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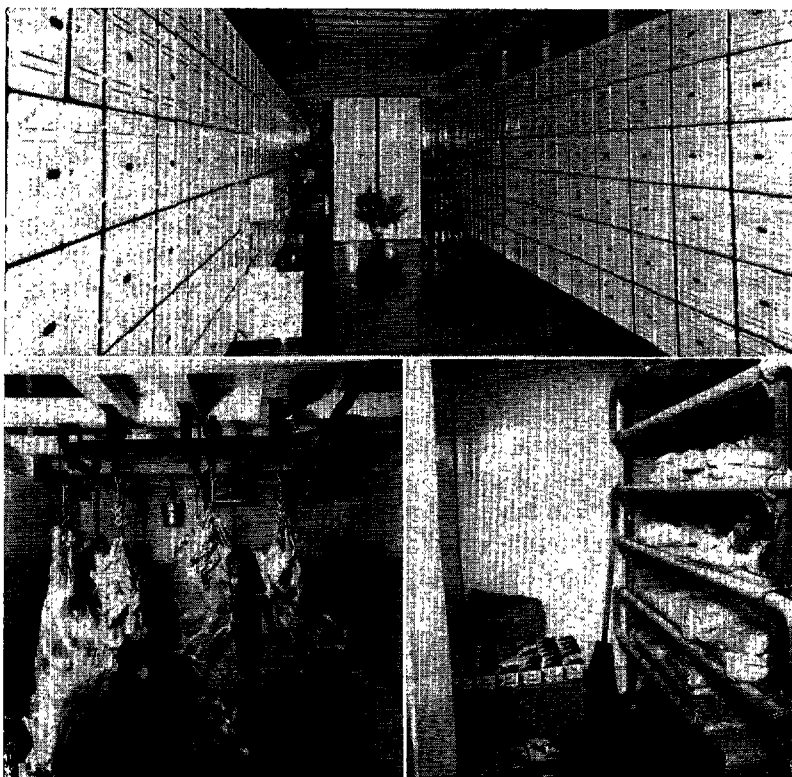
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PRESERVING FOODS IN FROZEN FOOD LOCKERS¹

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The modern freezer-locker plant consists of the locker room (top), the chill room for chilling carcasses (lower left), and the sharp-freeze room for freezing fruits, vegetables and meats (lower right).

1. Contribution No. 197, Department of Horticulture, and No. 154, Department of Animal Husbandry.

FOREWORD

Kansas has an abundance of good food because of the willingness of Kansas people to grow gardens, raise livestock and poultry and the ability of most housewives to use various home processing methods. The preservation of foods by the quick-freezing method is now generally appreciated throughout the state.

The use of frozen food lockers by farmers and townspeople for storing foods for their own use has increased rapidly in Kansas during the last few years. Refrigerated locker plants are located at present in almost every section of the state and their number and distribution is still increasing. There are about 220 plants now operating in Kansas, making about 75,000 individual lockers available for rent. The frozen food locker plant makes it possible for the family to utilize fresh home-grown meat, poultry, fruit and vegetables throughout the entire year and at a material saving in cost.

The maximum economy in use of the frozen food locker can be realized by those rural families who produce their own products. The urban resident, through careful planning and buying, can also realize a real saving through the use of frozen food lockers. Because of the desire for information relative to the use of this type of preservation on the part of locker patrons, this circular has been prepared, based on trade practices and on research work conducted at the Kansas and other state agricultural experiment stations.

The use of frozen food lockers should be as carefully planned as any other farm or home operation. Seldom is money saved by renting a locker to store an occasional surplus of some perishable food. A definite saving in food costs can be shown, however, through the well-planned, year-around use of a locker.

Since the methods of preparing and packing fruits and vegetables differ so much from methods of handling meats, the information is presented in two parts.

The recommended sanitary regulations of the Kansas State Board of Health and additional suggestions for cutting and packing meat are appended.

PRESERVING FRUITS AND VEGETABLES IN FROZEN FOOD LOCKERS

By G. A. FILINGER

The preservation of fruits and vegetables by the quick-freezing process, if properly done, preserves the flavor, the color and the vitamins better than any other method. The use of frozen products has increased rapidly during the last few years and commercial firms have kept pace with this demand by annually increasing their production of frozen fruits and vegetables. The use of community freezer lockers by farmers and townspeople has likewise increased. Many problems in connection with preservation of foods by freezing are still unsolved but sufficient progress has been made to assure good products of many kinds if a few simple directions are followed.

FRUITS

There are five general methods of packing fruit for freezing:

1. **Packed whole without sweetening.**—A few fruits, such as strawberries, raspberries, cherries and blackberries, may be frozen whole without any treatment except sorting and washing. They must be kept at low temperatures and well sealed to prevent the fruit from drying. This method is not as desirable as those requiring the addition of sugar or syrup.

