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FOOD PRESERVATION

By

CHARLOTTE HALGRIM, B.S., M.A.
Associate Professor

DEPARTMENT OF HOME ECONOMICS

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FOREWORD

We have today an increased emphasis on the maintenance of the best possible health and physical efficiency. This is stimulating a nationwide interest in a greater knowledge of the essentials for a state of good nutrition, and of the means by which these essentials can be provided for the family.

The only way in which many of our people can contribute to the solution of the world food problem is to increase home food production and food conservation. Due to the increasing cost of living food preservation becomes an economic necessity. It is the only means by which many families whose diets are now below standard can be provided with an adequate diet.

In order to utilize food surpluses and provide better variety in the diet, it is well to preserve certain foods in many ways. For example, peaches may be canned, dried, made into sweet pickles and preserves. A variety of products can be made from most any food. The homemaker must select the methods best suited to her particular circumstances. Whatever the material to be conserved, it must be in prime condition. Whatever the number of methods used, it is important that the greater quantity be preserved by the method which produces the best product.

In this bulletin emphasis is placed on the interpretation of the procedures. If the principles are understood all details appear important. Failure in one detail is often serious. The recipes given involve the use of foods generally available.

The photographs in this bulletin were made by Miss Zina Fowle, a student in the department of journalism. The drawings were made by Miss Mary Paxton, a student in the fine arts department.

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FOOD PRESERVATION

FOOD SPOILAGE

Several types of micro-organisms occur as food spoilage agents wherever they find favorable conditions of temperature, moisture, air, and food. They exist in the active or vegetative form and in the dormant or spore stage. They are present in the soil, air, water and food, and on all surfaces. The problem of food preservation involves the destruction of these spoilage agents or arresting their development.

Yeasts and Molds—All foods which contain starches and sugars are subject to spoilage by yeasts and molds. Warmth, moisture, air, and exposure to unsterile containers and surfaces result in this food spoilage. Since they are readily destroyed when subjected to temperatures at or near the boiling point of water, it is not difficult to protect foods from these types of spoilage.

Bacteria—The action of putrifactive bacteria is readily recognized by the putrifactive odor, gas, discoloration, and softening. The fermentative bacteria are evidenced by gas. The thermophylic bacteria develop rapidly at temperatures from 100°F. to 150°F. They produce the type of spoilage known as "flat sour." Corn, peas, and beans are very susceptible to this type of spoilage. Vegetables should not be stacked in masses in a warm place before canning, and there should be no delay between preheating and processing. Slow cooling after processing and a warm storage place also cause "flat sour." Clostridium botulinum may infest fruits, vegetables, or meats; but it occurs most frequently in canned meats and non-acid vegetables. These bacteria produce a very dangerous toxin. They live without the presence of air. While gas and a characteristic foul odor are produced, the fatal toxin may be present without definite evidence. Boiling the food uncovered for ten minutes destroys the toxin which otherwise produces very severe illness with a high mortality rate. In the preservation of meat, fish, fowl, and certain vegetables, temperatures up to 250°F. are necessary, because of the heat resistance of the spores.

Enzymes are normally present in all plant and animal

tissue. They bring about such natural changes as growth, maturing, and decay. Their activity is retarded at low temperatures and they are completely destroyed at boiling temperatures.

It is high art in food preservation to prevent spoilage, and to secure a product that is not overprocessed. It is necessary to observe the procedure which has been determined through years of research by highly trained scientists. Time and temperature schedules must be followed precisely. Some adjustments must be made for high altitude; different foods require different treatment; and the available storage conditions must be taken into consideration.

MEANS OF PREVENTING FOOD SPOILAGE

Low Temperatures—Freezing and near freezing temperatures retard the action of enzymes, yeasts, molds, and bacteria. Fresh foods which have been subjected to rapid chilling, then to rapid freezing at —20°F. to —30°F., and which are subsequently held at 0°F., keep well for several months. A small private plant can now be installed and operated at a low cost.

Removal of moisture—Spoilage agents are rendered inactive when subjected to conditions of insufficient moisture. Spoilage is inhibited when the water content is reduced below twenty per cent.

Preservatives—A fifteen per cent salt solution is effective as a preservative.

Sixty-five per cent sugar concentration is preservative for jellies, jams, and heavy preserves. Lower concentrations of sugar add keeping quality when combined with salt and acid as in pickles.

Acids used in a three to four per cent solution prevent spoilage. Vinegars vary from three to seven per cent acid. A good grade of commercial vinegar is usually about five per cent acid.

Spices have some value in giving keeping quality. However, they are not frequently used in sufficient concentration to be much of a factor as a preservative.

High Temperatures and Exclusion of Air—The method of applying heat in the preservation of any particular food must be determined by the temperature required to destroy the types of micro-organisms which develop in that food.

The open kettle method is used only for materials which have high acidity or high concentration of sugar. Pickles and rich preserves are prepared by this method.

Either the cold pack or the hot pack water bath method is used for canning fruits. The hot pack steam pressure method is used for canning non-acid foods, since they are subject to spoilage by micro-organisms which require temperatures above the boiling point of water. Meats and vegetables are processed by this method.

The rate of heat penetration is influenced by the type of processing used. It is slower in a dry tight pack than in one which contains more water. The size, shape, and kind of container affect it. Tin permits more rapid transmission of heat than does glass. Processing is better when the sections of food such as asparagus, slices of meat, etc., extend vertically rather than horizontally in the processor.

The thermal death time is determined by the kind of spores present, the sterilization time and temperature applied, and by the kind and quantity of the cooking medium used.

If one applies approved methods in the preservation of foods, the use of artificial preservatives is unnecessary. Canning powders should not be used.

CANNING EQUIPMENT

A pressure cooker is indispensable in canning meats and vegetables.

Capacity of Pressure Cookers

	12 qt. cooker	18 qt. cooker	25 qt. cooker
No. 2 cans	8	14	16
No. 3 cans	5	8	10
Pint jars	7	8	18
Quart jars	4	5	7

An eighteen to twenty-five quart pressure cooker of cast aluminum is desirable for home cooking and canning. The cover is so constructed that it can be adjusted so as to make the pressure cooker steam tight and air tight. It is equipped with a steam pressure gauge on which a movable hand indicates the number of pounds of pressure produced by the compressed steam inside. The petcock provides an outlet for enclosed air which must be driven out and replaced by steam before the cooker is sealed, in order to raise the pressure for processing and to avoid the danger of blowing up the cooker by the expansion of heated enclosed air. The safety valve regulates the pressure by permitting the steam to escape if the pressure goes too high. At the close of the processing period when the pressure is down to zero, the petcock is opened to release the steam from the cooker before the cover is removed.

The pressure cooker can be used for the water bath method of processing. The perforated disc or low wire rack is used to permit the circulation of water underneath the food containers. The cover is left unsealed with the petcock open. A deep flatbottomed kettle or pail can also be used, if it is provided with a tight cover and with a perforated tray or a wire rack to cover the bottom. For larger quantities a wash boiler fitted with a wire rack is more satisfactory. A granite or enamel-lined kettle or a long-handled stew pan is suitable for every type of food for which the open kettle method can be used.

Containers—Tin cans in sizes 1, 2, and 3 are used for home canning. The plain tin is used for most foods. The sanitary, or R enamel lining is deep gold-color with a bright finish. This enamel lining prevents discoloration of beets and red or purple fruits, and it also prevents perforation of the can by acids. The C enamel is light gold-color with dull finish. This enamel prevents dark discoloration from the formation of metallic sulphides in such foods as corn, lima beans, kidney-beans and black-eyed peas. C enamel cans should not be used for acid foods or meats.

Tin cans have several advantages over glass jars. Heat penetration is more rapid in tin and there is no loss of liquid during processing. They cool more rapidly than do glass jars; they require less space in the canner; and they can be stacked more compactly in storage. While the initial cost of

tin cans is low, they can be used only three times. The cost of a sealer must be taken into consideration.

On the other hand, glass containers and glass tops, if handled with care, can be used indefinitely for any food material. There is no corrosion or sulphide discoloration if one uses glass. The loss of liquid from the jar can be prevented.

Other equipment needed includes kitchen scales, a clock, puree strainer, colander, measuring spoons and cups, quart measure, wide-mouthed funnel, jar tongs, low enamel trays, wash pans and stew pans, scissors, large cutting knife, paring knife, cheese cloth, hand towels, and labels.

PREPARATIONS FOR CANNING

Before time for canning examine all equipment and make repairs and replacements. Examine and test the pressure cooker. Insert a tooth pick into the openings under the petcock and safety-valve to see that they are not clogged. Add one inch of water to the cooker, set it to heat, leaving the petcock open until steam has escaped forcibly five to seven minutes. Then close the petcock and observe the hand of the pressure gauge; it should move steadily. If it does not, remove the cooker and test the pressure gauge with a Maximum Registering Thermometer.

First test the thermometer by holding it in boiling water so the bulb is well below the surface of the water and does not touch the bottom of the container. It should register according to altitude (See "Adjustment for Altitude" p. 16).

Prepare the cooker with boiling water and rack as indicated above. Shake down the thermometer, and place it in a can or jar in the center of the rack in the cooker. Run the pressure to five pounds, holding it at exactly five pounds for five minutes. Remove the cooker and let the pressure down to zero slowly. The thermometer should then register 228°F. Repeat this procedure, holding the pressure at ten pounds for five minutes. The thermometer should register 240°F. Repeat the test at fifteen pounds pressure; this should give a temperature of 250°F. If the temperatures vary more than two degrees from these, have the guage replaced with a new one. If no maximum registering thermometer is available, have the country home demonstration agent test the cooker.

Examine tin cans and discard any that have dents or other irregularities which can not be straightened perfectly. Wash, rinse, and place them into boiling water before filling. Do not place tin lids with paper gaskets into water; wipe them with a damp, clean cloth just before placing them in position for sealing.

Examine used jars and covers. Discard all that have cracks or nicks on the edge. Provide new rubber rings. Although the jars and covers were stored away clean, wash and rinse them before using. Before filling, plunge them into boiling water and keep them submerged until the material is ready to pack.

STEPS IN CANNING

Preheating—In order to remove air and to secure a better pack and better heat penetration, heat the foods before packing and sealing. Adjust the time and temperature according to directions for each kind of food. Preheating or precooking does not mean that the food is cooked and is ready to serve.

Packing—Pack preheated foods into hot cans or jars. Heat penetration is very slow in corn, peas, shell beans, greens, sweet potatoes, squash, and pumpkin if they are packed tightly. Do not fill the container completely; leave head space to allow for expansion and vacuum. Remove the air by shaking the pack or by inserting a spatula or paddle to release the bubbles before sealing.

Exhausting—To exhaust means to heat the material in the filled container to near boiling in order to remove all air before sealing and provide a partial vacuum after processing and cooling.

Fruits and meats may be preheated before packing, or they may be packed raw. If packed raw in tin cans, they must be exhausted before sealing. Place the filled uncovered cans in boiling water which reaches within 2 inches from the top of the can. Keep the water boiling, but do not permit it to boil into the cans. Keep the water bath covered. Begin to count the time when the space inside is filled with steam. Follow directions for each food. Seal immediately after removing from the water bath. In glass jars the exhausting is done automatically during the processing and during the release of pressure and cooling.

Preheating or exhausting results not only in a better pack and better heat penetration, but it prevents perforation or bulging of the can, improves color and flavor, aids in preventing corrosion of the can, produces vacuum, and in glass jars makes possible a hermetic seal.

Sealing—Before placing the cover in position, wipe the top of the container. Any particle of material left on the surface at which the seal is made will cause a faulty seal. See that the rubber rings for glass jars are clean; dip them in boiling water before placing in position. A slight trace of fat left on the jars or rings will cause disintegration of the rubber and consequent spoilage of the contents.

If the automatic seal jars are used, place the lid and adjust the clamp or screwband firmly. Do not tighten after processing. The seal is completed by the vacuum produced during cooling. On the "lightning" jar, place the top clamp in position over the cover and leave the side clamp to be lowered after processing. Both clamps may be adjusted before processing if the heat is carefully controlled. Sealing before processing saves time and prevents loss of liquid from jars.

Processing in the Water Bath—To process means to subject food in a packed and sealed, or partially sealed container to a temperature sufficiently high to prevent spoilage. Overheating yields an inferior product. Under-processing results in spoilage.

