To preserve other vegetables than cabbage by dry salting with fermentation, wash and trim them as for cooking and proceed by the same method described for sauerkraut.

2. DRY SALTING WITHOUT FERMENTATION

Snap beans, lima beans, peas, corn, dandelion greens, beet tops, spinach, chard, and kale are preserved by salting without fermentation. Use one-fifth as much salt as vegetables by weight, that is, 1 pound of salt to 5 pounds of vegetables. This proportion of salt largely prevents fermentation and growth of molds. Although 20 per cent salt is ordinarily sufficient, some may prefer to use 25 per cent as an added precaution.

Boil corn 10 minutes, then cut from the cob. For best results blanch snap beans, lima beans and peas in boiling water or in steam 5 minutes. Cool before salting.

Proceed by the method described under sauerkraut, except that layers of vegetables should be not more than 1 inch thick. If a brine does not form in 24 hours after application of the weight, add a saturated brine until it comes up to the cover. A brine of 1 pound of salt to 2 quarts of water may be used.

Using brined products. Soak food preserved in salt without fermentation several hours in cold water before cooking, changing the water several times. Use 1 gallon of water per quart of vegetables. Cook and season as in preparing fresh vegetables, except that salt is omitted.