Fruits are processed in the water bath. Use a pressure cooker or a deep vessel fitted with a wire or wooden rack or other false bottom improvised to allow circulation of water underneath and between the containers. Have the water at least one inch above the top of the lids and keep it boiling evenly and continuously but not too rapidly. Uneven rate of boiling causes loss of liquid from glass jars. Follow the time schedule as indicated for each specific food, counting from the time the water boils and bubbles over the entire surface. After processing, do not invert glass jars to test the seal. Tilt them to examine for leakage.

TO ADJUST FOR HIGH ALTITUDES INCREASE THE PROCESSING PERIOD IN THE WATER BATH TWO MINUTES FOR EACH 500 FEET ABOVE SEA LEVEL.

Processing in Pressure Cooker—Use the pressure cooker for processing non-acid foods. Have boiling water 1½ or 2 inches deep in the cooker, keeping it at that level for each load to be processed. Place the containers on a rack allowing space between them for the circulation of steam. Tiers of the tin cans may be processed at one time by stacking them in staggers to keep the cans apart.

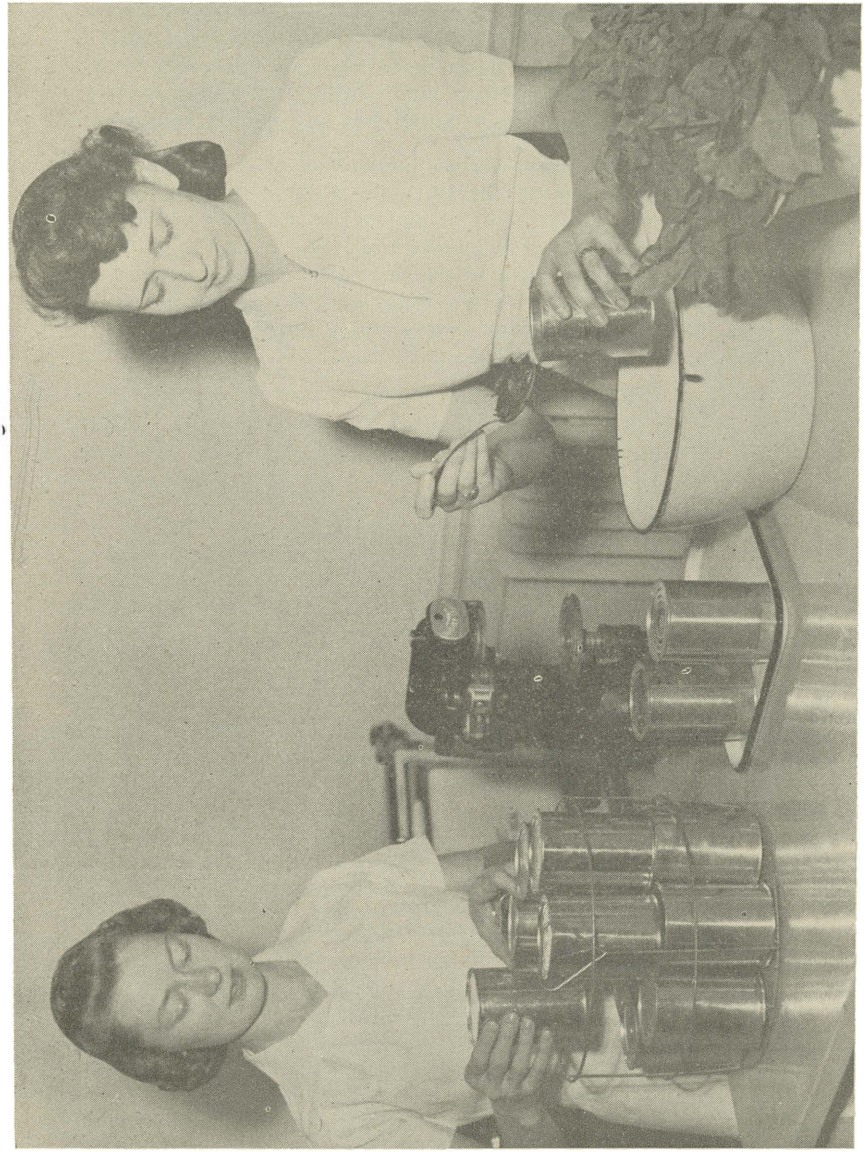
Before placing the cover, close the safety valve and open the petcock. In adjusting a clamp-sealed cover, fasten opposite clamps moderately tight, each in order; then tighten them completely in the same order.

In order to remove all air, allow the steam to escape from the petcock in a steady stream seven minutes before closing it. The presence of air in the sealed cooker causes the gauge to register higher than the actual inside temperature and results in inadequate processing. It also causes the cooker to blow up.

Raise the pressure steadily to the desired degree; then regulate the heat so as to maintain a constant pressure. Do not allow drafts to strike the cooker. Fluctuations in pressure will result in faulty processing; and if glass jars are used, it will cause loss of liquid from jars. Follow the time schedule. Increase the pressure for processing in high altitudes.

ADJUST THE PRESSURE FOR HIGH ALTITUDES BY INCREASING THE PRESSURE ONE POUND FOR EACH 2,000 FEET IN ALTITUDE ABOVE THE FIRST 2,000 FEET.

Releasing Pressure—At the end of the processing period remove the cooker from the fire. Do not attempt to remove the lid until the gauge registers zero. Never release steam suddenly from the petcock. If one is using No. 1 or No. 2 tin cans, the pressure can be released slowly at the end of the processing period. For all glass jars and for No. 3 cans, let the pressure down to zero before opening the petcock. Release the steam slowly. Allow glass jars to remain in the cooker five minutes after the pressure is down to zero before removing them from the cooker. This prevents breakage and loss of liquid due to abrupt cooling. If liquid has been lost, do not open the jars to refill



CANNING LEAF VEGETABLES

Cooling—Cool rapidly to prevent flat sour or over-cooking. Protect glass jars from breaking by placing them on a wooden or cloth-covered surface upon removal from the cooker. Do not cover them. Space them apart taking care that there is no exposure to a cold draft until they are cooled somewhat.

Plunge tin cans into a large quantity of cold water, changing the water frequently; or run cold water continuously into the cooling vessel. If bubbles appear at the edge of the lid, the seal is imperfect. The bulged ends snap in as the contents cool; if they do not, press them in. Upon removing the cans from the cooling water, place them in a draft, spacing them apart. Do not stack them away until they are thoroughly cooled. Label each can before storing.

Storage—Store all products in a dry, cool place. The color of materials in glass jars is protected by storing in a dark place. Fading can also be prevented by covering the jars with dark paper bags.

CANNING VEGETABLES

Vegetables should be canned immediately after they are brought from the garden. Only first class materials should be canned. Sort according to size, firmness, and shape. Second grade or irregular vegetables may be used for chopped or mixed pickles and relishes.

In preparing vegetables for canning, wash a few at a time in a large quantity of water. Remove the material from the water rather than drain the water off. Several washings in this manner are necessary to remove the soil and grit. Since the micro-organisms come from the soil, careful washing reduces the danger of spoilage.

All vegetables must be preheated and packed hot. After packing, add one-half teaspoonful salt to a pint or No. 2 can, or one teaspoon salt to a quart or No. 3 can and fill the jar with the boiling water in which the material was preheated. Leave a head space of one-fourth inch in a No. 1 can, one-third inch in a No. 2 can, three-eighths to one-half inch in a No. 3 can. Leave one-half inch head space in glass jars. For foods which require more head space, see the following directions. Seal at 180° to 190°F. and process immediately. See Table I.

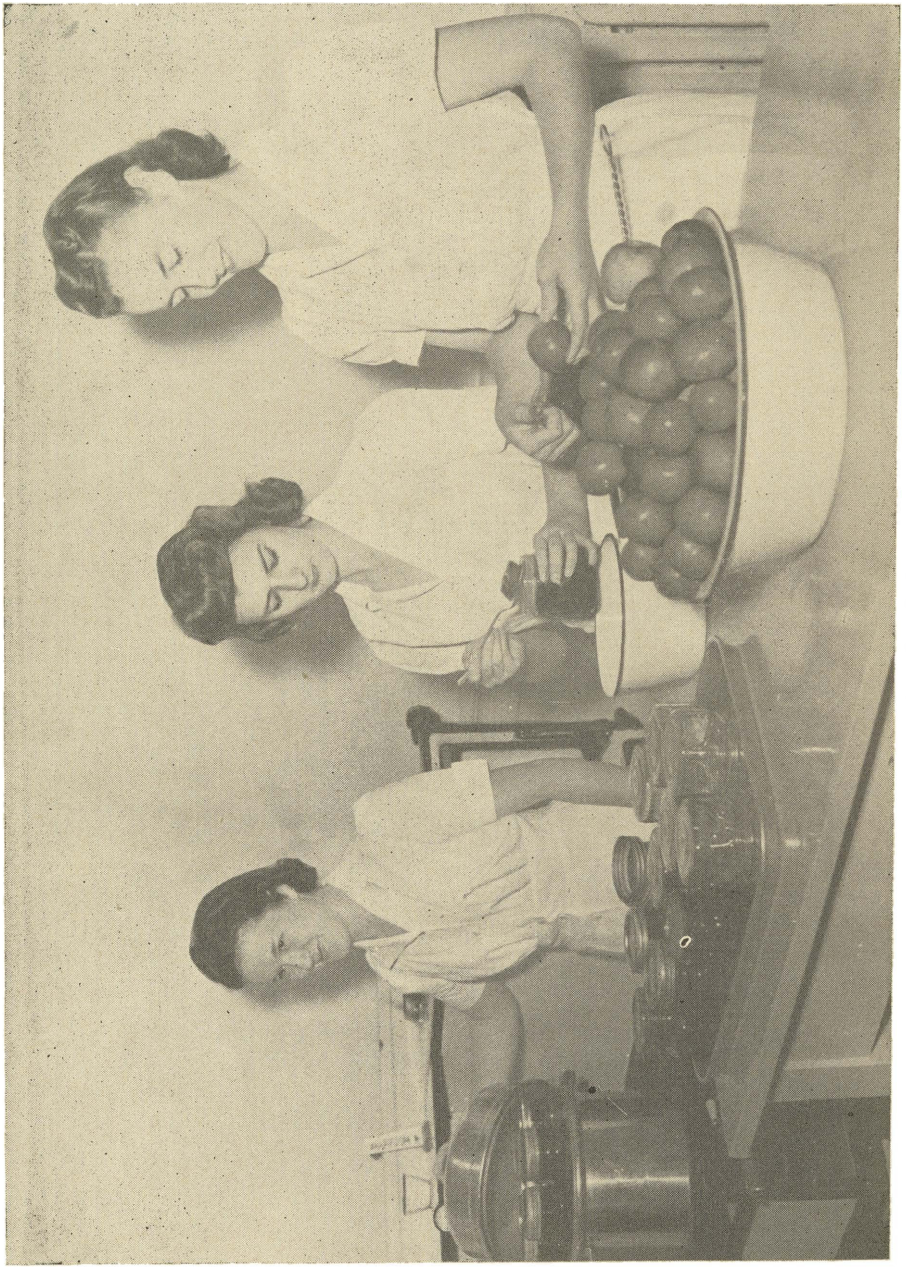
(Read carefully "The Canning Process" and "Adjustment for Altitude")

TABLE I

Preparation of Vegetables	Processing in Pressure Cooker				
	Pressure	Glass Jars		Tin Cans	
	Lbs.	Pts. Min.	Qts. Min.	No. 2 Min.	No. 3 Min.
Asparagus: Cut in lengths according to the container. Remove scales and wash. Tie into bundles the size of the container. Stand with tips up in a deep stew pan with hot water to cover the lower portion only. Cover tightly, boil 2 or 3 minutes and pack in glass jars or plain tin cans. Salt and fill. Exhaust 5 minutes. Seal.	10	30	35	30	
Baby Beets: Leave one inch of stem and do not cut the root. Wash, boil 15-18 minutes, or until skins are easily removed. Remove skin, stems, and roots. Pack in R enamel tin cans or in glass jars. Salt and fill. Exhaust 5 minutes and seal.	10	30	35	30	30
Carrots: Only tender, immature carrots are suitable. Sort, wash, and cook until the skin can be removed. Cut in lengths to fit the container. Pack in plain tin or glass jars. Add salt and fill. Exhaust 5 minutes and seal.	10	30	35	30	30
Corn: Use corn in the milk stage, fresh from the stalk. Remove every trace of silk. Whole Grain Corn: Simmer 5 minutes. Cut the whole grain off the cob. Add half as much boiling water as corn by weight. Add 1 t. sugar and ½ t. salt to each pint or No. 2 can. Heat to boiling, pack in C enamel cans or pint jars allowing one-third of an inch head space.	10	60		5C	

Preparation of Vegetables	Processing in Pressure Cooker				
	Pressure	Glass Jars		Tin Cans	
	Lbs.	Pts. Min.	Qts. Min.	No. 2 Min.	No. 3 Min.
Cream Style: Cut off the end of the grain. Using the back of the knife, scrape the milk and pulp from the part of the grain which remains on the cob. Add 1 cup of boiling water for each pint of prepared corn. Heat to the boiling point and pack in No. 2 C enamel cans or pint jars. Allow one-third of an inch head space. Add ½ teaspoon of salt and 1 teaspoon of sugar to each pack. Work rapidly and process immediately. Do not use quart jars or No. 3 cans.	15	75		70	
Okra: Wash. Add water and heat to the boiling point uncovered. Pack in plain tin cans or glass jars. Salt and process.	10	35	40	30	30
Peas, green: Shell, sort, and wash. Cover with water and simmer 5 minutes. Pack hot into plain tin cans or glass jars. Shake down while packing. Do not press. Allow one-half of an inch head space. Add salt and water.	10	45		40	
Black-Eyed Peas and Lima Beans: Shell and sort, dropping them into dilute cold brine until shelling is completed. Shelling must be done as quickly as possible. Wash, heat ten minutes. Pack without pressing, leaving a one-half inch head space. Use No. 2 C enamel cans or pint jars. Add ½ teaspoonful salt and 1 teaspoonful sugar to each pack. Add water to ½ of an inch from the top.	10	50		40	50

Preparation of Vegetables	Processing in Pressure Cooker				
	Pressure	Glass Jars		Tin Cans	
	Lbs.	Pts. Min.	Qts. Min.	No. 2 Min.	No. 3 Min.
Snap Beans: Can only fresh, crisp, and tender beans. Wash, snip the ends, and cut in uniform lengths. Cover with boiling water and simmer 5 minutes. Pack in plain tin cans, add salt and cover with water.	10	30	35	25	30
Spinach and Other Greens: Discard tough stems and imperfect leaves. Remove the larger leaves from the stems, leave stems on the tender inside leaves. Wash a few at a time in several waters. Preheat in an uncovered container until well wilted; add a little hot water. Pack, not solidly, in pint jars or No. 2 plain tin cans, salt, and add cooking water to cover. Press a knife through the center to the bottom of the container pressing aside the leaves to open space for liquid. Do not use quart jars or No. 3 cans.	15	60		55	
Squash and Pumpkin: Wash, peel, and cut into cubes. Heat, using a small quantity of water. Pack boiling hot. They may be baked or steamed before removing from the shell and packed hot. Salt and add water to cover. Use glass jars or R enamel cans.	15	60	75	60	70
Sweet Potato: Precook slowly until the skin slips. Peel and pack into R enamel or plain tin cans, or glass jars. Work rapidly to prevent discoloration. Salt, and add water.	10	95	120	95	115
Tomato and Okra: Select ripe, firm tomatoes and fresh, tender okra. Remove skins and cores from the tomato and cut into sections. Cut the okra in slices. Combine, add seasonings, heat to boiling and pack in plain tin cans or glass jars. Salt, add water, leaving one-half an inch head space.	10	25	35	25	30
Vegetable Soups: Use tomato pulp and any combination of vegetables desired. Add seasoning. Pack boiling hot into plain tin cans or glass jars.	10	60	70	50	65



CANNING FRUIT

CANNING FRUITS

Selection of Fruits—Firm ripe fruits in prime condition give the best flavor and texture. Unripe fruits lack flavor and aroma; they have excess acidity; the textures are difficult to control, and the color is inferior.

Under-ripe berries, apples, and plums can be used for jellies and jams. Slightly under-ripe peaches are best for sweet pickles. Over-ripe fruits can be used for butters, jams, syrups, and juices. They can also be used to give flavor to jelly by combining them with other fruits that are rich in pectin and acid but which lack flavor and color.

Methods—The water bath method of processing fruit gives a product of more attractive appearance, better texture, and better retention of the natural fruit flavor than does the open-kettle method. It eliminates the exposure of the processed food, and it sterilizes the jars and covers while processing the food.

The open-kettle method can be used for canning highly acid fruits. Since the food is exposed to air in packing and no further heating follows, there is some danger of spoilage. Jars and covers require very careful sterilization for this method.

Preparing Fruits—Handle berries and soft fruits gently and as little as possible in order to prevent softening and crushing. In gathering and carrying them, use shallow trays or small boxes. Remove stems and hulls and wash a small quantity at a time in a large volume of water. Remove it from the water rather than drain the water off. Use a wire basket or scatter the fruit in the water and remove it with a puree sieve. Several washings may be necessary. Harder fruits can be washed in larger quantities at a time.

Removing Skins—Plunge tomatoes or peaches, a few at a time, into water just below boiling point until the skins loosen.

Prevent discoloration of peeled apples, skinned peaches, and other skinned fruits by plunging them into a brine made of two tablespoons each of salt and vinegar to one gallon of water, by keeping the fruit in this until enough is prepared to pack and process.

If a large quantity of hard peaches is to be prepared, the

lye-bath method of removing skins is less time-consuming. Only very firm fruit can be treated successfully by this method. Use an iron or granite ware kettle. Dissolve 4 level tablespoons of lye to each gallon of cold water. adding the lye slowly. Place a few peaches into a cheese cloth and immerse them in the boiling solution about thirty seconds or more, and adjust the time to the condition of the fruit. Plunge immediately into cold water; wash in several waters or under running water. The skins can be removed quickly by rinsing in several waters. After this treatment the fruit will discolor readily. To prevent this, plunge it in a weak brine made with two tablespoons salt and two tablespoons vinegar to the gallon of water until a sufficient quantity is prepared to pack and process. Can immediately. (Boiling lye solution should be used by very careful workers only.)

Packing—Some fruits tend to rise to the top of the jar during processing. This can be prevented by boiling the fruit in the syrup two to three minutes before packing. Shake the container during the preheating to aid the fruit in absorbing syrup. Preheating not only drives out the air and causes the fruit to remain in the syrup better, but it reduces the time required to raise the center of the pack to processing temperatures. With hard fruits it makes possible a better pack. Leave ½ inch head space in glass jars.

In packing hard fruits, press them in to secure economy of space. Fruits which are softened by preheating fit into the spaces better if they are packed by shaking rather than by pressing. If fruits have been preheated, cover them with boiling syrup. If raw fruits are packed in tin cans, exhaust three to five minutes. Hot syrup leaves fewer air bubbles than does cold syrup, and it prevents breakage of jars when they are placed in hot water for processing.

The quantity of syrup required is determined by the condition of the fruit. Hard fruits require about three-fourths of a cup of syrup to a pint of fruit. Less syrup is required when fruits are preheated than when cold-packed. The quantity and concentration of the syrup must be adjusted according to these conditions.

Syrups—Make the syrups before the fruits are prepared. Add the sugar to boiling water; boil until the sugar is dissolved. The degree of sweetening must be modified according

to the type of fruit and individual taste. The variety, the state of ripeness, and the closeness of the pack must be considered.

The following table is a general guide. It may be desirable at times to reduce the sugar by one-half for a thin syrup or to increase the sugar one-half in either type of syrup.

TABLE OF SYRUPS

	Sugar	Water	Uses
Light syrup	1½ cups	1 quart	apples, peaches
Medium syrup	3 cups	1 quart	grapes, apples, figs
Heavy syrup	4 to 6 cups	1 quart	berries, figs, apricots, sour peaches, sour plums, cherries

Fruits may be canned without sugar, but a small quantity improves color, flavor, and texture. If water is substituted for syrup, the flavor of the fruit is better if a solid pack is made and the least possible amount of water is used.

In canning the soft fruits without sugar, a finer product is obtained by using fruit juice instead of water. Sort out the softest fruits, crush, heat, and strain. Pack the perfect fruit into the jar and cover with the heated juice. Syrups made using the juices from the fruit give a superior product.

A sealing temperature of 125° to 150°F. is recommended for fruit. Have the processing water boiling or near boiling when the packed cans or jars are ready. See Table II.

CANNING MEAT

Meat is readily attacked by bacteria. Absolute cleanliness is required in handling meat which is to be canned.

Immediately after slaughter, the meat should be chilled rapidly to near freezing temperatures. Fowls require only over-night chilling. Large carcasses require twenty-four hours cooling. It is better to keep them in cold storage two or three days. Can promptly after removal from cold storage. Process with steam pressure.

Equipment—Provide measuring equipment, scales, several enamel-lined pans or trays, large stew pans, a heavy iron kettle and skillet if searing is desired, long-handled fork and spoon, can tongs, pressure cooker, plain tin cans and sealer, or glass jars.

Cutting and Sorting—Wipe the meat with a clean wet cloth. Trim, remove bones and tough membranes, and leave no thick portions of fat. Sort roasts, steaks, and tough cuts. Allow about 25 per cent for shrinkage for pieces to be fitted into the containers. Cut steaks cross grain three-fourths of an inch thick and cut roasts with the grain. Sort the less desirable cuts and trimmings for stew, hamburger, and chile. If the cuts are placed in copper, iron, or galvanized iron vessels, line these vessels with heavy paper.

Preheating, Packing and Exhausting—Preheat before packing, or pack with raw meat and exhaust before sealing. Preheat by cooking in water until the center is 170°F. to shrink the meat and expel air before packing and sealing. If the meat is not preheated before packing, exhaust in the water bath according to preceding directions; or to save time exhaust with steam pressure as follows: place the cans filled with raw meat into the pressure cooker and leave them uncovered. Raise the pressure to 10 pounds for 15 minutes for No. 1 cans, 25 minutes for No. 2 cans or pint jars, and 35 minutes for No. 3 cans. Release the steam slowly to prevent loss of liquid. Each pack must be refilled from another exhausted can. Tender meat is better if preheated in dry heat and dry-packed.

Use plain tin cans for meat. Do not pack tightly. Add the salt to the center of the pack or add it to the pan liquor or broth. Place the portions so they will be in a vertical position during processing. Seal at 170°F. and process immediately. Adjust pressure according to altitude. Cool quickly and label the cans.

Steaks and Chops—Remove bones and tough membranes. Cut ¾ of an inch think. Preheat quickly in a hot oven, under the broiler, or in a heavy skillet. Do not cook to harden the surface. Pack, salt, add 2 tablespoons of fat to No. 2 cans and 3 to No. 3 cans, and then add pan liquor. Exhaust at 10 pounds pressure, seal, and process at 15 pounds

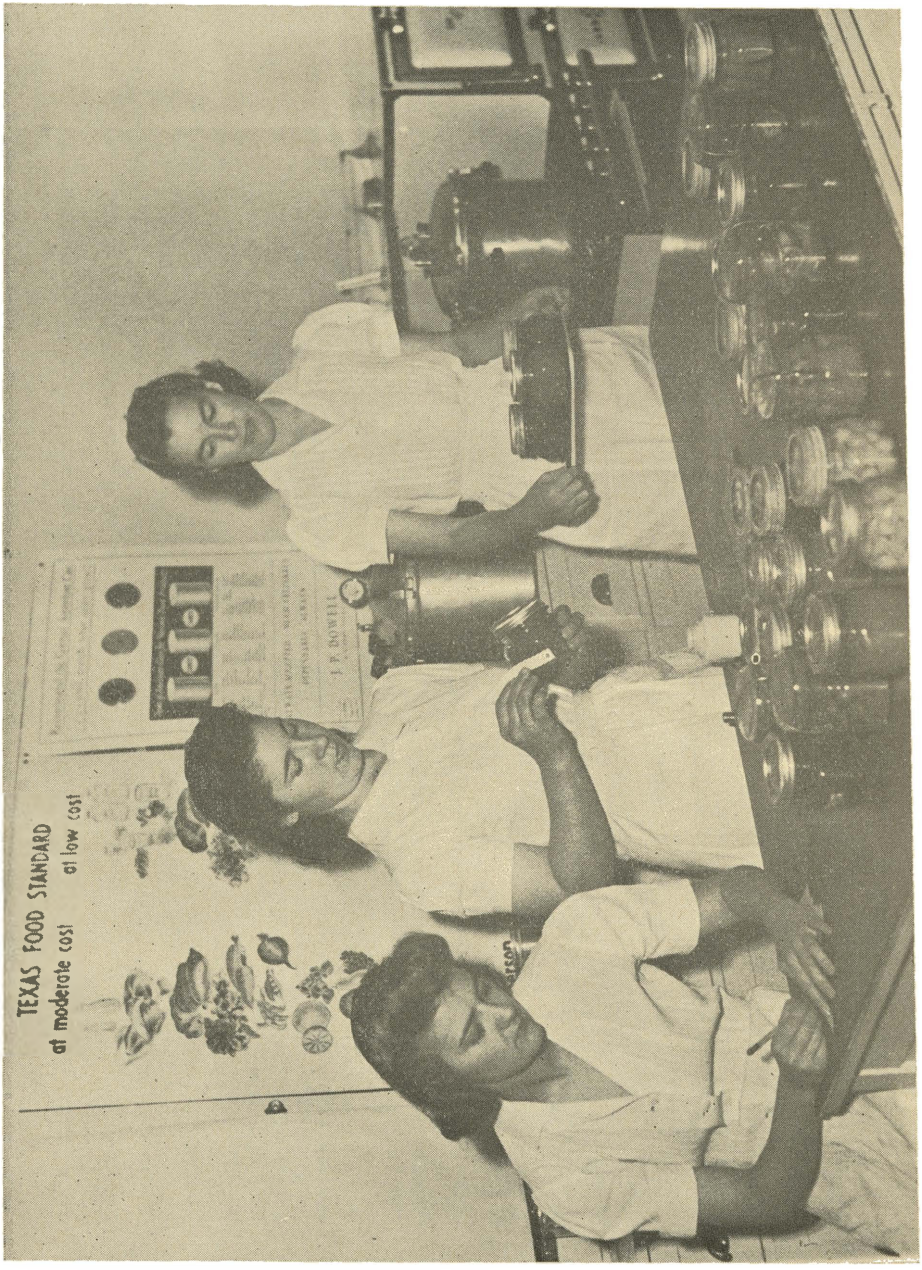
TABLE II

(Read: "Preparation for Canning" and "Adjustment for Altitude" and "Table of Syrup")

Preparation of Fruits	Processing in Water Bath	
	Glass Jars pts. & qts.	Tin Cans 2 & 3
	Min.	Min.
Apples: Peel, cut, preheat in thin syrup 3-5 minutes. Do not cook soft.	15	10
For pies, cut small, make a solid pack, process without water.	20	15
Baked apples: Bake with sugar, hot pack.	5	5
Apple sauce: Cook, strain, sweeten, and hot pack. Use glass or plain tin.	5	5
Blackberries and Dewberries:		
I. Wash, cold-pack, cover with boiling medium syrup. If tin cans are used, exhaust 3 to 5 minutes.	20	15
II. Simmer 2 to 5 minutes in medium syrup, sweetened berry juice, or unsweetened berry juice. Pack hot. Use glass or R enamel.	5	5
Cherries: To can whole, unpitted cherries blanch 30 seconds in boiling water or prick to prevent shrinkage and cracking of the skins. Pack and cover sweet cherries with hot medium syrup. Use heavy syrup for sour cherries. Exhaust tin cans 3 to 5 minutes.	25	20
Fill packs of pitted cherries with the fruit juice. For hot packs, preheat in syrup or in juice for 5 minutes. Use glass or R enamel.	5	5
Figs: Method I. Plunge 6 quarts of figs into a soda bath made with 1 cup of baking soda and 1 gallon of boiling water. Let this stand for 5 minutes. Rinse several times and drain. Drop into 2 quarts of boiling syrup and boil 1 hour. (The addition of 1 teaspoon of citric acid powder to the syrup improves color and flavor.) Pack carefully, adding syrup at various levels in packing, and cover with syrup.	5	5
Method II. Pack the drained figs and cover with heavy syrup. Exhaust to 160°F. Use glass or R enamel.	60	60

Preparation of Fruits	Processing in Water Bath	
	Glass Jars pts. & qts.	Tin Cans 2 & 3
	Min.	Min.
Berry Juice or Grape Juice: Heat the fruit to boiling and strain through a jelly bag or run through a fine sieve. Add ¼ to ½ a cup of sugar to each quart of juice. Pour it boiling hot, into sterilized containers and seal. Process at 165° for 20 minutes. Use glass or R enamel tin.	5	5
Tomato Juice: Use only ripe, fresh tomatoes free from blemish. Cut, mash to pulp, and strain out the seeds and skins. Heat to 180°F., fill containers and process. (Simmering until soft before straining causes the juice to run through the sieve more easily, but the product is not so satisfactory. Use plain tin or R enamel.	5	5
Grape Fruit: Remove skin, membranes, and all white peel. Make a solid cold-pack. Cover with own juice using little or no sugar. Exhaust to 160°F.	7	7
Guavas: Use firm sound fruit. Pare, remove seeds, and blanch in boiling water 20-30 seconds. Drain, pack, fill with heavy, hot syrup. Use plain tin or glass containers.	30	25
Peaches and Apricots: Plunge peaches into hot water or lye solution to remove skins. See p. 22. Cut into halves. For cold-pack fill with hot medium syrup. If tin cans are used for cold-packs, exhaust 5 minutes before sealing. Process soft fruit.	25	20
Process hard fruit. Use plain tin or glass containers.	35	30
For hot-pack preheat 4 to 6 minutes at simmering temperature.	15	15
Pears: Peel, halve and core. Preheat in medium syrup 4-8 minutes, pack hot. One tablespoon lemon juice in each pack will improve color and flavor. Use plain tin or glass containers.	20	20

Preparation of Fruits	Processing in Water Bath	
	Glass Jars pts. & qts.	Tin Cans 2 & 3
	Min.	Min.
Plums: Prick skins. Pack raw and fill with boiling medium syrup.	20	15
For hot-pack preheat in medium syrup. Use glass or R enamel tin containers. Exhaust tin cans 5 minutes before sealing.	5	5
Quince: Pare, core, cut in pieces. Precook in heavy syrup 3 minutes. Use glass or plain tin containers.	35	30
Rhubarb:		
I. Wash, cut in one inch lengths. Pack, cover with heavy syrup. Use glass or R enamel containers.	20	15
II. Open Kettle Method: Boil in medium or heavy syrup. Pack and seal with no further heating.		
III. Using one-fourth to one-third of a quart of sugar to 1 quart of cut rhubarb, bake until tender. Cover tightly while baking. Pack hot. Use glass or R enamel.	5	5
Strawberries: Add 1 cup of sugar for each quart of stemmed strawberries. Let stand one-half an hour. Heat slowly in a broad stew pan until the sugar is dissolved. Let the berries boil freely three minutes. Do not stir the berries. Shake the stewer to prevent scorching and to keep the berries in motion. Cool; shake occasionally. Let the berries stand several hours or over night. Reheat, pack, and process.	5	5
II. Add one cup of sugar to one cup of strawberry juice and boil. Cool, add two quarts of whole firm strawberries. Heat and boil 5 minutes. Shake during heating and boiling. Cover and let stand over night. Pack and process. Use glass or R enamel containers.	15	15
Tomatoes: Blanch and remove skins and cores.		
I. Pack closely. Fill with tomato juice or pulp. Add one teaspoon of salt to one quart. Exhaust tin cans 5-6 minutes.	45	35
II. Cut into sections. Heat to boiling. Pack and salt. Use glass, plain tin or R enamel containers.	5	5



LABELING FOR STORAGE

pressure, 50 minutes for No. 1 cans, 65 minutes for No. 2 cans, 75 minutes for pint glass jars, 80 minutes for No. 3 cans.

Swiss Steaks—Cut round steak one inch thick. Preheat and pack. Add ½ teaspoon of salt and 2 tablespoons of fat to a No. 2 can and 3 to a No. 3 can. Fill with tomato juice seasoned to taste with onions, pepper, or green pepper. Exhaust, seal, and process as "Steaks."

Stew Meats—Cut meat into cubes. Preheat, using for each ten pounds of lean meat, one pound of fat, 2 tablespoons of salt, and 1½ quart of water. Cover and simmer 10-15 minutes. Pack, seal, and process as "Steaks."

Roasts—Cut to fit the container; allow for the shrinkage resulting from exhausting. Tie the meat into rolls with the grain lengthwise. Sear in hot fat 15 to 20 minutes or in a 350°F. oven 30 minutes, or pack raw, and exhaust. Before packing place ½ of a teaspoon of salt in No. 1 cans, 1 teaspoon of salt in No. 2 cans, and 1½ teaspoon of salt in No. 3 cans. Seal and process immediately at 15 pounds pressure. No. 1 cans require 50 minutes; No. 2 cans 65 minutes; No. 3 cans 80 minutes; pint jars 75 minutes; and quart jars 90 minutes.

Chicken—For canned chicken older fowl give the best flavor and texture. Singe the carcass; wash it with warm water and soda. Rinse it in cold water. Remove the head, neck, and feet. Cut the skin between the leg and the body pressing the side of the knife well against the body and cutting back under the joint. Break back the joint. Cut the fowl for drawing beginning under the end of the breast bone and cut along the edge of the breast meat to the back bone. Double the fowl backward to sever the back. Do not disjoint until after precooking. Remove the skin and claws from the feet.

Place the necks and feet in the pressure cooker, and add 1 cup of water for each fowl. When this boils place the cuts of meat on a rack in the cooker. Precook at ten pounds pressure 15-25 minutes, according to the age of the fowl. Release the pressure slowly. When the pressure is at zero, take the cooker from the stove. Remove the chicken, strain off the broth, and prepare the cooker for processing while the meat is cooling slightly.

1. Remove the bones which do not pack well. A little bone in the center of the pack gives better heat penetration and better flavor. Leave the meat in the largest pieces possible. Remove most of the fat from the broth. Combine the broth and meat, heat to boiling. Pack closely in plain tin cans, add salt and broth. Seal at 170° or above and process immediately.

2. Remove all bones. Pack light and dark meat separately, if desired. Add salt and broth. Exhaust in boiling water. When the center of the can reaches 170° or above, seal and process immediately.

Process at 15 pounds pressure No. 1 cans 45 minutes; No. 2 cans 50 minutes; pint jars 60 minutes.

To can the remaining broth, remove most of the fat. Heat to boiling, place in containers and process at 15 pounds pressure No. 1 cans 20 minutes; No. 2 cans 25 minutes; and pint jars 30 minutes.

SOME CAUSE OF CANNING DIFFICULTIES

Discolorations:

- Inadequate precooking or exhausting
- Failure to expel air
- Reaction of the food on container
- Over-processing
- Use of iodized salt
- Contact with copper or iron utensils
- Permitting enzyme discoloration after removing skins
- Storage in a warm or light place

Loss of liquid from jars in water bath:

- Jars too full
- Jars not standing level
- Failure to keep boiling evenly and continuously
- Delay in sealing

Loss of liquid from jars processed under pressure:

- Jars not closed properly
- Uneven pressure
- Permitting steam to blow off during processing
- Opening the petcock before the pressure is released or before the steam inside the cooker has condensed (The

petcock should be opened very slowly 5 minutes after the pressure is down to zero.

Delay in sealing

Spoilage:

Food materials not in good condition
Food or utensils not clean
Poor seal or use of poor rubbers
Foods packed too tightly, too little liquid, containers too full
Failure to have sealing surfaces absolutely clean before sealing
Too low initial temperature
Delay at any stage of the process. It is especially important that no delay occurs between preheating and processing. Do not attempt too much at a time.
Fluctuation of pressure in processing
Processing period inaccurate
Too low pressure
Containers of unsuitable size for the material
Exposure of the food after processing
Too slow cooling
Failure to adjust processing for altitude
Unsuitable storage temperature
Breaking the seal. (Do not lift glass jars by the covers. Do not tighten the lids after cooling. Do not turn the screw band too tight.)

INDICATIONS OF SPOILAGE

Fermentation—Fermentation of fruits is recognized by rapid bubbling or oozing and by the odor.

Flat Sour—This type of spoilage is characterized by sour, disagreeable flavor and usually by cloudiness of the liquid. There is no bulging of the can.

Putrifaction—The presence of putrifactive bacteria is recognized by gas formation, putrid odor, sliminess, softening, and often by discoloration. (Read "Bacteria" p. 4). Odors are detected best when the food is being heated. Do not taste foods to detect spoilage. A small amount of decomposition products can cause serious illness. Home-canned non-acid

foods should be boiled ten minutes before tasting. This boiling will destroy certain bacterial products which can not be detected by odors or appearance.

Swelled Cans—The ends of the cans should be slightly concave when cool. All non-acid foods which have developed gas that bulges the end of the cans during storage are spoiled. These should be burned. Farm animals should not have access to them and the soil should not be contaminated by them.

Highly acid fruits in tin cans, if stored in a warm place, may produce "hydrogen swells." The hydrogen is generated by the action of acid on tin. These foods are not spoiled unless the hydrogen has caused perforation of the can, which leads to spoilage through exposure to air.

If the cans have been over-filled so that the ends do not snap in during cooling, this fact should be noted on the label in order to avoid mistaking these for spoilage "swells."

Perforation of the Can—Aside from hydrogen perforation, other forms of corrosion may occur from the inside or outside of the can. Damp, warm storage will cause rust. Salt sea air has a corrosive effect on tin cans.

Buckled Cans—Buckling or slight collapse of the side of the cans may cause springing of the seam. This may be due to leaving too much space in the can or to releasing the pressure too rapidly after processing. For No. 3 cans the pressure gauge should go to zero before the petcock is opened.

Color Changes—There are certain color changes which are not indications of spoilage. Red or purple berries and other fruits become duller or darker because of the effect of tin on the color pigment. Canned corn may have dark sulphide discoloration next to the can. This is the result of the sulphur gasses which are freed from the corn during the high processing, and which come into contact with the tin. The tannins in the sweet potatoes form dark inky discolorations when in contact with metal. These color phenomena have no effect except that of color.

DRYING

Preservation of food by means of removal of moisture can

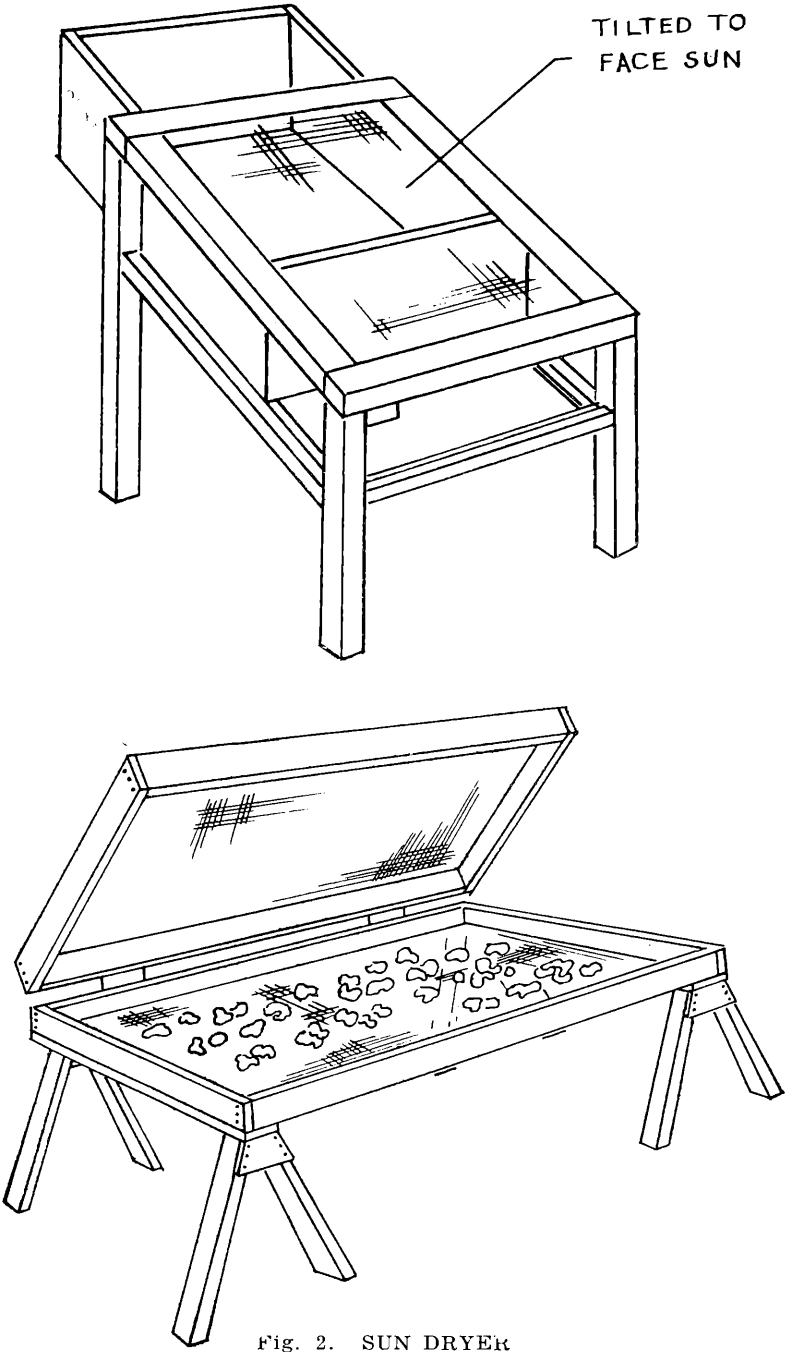


Fig. 2. SUN DRYER

not replace the other methods of preservation; but drying does afford an inexpensive means of conserving surpluses. It eliminates the cost of cans and jars, it requires little or no cost in equipment, and it so reduces the volume that little storage space is required.

Sun-Drying—The climate of the Southwest is well adapted to sun-drying. An outdoor drier can easily be made at home at little cost. It may be a shallow, well ventilated glass-topped, or a screen covered box placed slanting so the sun's rays will fall perpendicularly on the material as many hours a day as possible. The glass top box must be ventilated through screen strips to permit the escape of moisture. Prepared foods can be dried on cloth covered window screens or screen doors placed on boxes out in the open. On bright warm days when the air is dry, spread the prepared material on a muslin-covered surface away from dust. Protect the food from flies, moths, and dust by covering it with cheesecloth. Turn the product over or stir it twice a day. Move it indoors over night and during rain. (Figures 1 & 2)

Rapid-Drying—The drying which is done by means of artificial heat and moving air gives the best results in flavor, texture, and appearance. For most products start at 110°F. and raise it gradually to 145°F. This range of temperature arrests the changes that occur rapidly when the material is exposed to air, and it completes the dehydration in a short time. The time required is determined by the thickness of the pieces, the temperature, the dryness of the air, and the rate of movement of the air. The temperature must be adapted to the particular material. Under no conditions must it be raised above 185°F.

Oven-drying can be done with little or no cost in equipment. Place the prepared material on a muslin-covered tray made of galvanized wire screen of convenient size, or on wire cake coolers. Leave the oven door open to permit the escape of moisture. An oven thermometer is very helpful. When the oven is in use for baking, the trays can be kept at a suitable temperature over the stove where no steam reaches it. Inexpensive driers with one or several trays can be made, to be placed over a small stove, a gas burner or an electric light bulb. The frame will require strips of wood ½ inch thick and 2 inches wide (See Fig. 3).

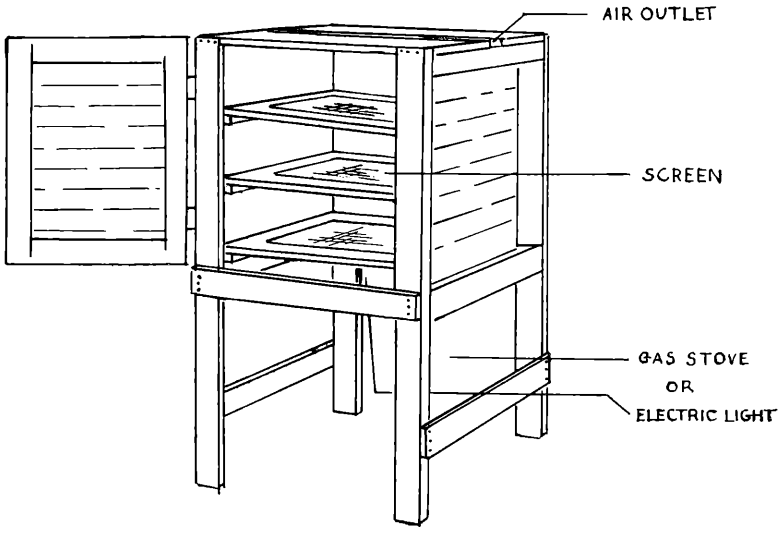


Fig. 3. DRYING OVER ARTIFICIAL HEAT

Where the cost of electricity is not high, drying by means of an air blast from an electric fan gives good results. Place the fan at the end of a series of trays, with the air current directed lengthwise of the trays.

A combination of the sun-drying and rapid drying methods is practical, starting and finishing with rapid drying.

Conditioning—Whatever the method of drying, the material must be turned over or stirred occasionally. The drying of fruits is completed when the material is leathery and no water can be pressed out. When this stage is reached the product must be "conditioned." Place it in covered containers, once a day for five to ten days, pour the materials out of the boxes and mix thoroughly. This is necessary for further drying and to secure uniformity in dryness, since the pieces are never uniformly evaporated when removed from the drier. This eliminates danger of spoilage originating in the wetter parts. The conditioning of fruits is completed when the pieces are uniform in flexibility, spongy and yielding when pressed together, and

spread apart readily when released. Vegetables must be crisp throughout. They also require conditioning.

Destruction of Insect Eggs—If there is any doubt as to the presence of insect eggs, spread the material loosely on drying trays and heat ten to fifteen minutes in a low oven (165 to 185°F. This will destroy insect eggs and micro-organisms. After cooling thoroughly pack into lard cans, tin coffee cans, or other closely covered containers. Store in the driest place available. Storage in an airy attic is better than near the kitchen.

If there is evidence of insect eggs during the storage, reheat the product again.

Prevent Discoloration—When fruit is cut it undergoes rapid discoloration and change of flavor. This can be prevented in part by plunging it into brine made with ⅛ of a cup of salt and ⅛ of a cup of vinegar to a gallon of water until enough is prepared to arrange for drying. Then drain, remove adhering moisture with a cloth, and place it to dry.

Sulphuring the fruit before drying aids in retaining good color and flavor, prevents insect infestation, and aids in preventing vitamin destruction. The sulphuring must be done out of doors. Place the trays in a tightly covered box, allowing space underneath for the sulphur container and arrange the trays so as to permit free circulation of the sulphur fumes. Burn a teaspoonful of sulphur for each pound of fruit. A simple method is to arrange for holding the trays apart leaving space below for the sulphur container. Then ignite the sulphur and invert the box over the trays of fruit.

Apples—Select firm, ripe apples free from bruises. Wash, pare, and core whole. Cut crosswise into rings ¼ of an inch thick and drop at once into brine, take from the brine, drain, and remove adhering moisture, or sulphur 20 minutes if desired, spread, and place to dry at 110°, raising it gradually to 165°. Drying is completed when the material is spongy.

Pears—A good product is secured from Bartlett pears in the firm ripe stage. Remove stem and calyx. Split lengthwise and remove the core and woody fiber. Prevent discolor-

ation as Indicated for apples. The drying period can be shortened by cutting in smaller pieces.

Peaches—Select yellow, firm ripe peaches which are free from bruises, skins may be left on or removed. Cut in halves, remove pits. Sulphur three to four hours and place to dry with the cut side up. Begin drying the unpeeled peaches at 140°F. and raise it gradually to 165°.

Figs—The large, sweet varieties should be thoroughly ripened and somewhat dry. The Magnolia fig should be firm ripe. Dip for thirty seconds in a boiling lye solution made with ¼ cup of lye to a gallon of water. Rinse in several waters and dry with a cloth. For dehydrating with artificial heat sulphur 20 minutes. Begin the drying at 120° and finish at 145°. For sun-drying sulphur them three hours or longer. If atmospheric conditions are favorable, sun-drying is preferable. Turn the figs frequently. Near the end of the drying period remove tne dry pieces and leave the wetter parts for further drying. The finished product should be leathery and should leave no moisture when torn or pressed.

Sweet Corn—Select corn that is in the milk stage. Prepare and place to dry immediately after gathering. Sort according to firmness. Remove husks and blanch in boiling water 8 to 12 minutes, or until no liquid escapes from the grains when they are cut through the center. Then drain and cool enough to handle. To cut off the grains use a stiff, sharp knife holding it parallel with the cob.

Begin the evaporation at 165°F. and decrease it to 145°, as the drying continues. Stir frequently, being careful to separate masses which clump together. Dry until the grains are hard and translucent, and crack open with smooth cleavage when cut with a knife.

Shelled Green Peas and Beans—Shell, sort according to size, blanch two to three minutes in boiling water. Plunge into cold water and drain. Dry at 120°F. to 140°F. beginning at the lower temperature. The material should be uniformly dried to the center.

PICKLES

The combinations of materials used in pickles may be al-

tered according to availability and preferences. The seasonings largely determine the flavor and general character of the pickles. They may be varied according to taste.

PRESERVATIVES IN PICKLES

Salt serves several purposes in pickles. It controls fermentation, improves flavor, causes translucency, and produces an olive green color. It makes the texture more firm by withdrawing some of the juices and in so doing, it removes unpleasant odors and flavors from strong flavored vegetables. The concentration of the brine used in curing pickle material must be controlled very carefully. A weak salt solution is favorable to the development of lactic acid bacteria. This is the underlying fact which makes it possible to salt cabbage and secure fermentation in making kraut and fermented pickles. The salt and lactic acid supplement each other in preventing spoilage.

Vinegar is used in pickles to prevent spoilage, to impart flavor, to aid in securing the desirable type of fermentation and to increase crispness. If used in too great strength it causes the pickles to shrivel. Cider vinegar has pleasant aroma and flavor. It imparts an amber color to the product. White malt or distilled vinegars have a less pleasing flavor, but they give better color to white and green pickles.

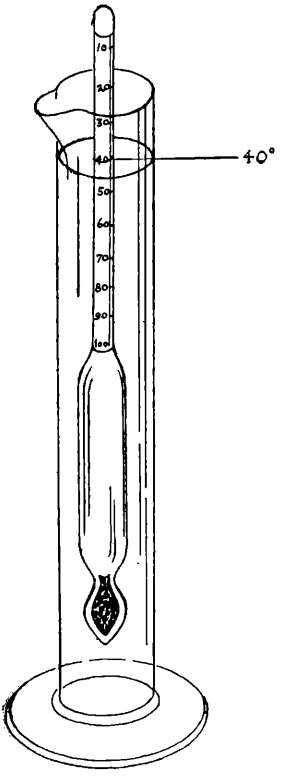
Sugar contributes to the keeping quality of pickles. Like salt it extracts juices, thus causing shrinkage; if used in too high concentration, it causes shriveling.

Spices have preservative properties. They cause discoloration if left in the pack. Use fresh whole spices; tie them in a thin cloth and remove them when the pickles are packed for storage. Ground spices darken the product and give a grimy appearance.

EQUIPMENT FOR MAKING PICKLES

Metals react with salt and acids. Use wooden casks or stone jars for brining and fermenting, and use glass top jars for packing and storage. Select enamel-lined stew-pans, colanders, trays, and spoons. Wooden spoons and paddles are

suitable. Provide measuring equipment, chopping knife, a slicer, and scales. A salinometer is very useful for determining the density of brines for salt curing.



SALINOMETER

SALT CURING

Density of Brine—Use dairy salt for pickles. Distilled water, or boiled and filtered rain water are better than well waters. A little more than half as large a volume of brine is required as the total volume of the vegetables used.

Adjust the density of the brine according to the pickling material and its later treatment. In a 5 per cent salt solution which is used for making dill pickles, fermentation is rapid. A 10 per cent salt solution permits slow fermentation, and a 20 per cent solution permits practically none.

TABLE OF BRINES

Salt Solution per cent	Salinometer reading degrees	Weight of salt to six quarts of water
5	20	11 oz.
10	40	1 lb. 6 oz.
15	60	2 lbs. 2 oz.
20	80	3 lbs.

Salt Curing Cucumbers—Select fresh, firm medium sized cucumbers and cut them leaving a ¼ inch stub on each stem. For each 10 pounds of cucumbers prepare a brine, using 1 gallon of soft or distilled water and 1 pound of salt. This

will be a forty degree salinometer reading, which is the concentration needed to float an egg. (Figure 4)

Wash and drain the cucumbers and pack them into a stone jar leaving 2 inches of space at the top of the jar. Pour the cold brine on them, cover with an inverted plate or a wooden cover weighted down just enough to hold the cucumbers completely submerged. Cover with a white cloth and place to ferment where a temperature of 80 to 85°F. can be maintained. Keep the vegetable completely submerged continuously. Remove the scum about every two or three days.

The salt shrinks the cucumbers by withdrawing juice; this dilutes the brine. For this reason additional salt must be added at intervals in order to retain the density of the brine. After one day, add 1 cup of vinegar and 1 cup of salt; place it on the cover under the surface of the brine. Test the strength of the brine; add more salt if necessary to raise it to 40°. After one week add ½ cup of salt once a week for five weeks, each time place it on the weighted cover. Fermentation is complete when bubbles cease to rise. This will require six weeks or longer. A layer of hot paraffin may then be poured over the brine and the jar may be stored in a cool place until the pickles are to be made up for use.

Salt-cured pickles may be used as salt pickles. Drain and partially remove the salt by soaking in cold water, changing the water several times until the desire flavor is obtained. The salt is removed more rapidly by using warm (not hot) water and changing it frequently.

Sour Fermented Pickles—Cover cured pickles with equal parts of vinegar and water. Permit them to stand for one or two days. If still too salty, drain and apply fresh vinegar and water and repeat until sufficient salt is removed. Drain, cover with vinegar. After a week or ten days pack them in jars; cover with fresh vinegar; seal and store.

Spiced Sour Pickles—Extract the salt according to preceding directions. Prepare spiced vinegar using 1 tablespoon of mixed spices to 1 quart vinegar. Heat the vinegar, place spices in a bag and simmer 5 minutes. Remove the spices, pack the pickles into jars, fill with the spiced vinegar, seal and store.

Dill Pickles—For each peck of cucumbers prepare 1¼ gallons of 20° brine. Use 5 quarts of water, 1 cup vinegar, 1¼ cups of salt. Cover the bottom of the container with a layer of grape leaves. Add a layer of dill and a little mixed spice if desired. Wash the cucumbers and pack them into the jar. In making a large quantity, add a layer of dill when the jar is half full. Fill the jar and add dill. The addition of ¼ of a cup of sugar to each peck of pickles will hasten the fermentation. Cover with grape, rhubarb, or cabbage leaves and place to ferment at 75° to 80°F. When the fermentation is complete, pack in sterilized glass-top jars. Heat the brine to boiling, pour it over the pickles and fill the jars completely. Seal and store in a cool place.

Sauerkraut—Select firm, mature heads of late cabbage, free from dark specks or rot. Remove the bruised or unclean leaves. Permit the outer remaining leaves to wilt slightly in order that they will not crack in shredding.

Use a container which is large enough to allow space for weighting. Each ten pounds of cabbage will make about one gallon of shredded and packed cabbage. A stone jar must be washed and scalded. A keg must be washed, scalded, sun-dried, and brushed over with hot paraffin. Cover the bottom with large cabbage leaves.

Cut the heads in quarters. Shred, discarding the core and the stem end of the large leaves. Mix 5 pounds of shredded cabbage with ¼ cup of dairy salt and pack it. Repeat, each time packing it firmly. Do not delay at any point in the process, avoid unnecessary exposure of the prepared material, and avoid bruising it in packing.

Cover with large leaves of the cabbage, or with a clean, white cloth and weight it down with a wooden cover or with an inverted plate which fits close inside the container. Weight this cover down just enough to force the brine to cover the cabbage. For this purpose it is convenient to use a low earthenware or glass container to hold water. Increase or decrease the amount of water as needed to keep the brine at the correct level. Do not use limestone or metal weights to come in contact with the brine. If additional brine is needed later, make it with distilled or soft water or with water which has been softened by boiling.

Place where a fairly constant temperature can be maintained. At a temperature of 75° to 85°F., it will require 10 days to 3 weeks to complete the fermentation. In the warmer storage place it requires a shorter fermentation period. Remove the scum frequently. Fermentation is completed when bubbles cease to rise. Kraut can be stored in the crock for some time if it is kept at a low temperature. Continue to remove the scum as it forms.

For a long period of storage pack it into jars. Process pint jars 5 minutes, and quart jars 7 minutes in a hot-water bath.

Easy Cucumber Pickles:

- 2 quarts cider vinegar
- 1 quart water
- 1 cup salt
- 1 cup sugar
- 1 cup ground mustard or dill

Mix the ingredients. Pack fresh cucumbers into sealers or into a crock. Cover with the pickling mixture. If a crock is used fresh cucumbers may be added from day to day. Weight the cover to keep the cucumbers submerged. Let stand several weeks.

Watermelon Rind Pickles:

- 4 lbs. prepared rind
- 3 tablespoons lime
- 3 quarts cold water
- 1 quart vinegar
- 1 quart water
- 6 to 8 cups sugar
- 1 tablespoon whole cloves
- 2 sticks cinnamon
- 1 tablespoon whole allspice

Use rind from ripe melons. Cut as desired and remove the skin and red pulp. Add the lime to 3 quarts of cold water; add the rind and let it stand several hours. Drain and rinse. simmer in clear water 10 minutes. Combine vinegar, sugar, and one quart of water, and heat to boiling. Add the drained rinds and cook until they become translucent, and the syrup is heavy. Remove spices, pack the rinds into jars, and evaporate the syrup if necessary to reduce the volume. Fill the jars and seal.

Sweet Pickled Peaches:

- 1 gallon peaches
- 1 pint vinegar
- 3 pounds sugar
- 2 tablespoons whole cloves
- 2 tablespoons stick cinnamon
- 1 pint water

Select hard-ripe clingstone peaches. Remove skins. To prevent discoloration drop the peaches into a salt solution made with 2 tablespoons of salt to 2 quarts of water.

Boil the vinegar, water, sugar and spices 5 minutes. Add the peaches. Cover and simmer until the fruit is slightly tender. Let it stand in the syrup over night. Remove the spice bag. Drain off the syrup and boil it rapidly until it is reduced in volume just enough to cover the fruit. Pack the fruit into hot sterilized jars; add syrup to ½ of an inch from the top; (about 1½ cups should cover 1 quart). Process 15 minutes at 180°F. or in boiling water 5 minutes.

If a larger quantity is to be prepared cook in more than one container.

Pear Pickles:

Remove the skins and cores and cut the pears in half. Use a pickle syrup as that used for peaches. Alter the spices, if desired. Whole ginger or mace may be substituted for part of the other seasonings. Follow the procedure for peaches.

Pickled Beets:

Select small beets, and sort according to size. Cook until tender; dip into cold water and remove the skins. Simmer in sweet pickle syrup 12 to 15 minutes. Pack and seal.

Mixed Pickles:

1 quart cauliflower cut in small sections
1 pint small pickling onions
1 quart green tomatoes cut in thick slices
1 pint small whole cucumbers
1 quart cider vinegar
1 cup sugar
1½ tablespoons celery seed
1½ tablespoons white mustard seed

Soak cucumbers, onions, and green tomatoes separately overnight in brine; use ½ cup salt and ½ gallon of water. Drain, rinse in fresh water, and drain again. Combine vinegar, sugar and spices and heat to the boiling point. Add the vegetables. Simmer about 10 minutes or until slightly tender. Pack in hot sterilized jars and seal.

For mixed pickles any combination of vegetables can be used. Cut medium sized onions into thick slices; cut large cucumbers in chunks or thick slices. String beans, carrots, muskmelon, and celery may be used.

Mustard Pickles:

- 1 quart thickly sliced cucumbers
- 1 pint pickling onions or thick slices of small onions
- 1 quart cauliflower or green tomatoes
- 1 cup sweet red pepper
- ½ cup sweet green pepper
- 1 pint vinegar (for soaking)
- 1 quart cider vinegar
- 1 cup sugar
- ½ cup flour
- 3 tablespoons ground mustard
- 1 tablespoon tumeric
- 1 tablespoon celery seed
- 1 tablespoon horse-radish

(Green tomatoes, green beans, and carrots may be used.)

Cut the vegetables, and cover with brine made with 1 cup of salt to 1 gallon of water and let stand over night. Drain, rinse with cold water, and drain. Add 1 pint of vinegar and 1 pint of water and simmer until slightly tender but firm.

Combine sugar, flour, and seasonings. Add 1 quart of hot vinegar; stir to remove lumps. Cook over hot water stirring continually until thick. Combine with the mixed vegetables. Pack into sterilized jars and seal. Process at 180°F. for 15 minutes.

Bordeaux Relish:

- 1 pint chopped green tomato
- 2 quarts finely chopped cabbage
- 1 pint chopped green peppers
- 1 pint chopped onions
- 1 quart cider vinegar
- 3 tablespoons salt
- 1 cup sugar
- 3 tablespoons tumeric
- 2 tablespoons celery seed
- 2 tablespoons mustard seed
- 1 tablespoon whole allspice

Add ¼ cup of salt to the tomatoes, let stand over night. Press the water out thoroughly. Combine all ingredients, mix

well. Pack into sterilized jars, seal, and process. (See Dixie Relish.)

Chow-Chow:

- 1 quart chopped cabbage
- 1 quart chopped green tomatoes
- 1 quart chopped green cucumbers
- 1 cup chopped onion
- 1 cup chopped green pepper
- ½ tablespoon stick cinnamon
- 1¼ quarts vinegar
- 1¼ cups sugar
- 1 tablespoon celery seed
- 1 tablespoon mustard seed
- ½ tablespoon whole allspice
- ½ tablespoon cloves

Cover the vegetables with brine using ½ cup of salt to 2 quarts of water. Let stand over night. Add the spices to the vinegar and heat to boiling. Let stand over night.

Drain the vegetables pressing to remove the brine thoroughly. Reheat the vinegar, let it simmer a few minutes. strain out the spices. Combine the vinegar, sugar, and vegetables and simmer until slightly tender but firm. Pack into hot sterilized jars and seal.

Dixie Relish:

- 1 quart chopped cabbage
- 1 quart chopped white onions
- 1 pint chopped sweet red peppers
- 1 pint chopped sweet green peppers
- 1 quart cider vinegar
- 4 tablespoons mustard seed
- 2 tablespoons celery seed
- 3 tablespoons salt
- ¾ cup sugar

Remove seeds and inside white sections from the peppers. Cover with 2 quarts of water and ½ cup of salt. Let stand over night. Drain, let stand in fresh water 2 hours. Drain. Chop the other vegetables separately, measure, add the sugar, vinegar, and seasonings. Mix and let stand over night. Pack into sterilized jars, seal and process in water bath 15 minutes at 180°F. (simmering temperature).

PICKLE DIFFICULTIES

General spoilage:	Insufficient acid, salt, or sugar. Failure to sterilize the container. Failure to drain well so that the concentration of acid, salt, or sugar is reduced.
Scum:	Fermentation.
Uneven opaqueness:	Not well cured.
Shriveled pickles:	Failure to leave portion of stem on (cucumbers). Too strong brine at the beginning of fermentation. Too strong vinegar. Too much sugar. Keeping too long before pickling.
Hollow pickles:	Cutting too long before brining. Incorrect concentration of brine.
Dark discoloration:	Too much spice. Iron in the water or from containers. Very hard water.
Strong flavor:	Too strong vinegar. Excess of spices.
Soft texture:	Overcooking. Spoilage.

CONCENTRATED FRUIT PRODUCTS

In the preparation of jelly, preserves and jam, the problem is to retain the natural flavor and color of the fruit, to produce a desirable texture or consistency, and to give keeping quality by adding sugar and evaporating to the required concentration.

Flavor—The characteristic flavor or aroma of fruits is due to volatile substances which are driven off with the steam during cooking. The longer the cooking period, the greater is the loss of flavor.

When sugar is subjected to cooking, it changes to a form which is more strongly sweet. The extent to which this change occurs is influenced by the length of the cooking period. Evaporation should be rapid. TO REDUCE THE COOKING

PERIOD USE A BROAD VESSEL, HAVE THE MATERIAL NOT MORE THAN 1½ TO 2 INCHES DEEP AND BOIL RAPIDLY. The flavor of sub-acid fruits is improved by adding lemon juice, powdered citric acid (from citrus fruits), or tartaric acid (from grapes). These can be procured in crystalline form at drug stores.

Color—Over-cooking produces a dull or dark color. It caramelizes the sugar and gives a dark brown color. The tannins in the fruit become brown under the same conditions. The anthocyanin pigment which constitutes the red, purple, and blue coloring in fruits become dull brown by over-cooking. These pigments become dull or inky when in contact with metals. Therefore, granite ware or enamel-lined containers and spoons should be used. Ground spices cause darkening, and whole spices also cause discoloration if they are not removed when the pack is made.

Texture—Pectose (fore-runner of pectin) and pectin are softened or brought into solution by boiling. The extent of this change is influenced by the degree of acidity and by the length of the cooking period.

Sugar extracts the juices from fruits and thus causes shrinkage and toughening. The hard fruits which toughen readily, as quinces, Kieffer pears, melon and citrus fruit peel, are cooked tender by steaming or by boiling before combining them with sugar or syrup.

Another method of treating fruits which tend to toughen is to cook them in a light syrup until the fruit is so tender that diffusion of the syrup into the fruit can take place; then add the rest of the required amount of sugar and concentrate by rapid boiling. Many fruits can be cooked in heavy syrup from the start. Fruits which go to pieces readily will remain whole during cooking if they are combined with the sugar and allowed to stand several hours or overnight before cooking.

The textures of fruit products are determined by the character of the fruit, the degree of ripeness, the concentration of the sugar, the stage in the cooking process at which the sugar is added, the length of the cooking period, and the acidity in relation to the structural elements of the fruit.

JELLY

Jellying Properties of Fruits—The pectin and acid of fruits determine their jellying possibilities. The best pectin value is found when the fruits are in the firm-ripe or slightly under-ripe stage. The juice extracted from uncooked fruits may contain little, if any, pectin. Boiling the fruit brings the pectin into solution and makes it possible to extract it. Acid, too, aids in bringing the pectin into solution. Prolonged boiling of the fruit destroys its jellying power. Excess acidity increases the rate of destruction of the pectin from the over-cooking.

Gelation requires a definite degree of acidity. Good results can be obtained by combining a fruit which is poor in pectin, but which has high acidity, with one that is rich in pectin and lacks acidity. A fruit which has a fairly good pectin content but which is lacking in acid can be improved by adding one-fourth to one-half a teaspoon of powdered citric or tartaric acid to a pound of prepared fruit when it is placed to cook. This treatment of a sub-acid fruit not only increases the extraction of pectin, but it also increases the yield. It improves flavor, color, transparency, and tenderness of the jelly. Mineral salts play some part in gelation through their relation to the acids and to pectin.

Many fruits, if used in the correct stage of ripeness, have all the essentials for good gelatin. Blackberries and dewberries are best when firm-ripe with about one-fourth or one-fifth of the berries still in the dark red stage. Apples should be sour and slightly under-ripe. Fully ripened and over-ripe apples have better pectin content than acidity. Concord grapes are best when partially ripe.

Fruits which are rich in pectin and acid are plums, cranberries, red currants, sour apples, crab apples, blackberries, wild grapes, Concord grapes, and citrus fruits.

Fruits which are poor in acid but contain pectin are quince, pears, ripe blueberries, ripe huckleberries, and some varieties of sub-acid or over-ripe apples.

Fruits with sufficient acid but which are poor or lacking in pectin are cherries, apricots, pineapple, under-ripe strawberries, and pomegranates.

Fruits which are poor in pectin and poor in acid are ripe strawberries, raspberries, and peaches.

Suggested combinations: quince and sour apples, crab apples and bland plums, berries and tart apples, peaches and sour apples or crab apples.

Equipment—Provide a wide kettle for sterilizing glasses and lids, vessels for washing the fruit, colander for draining, stainless steel paring knife, skimmer or small puree strainer for removing small fruit from the wash waters, scales, measuring equipment, cheese cloth or cotton flannel for straining, large broad stew pan, longhandled enamel spoon, jelly glasses, tray for the glasses, alcohol, and parafin. A jelly thermometer and a jelemeter are helpful.

Preparation of Jelly Stock—Wash and drain the fruit. Remove stems, calyx, and any blemished parts. Do not remove skins or cores; since they give flavor, color, and pectin. Retain the pits for flavor. Cut apples crosswise in ⅛ inch slices. Add about 1 pint of water to one pound of prepared apples. Cut firm, sour plums lengthwise and add about ¾ of a pint of water to one pound of fruit. Use very little water with soft plums. Use little or no water with berries. Cook all fruits until thoroughly softened. Boil small soft fruits 3 to 5 minutes. Hard fruits require longer boiling. Apples usually require 12 to 20 minutes. Strain immediately through a double cheese cloth or a cotton flannel bag. Drain about 15 minutes; then press. Pressing to remove the juice may cause cloudiness in the jelly. To prevent this strain the juice again without pressing.

A second extraction of good jellying fruits yields a satisfactory product. Under-ripe sour apples, crab apples, sour plums, and red currants yield a good second jelly stock. This may be added to the first extraction, or it may be made into a second grade jelly.

Pectin Test—Add one teaspoonful of cool juice to one tablespoonful of wood alcohol or denatured alcohol. If it forms a gelatinous mass about as large as the volume of juice added, the pectin is adequate for jelly-making. Since certain gummy and mucilaginous substances are also precipitated by alcohol, this test is not always infallible; the firmness of the jell structure as shown by the manner in which it

holds together or stands up also indicates the character of the pectin. If the precipitate is small in quantity and does not hold together well, concentrate the juice to half by rapid boiling. Test again for pectin and add sugar according to the test.

The jelemeter is a guide to the pectin content of the juice. It is a small graduated glass tube which indicates the proportion of sugar to use according to the rate at which the juice flows through the tube. (See Fig. 5) This test has the same limitations as the alcohol test.

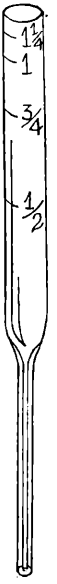


Fig. 5.

Sugar—If the pectin test is good and the juice is sufficiently acid use ¾ to 1 cup of sugar to 1 cup of juice. A cup of average jelly stock requires from 2/3 to ¾ cup of cugar. In second extractions, if the juice shows a rather poor pectin test, use ½ cup of sugar to 1 cup of juice. Blackberries and dewberries cooked with very little or no water may take 1 cup or more of sugar to 1 cup of juice.

Add the sugar to the juice when placing it to cook, stir until the sugar is dissolved; then discontinue stirring.

Cooking the Jelly—Use a vessel which is broad enough so that the juice is not more than 1½ to 2 inches deep. Cook rapidly, keeping it at a rolling boil. The cooking of jelly can not be timed. The jelly stage should be reached in five to 20 minutes. Good jelly stocks should jell by boiling 7 to 15 minutes.

Jelly Test—The jelly thermometer indicates the concentration of sugar rather than the actual jelly consistency. If the sugar is well proportioned to the acid and pectin of the juice, jelly should form when cooked to 219° to 221°F. at sea level. The finish in cooking will be 1°F. lower for each 500 feet increase in altitude. Jelly may form at one or two degrees below or above the estimated temperature depending on the concentration of the jelly stock and the proportion of sugar added. If the thermometer is used, the bulb must be completely covered with the syrup, not merely immersed in bubbles. Keep the mercury from touching the bottom of the pan and read the scale having the eye level with the top of the column of mercury.

Test for gelation by dipping a spoon into the jelly and holding it in a horizontal position. (See Fig. 6) As the mixture

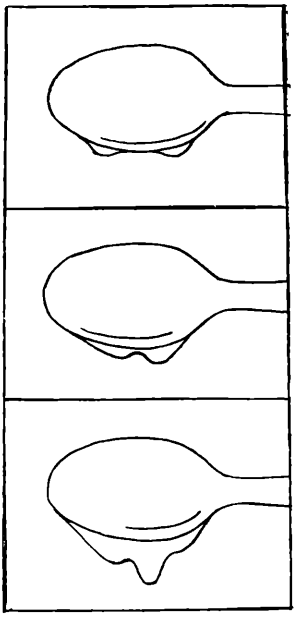


Fig. 6. JELLY TEST

thickens, it collects on the edge of the spoon, and two drops form at a time. With a little more cooking the two drops pull off together. This is the beginning of the jellying stage. When the two drops pull together and the mass breaks off abruptly into a sheet the firm jelly stage is reached. When it is approaching the jelly stage, shake the pan in a rotary motion to concentrate the scum, then remove it. Pour the jelly immediately into dry, hot, sterilized glasses; hold the vessel down to the rim of the glass. Skim each glass if necessary.

Cover with hot paraffin; then run the tip of a hot paring knife along the edge of the jelly to seal. Cover with a sterile lid. Do not move the jelly until it is cold.

FAULTY JELLIES

Soft Jelly:	Too much water used in extracting the juice. Insufficient cooking of the jelly.
Syrupy Jelly:	Too much sugar. In a very acid fruit it may have been cooked too long in making the extraction or it may have been cooked in too large a quantity at a time, so that it required too long a cooking period to reach the necessary concentration. Either of these conditions hydrolizes the pectin.
Cloudy Jelly:	Not strained well. Not skimmed well.
Opaqueness:	Under-ripe fruits which contain starch or related substances.

Poor Color:	Too long cooking. Contact with iron or tin.
Bubbles:	Held too high when being poured into the glass.
Rough Cleavage:	Permitting the jelly to begin to set before it is poured into the glass.
Syneresis or "Weepy Jelly":	Highly acid fruits. Oxidation and temperature changes. Enzymes secreted by molds.
Fermentation:	Too low concentration of sugar. Failure to sterilize glasses and lids. Warm storage place. Imperfect seal.
Mold:	Failure to sterilized glasses and lids. Imperfect seal. Warm, damp, poorly ventilated storage place.
Crystals:	Too much sugar in relation to acidity. Permitting the jelly stage to be reached before the sugar has been cooked sufficiently to change it to a less crystallizable form. Sugar crystals on the sides of the pan become mixed with the jelly when it is poured into the glass. Although these crystals may be very small, they "seed in" crystals which increase in size while the jelly is in storage. Evaporation at the surface of the jelly before sealing.

PRESERVES

Rich preserves are cooked until the syrup is thick and the fruit is clear or translucent. The fruit solids should remain whole, retain their natural flavor, and color, and should be well distributed throughout the syrup.

Materials—Select fresh, firm-ripe fruits which are free from blemishes. Wash and drain. If using smaller fruits

suitable to cook whole, sort them according to size. Cut large fruits into uniform pieces.

Sugar—Use 2/3 to 1 pound of sugar for each pound of prepared fruit. Consider the method of adding the sugar for each kind of fruit. (See "Textures" above.)

Cooking—Use a wide, long-handled stew pan. Have the material not more than two inches deep. Cook at an even, rolling boil. Stir to prevent scorching. Soft fruits which tend to rise to the top of the syrup should be shaken, since stirring breaks the fruit.

Just before removing it from the fire shake the pan in a rotary motion to concentrate the scum in the center; then remove it. Frequent skimming during the entire cooking period is laborious and wasteful.

The consistency of the syrup and the translucency of the fruits must be observed to determine the degree of cooking preserves. Final temperatures may vary from 216°F. to 223°F.

Cooling—Rapid cooling results in better color and flavor. Materials which tend to rise to the top will remain distributed in the syrup if cooled to the point at which the syrup thickens or is about to begin to jell before packing.

Shaking occasionally during cooling forces all the surfaces or the solids against the syrup causing diffusion of syrup into the fruit. This produces plumpness of the fruit and prevents it from rising in the syrup.

Fruits which are difficult to plump require special treatment. After cooking, distribute the fruit evenly over a large platter or a broad, flat-bottomed glass or enamel-lined vessel. Cover the fruit with the syrup. If the syrup is rather thin concentrate it by rapid boiling before pouring it over the fruit. Allow the preserves to stand over night and turn the fruit in the syrup one or more times.

Packing—When the product is ready to pack remove the sterilized jars from the hot water and invert them to drain. Distribute the fruit and syrup evenly in each container. Pack the jar about three-fourths full of solids; then fill it with

syrup. If there is an excess of syrup, evaporate it rapidly to the necessary volume. Fill the jars, adjust the rubbers and the lids and seal.

Processing—Rich preserves require no processing if they are packed boiling hot and if sterile spoons, jars, and lids are used.

Less concentrated products, or those which have been exposed to possible contamination by yeast and mould spores should be subjected to a brief processing. This is especially necessary if a cool storage place is not available. Process 20 minutes in water bath at 190°F. having the water up to the neck of the jar, or process in steam without pressure ten minutes. The pressure cooker can be used for either method. To process in steam, leave the cooker unsealed and leave the petcock open. Begin to count the time when the vessel is filled with steam.

Cherry Preserves—Sort, wash, drain, and remove stems and pits. Use ¾ pound of sugar to 1 pound of pitted cherries. Combine the sugar and cherries and let stand several hours. Heat slowly, shaking or stirring to prevent scorching. When the sugar is dissolved, boil rapidly to the desired concentration.

Fig Preserves—Select ripe figs. Prepare them as for canning (See "Canning Fruits"). For each pound of figs use the juice of ½ lemon and the syrup from 1 cup of water and 2 cups of sugar. Add the figs to the syrup and cook until clear. Remove the figs; then boil the syrup until very clear. Add the figs and let stand 12 hours. Pack, seal and process 20 minutes at 180°F.

Yellow Fig Tomato Preserves—Blanch, cold-dip, peel, and drain the tomatoes. To 1 pound of prepared tomatoes use ¾ of a pound of sugar, ½ lemon and 1 tablespoon of whole ginger.

Make a heavy syrup of half the sugar by using one part water to four of sugar. Add the tomatoes and seasonings; boil 5 minutes and cool.

Allow it to stand to absorb syrup several hours. Add the remaining sugar; cook until thick and clear, shake or stir frequently. Cool rapidly. Pack in hot sterilized jars.

Green Tomato Preserves—Wash the tomatoes and cut in sections. Add ½ cup of water, cover and place over low heat. Stir frequently. When the skins loosen, remove from the fire, slip off the skins, and drain thoroughly. To each pound of drained solids add ¾ pound of sugar. 1 tablespoon of whole ginger and 1/3 teaspoon of citric acid crystals or ½ lemon cut in very thin pieces. When the sugar has dissolved, boil rapidly to 221°F., or until the solids are translucent and the syrup is thick. Pack in hot sterilized jars and seal.

Peach Preserves—Select firm ripe peaches. Remove skins, and cut in uniform sections. Make a heavy syrup using one cup water and ¾ of a pound of sugar to 1 pound of prepared fruit. Add the fruit and cook rapidly until the fruit is translucent and the syrup is thick.

For soft peaches use no water. Mix the sugar with the fruit and let stand until most of the sugar is dissolved before placing to cook.

Preserved Pears—Follow directions for peaches. Kieffer pears require precooking if they are in the hard stage. Boil them in a closely covered vessel until tender. Remove the fruit and use the juice for the syrup. To improve the flavor add lemon or pineapple juice, or add ¼ teaspoon citric acid and one tablespoon of ginger-root to each pound of fruit. Kieffer pears do not require precooking if they are stored until well ripened.

Plum Preserves—For each pound of plums make a syrup using ¾ to 1 pound of sugar and ¾ cup of water. Wash and drain the fruit and prick each several times to prevent large cracks in the skin. Boil the syrup 5 minutes, add the fruit, and boil until the syrup gives the jelly test.

Bitter plums which tend to shrivel in syrup yield a better product if subjected to a soda blanching. Cover the plums with boiling water and add a tablespoon of soda for each quart of water. Simmer until the skins have small cracks. Drain, add the sugar, and boil rapidly to 221°F. or until the syrup is thick.

Quince Preserves—Pare the fruit and cut into sections. Boil until tender. Use the juice for syrup; add ¾ pound of sugar for each pound of fruit. Add the fruit and boil until the syrup is thick and the fruit is translucent.

Strawberry Preserves—Select firm, ripe berries. Sort according to size. Wash a few at a time in a large volume of water; be careful not to crush the berries. Repeat until all grit is removed. Stem, wash again and drain.

I. **Quick Process.** To each pound of berries use 1 pound of sugar. Place alternate layers of berries and sugar in a broad, longhandled stew pan. Allow to stand until some juice has formed. Heat slowly until all of the sugar is dissolved. Shake gently instead of stirring. When the sugar is completely dissolved, continue shaking and boil rapidly to the desired transparency and thickness. Remove scum. Cool rapidly and shake occasionally. Let it stand a few hours. Pack the jars about ¾ full of berries and fill with syrup. Berries cooked by this method will be plump and will not float on the syrup.

II. **Over-night Process.** Combine sugar and berries and let stand several hours. Heat slowly, and then boil rapidly until the berries become clear. Remove the scum. Allow the berries to stand over-night. Turn them over in the syrup a few times. The next day pack and store.

III. **Sun-Preserved Strawberries.** Prepare the berries as in the recipe above. Mash and cook the culls, and strain off the juice to use for the syrup. Use 1 pound of sugar to 1 pound of whole berries. Add the berries and boil 2 minutes. Remove the berries with a perforated skimmer and place them on a shallow enamel tray or china platter. Concentrate the syrup and pour it over the berries. Cool, cover with window glass; prop it up to permit the escape of moisture. Turn the fruit several times. Let stand in the sun 2 to 4 days or until thick. Pack and seal.

Watermelon Preserves—Select thick rinds cut in convenient size to handle. Remove the peel and the pink flesh. Cut in uniform oblongs or cubes, and weigh. For each pound of material prepare one pint of lime water by using a tablespoon of slaked lime to a pint of water. Cover the melon with lime water; let stand several hours to become crisp. Drain, cover with fresh water and let stand one hour. Drain, cover with fresh water and cook until tender. Allow one-half a lemon and ¾ to 1 pound of sugar to each pound of fruit.

Cut the lemon in very thin pieces; add twice its volume of water and boil until the skins are tender.

Make a syrup by using one-half of the sugar and one pint of the cooking water to each pound of fruit and cook covered thirty minutes. Add the rest of the sugar and cook uncovered until the syrup begins to thicken. Add the lemon and the liquid: cook until the rind is clear and the syrup is thick. Pack and seal.

JAMS, BUTTERS, CONSERVES, AND MARMALADES

Jams, butters, and conserves make desirable products of fruits which are irregular in form, size, or degree of ripeness or which have blemishes. Fruits which lack flavor may be combined with others of stronger flavor to improve both.

Jam consists of finely cut pieces of fruit cooked to a pulpy mass. Berries may be used mashed or whole. About ¾ of a pound of sugar is used to one pound of fruit.

Butters are made from the strained pulp of fruits cooked to a spreading consistency; use one-half to two-thirds as much sugar as prepared pulp. Spices or other flavors may be added.

Conserve is a combination of two or more fruits cut into small pieces and cooked until thick. Nuts or raisins are usually, though not always, included. Each pound of fruit requires about two-thirds to three-fourths of a pound of sugar.

Marmalade is made of fruit cut in very fine pieces and prepared in such a manner that the thin pieces of solids remain evenly suspended in the jellied juice.

As in preserves the best results are obtained by rapid cooking in a broad container and have the material not more than 2 inches deep. Rapid cooling is important. Since pulpy materials scorch readily, use an abestos under the stew pan.

See directions for packing and processing under "Preserves."

Apricot Jam—Remove skins and pits. To one pound of prepared fruit use ¾ of a pound of sugar. Add ½ cup of

pineapple juice or the juice of ½ a lemon. Combine sugar and fruit and allow to stand until enough juice is extracted to start cooking. When the sugar is dissolved boil rapidly until thick. Stir carefully during the entire period. Pack hot in sterilized jars and seal.

Apricot and Pineapple Jam—Soak evaporated apricots; cook in the juice until very tender; rub through a fruit press or coarse sieve. To 3 cups of strained pulp add 1 cup of crushed pineapple and 2 cups of sugar. Cook rapidly until thick. Pack and seal.

Berry Jams—Wash, drain, and crush the berries. Add ¾ as much sugar as crushed berries. Boil rapidly until thick and clear. Pack hot in sterilized jars and seal.

Apple, Cherry, and Pineapple Jam—To each pound of finely chopped or ground apples use 1 pound of pitted pie cherries or a No. 2 can of sour pie cherries, and 1 cup of canned crushed pineapple and juice. Parboil the apples; use 2/3 of a pint of water to each pound. Combine the fruits; add 2/3 as much sugar as fruit and boil rapidly until thick. Pack and seal.

Apple Butter—Wash the apples; remove stems and the calyx. Cut in rings ¼ inch thick. Cook until tender, use almost enough water to cover. Run through a sieve or fruit press. For each pint of pulp add one to one and one-third cups of sugar according to the acidity of the apples. To this quantity add one teaspoonful of whole cloves and a few pieces of cinnamon bark. Cook rapidly with constant stirring until translucent and thick. Remove the spices, pack hot and seal.

Apple butter may be made from the pulp remaining after the first extraction of jelly stock is made. Add more water to the apples and boil for several minutes. One-fourth of a teaspoon of citric acid crystals to each pound of fruit improves flavor and extracts more pectin. Rub through a sieve. For each pint of pulp add two tablespoons of lemon juice. Use sugar and spices and cook as indicated above.

Plum Butter—Follow directions for apple butter. Use 1 cup of water to 1 quart of fruit.

Useful References

United States Department of Agriculture:

- Farmers Bul. No. 879, Home Storage of Vegetables
- Farmers Bul. No. 900, Homemade Fruit Butters
- Farmers Bul. No. 984, Farm and Home Drying of Fruits and Vegetables
- Farmers Bul. No. 1186, Pork on the Farm—Killing, Curing, and Canning
- Farmers Bul. No. 1762, Home Canning of Fruits, Vegetables and Meats

Texas Agricultural and Mechanical Arts College Extension Service:

- Circ. C-108, Food Preservation Plan
- Bul. C-95, Preparing Fowls for Home and Market
- Bul. M.S.-496, Uses for Peaches
- Bul. B-100, Canning Meat in the Home