2. **Packed whole with sugar.**—This is the oldest and most commonly-used method of freezing small fruits. This method is especially desirable if the fruits are to be used in baking. The fruit is sorted, washed, and packed with sugar. A common proportion is 3 parts of berries to 1 part of sugar. Some prefer less sugar and mix the fruit 4 or 5 to 1. The berries and sugar should be allowed to stand for an hour or two to dissolve some of the sugar in the fruit juice before freezing. There is no advantage in adding sugar to dry fruits like gooseberries.

3. **Packed whole with syrup.**—If small fruits are to be used for desserts and thawed before use, they may be covered with a 40- to 60-percent syrup (see Table 1). The syrup dilutes the fruit flavor somewhat, but preserves the shape and color of the fruit and penetrates the fruit during storage.

4. **Sliced and packed with syrup.**—Large fruits, such as apple peach, apricot, and plum are sliced, covered with a cold 40- to 50-percent syrup, and held for some time in a cool room to allow the syrup to penetrate the tissues of the fruit before freezing.

5. **Sliced or crushed and packed with sugar.**—Fruits such as strawberries and raspberries may be crushed or sliced and mixed thoroughly with sugar about 3 or 4 parts to 1 part of

sugar, before packing into containers for freezing. Since no water is added, the flavor is unimpaired. This method is recommended for fruits of irregular size and shape.

Fruit juices and fruit pulps are excellent if preserved by freezing. They should be stored in air-tight containers. Glass containers which are narrower at the top than at the bottom may crack if used for fruit juice containers unless laid on their sides until contents are frozen. Allow 1 to 1½ inches for expansion of the juices. (Fig. 2.)

Table 1 may be used in determining the amount of sugar and water to use in making up syrups. The proportions of sugar and water are based on weights but volume measurements are sufficiently accurate. A pint of water or a rounded and well-settled pint of sugar each weighs about a pound.

TABLE 1.—AMOUNTS OF WATER AND SUGAR TO USE IN PREPARING SYRUPS.

Syrup Desired (percent).	Sugar.	Water.	Pints of syrup from one pound of sugar.
	(Parts).		
20	1	4	4.5
30	1	2½	2.7
40	1	2	2.2
50	1	1	1.7
60	1½	1	1.8

The amount of syrup necessary to pack a quart of fruit will vary with the size of the fruits or fruit pieces and with the tightness of the pack but usually from 1 to 1½ cups will be required.

Sugar substitutes.—Honey may be substituted for part of the sugar but will impart a slight honey flavor to the product. Desirable proportions are 1 part sugar, 1 part honey, and 2 parts water or 1 part sugar, 2 parts honey, and 3 parts water. Corn syrup (Karo) alone is not a satisfactory substitute for sugar, but 1 part corn syrup, 1 part sugar and 2 parts water can be used.

Dextrose or corn sugar is not as satisfactory as cane sugar and more of it is required equally to sweeten fruit. With some fruits such as strawberries, dextrose produces a purplish color while frozen. The normal color returns when the products thaw.

Saccharin may be substituted for cane sugar for people who cannot use cane sugar. Thirty-six, one-fourth-grain saccharin tablets are equivalent to a cup of sugar for sweetening. Saccharin tablets must be dissolved in water to insure uniform distribution. To make a solution approximately equivalent to a 40-percent cane syrup, dissolve 18 one-fourth-grain

saccharin tablets in one cup of water. Fruit preserved in saccharin solution freezes into a solid hard lump which thaws slowly and may be more likely to crack containers unless sufficient expansion space is allowed.

Containers.—Containers for frozen fruits and vegetables should be reasonably air tight, moisture proof, strong, of a shape that is economical of space in the locker and allows removal of products easily, and economical in cost.

Glass containers, such as the common fruit jars, may be used if they do not have a too decided shoulder and if they are not filled up into the tapered portion when a liquid is added. Wide-mouthed jars are preferred.



FIG. 1.—Satisfactory types of containers for preserving fruits and vegetables in frozen food lockers. (1) Cellophane-lined carton for use where large amounts of fruit or fruit pulp are preserved. Too large for vegetables. (2) Bottle for fruit juices, wider at the top than bottom. (3), (4), (5) Cylindrical, paraffined cartons. (6) Parchment bag with a waxed inter-liner bag that can be heat-sealed. (7) Paper carton with metal top. Opening is too small for convenient use. (8), (9) Wide-mouth glass fruit jars. (10), (11) Lacquered tin cans with tight slip-in lids. (12) Cylindrical paper carton with pleated cellophane liner. A cellophane cover is sealed over the top and protected by a cardboard lid. (13) Paraffined cardboard cup with a disc lid. It is wider at top than at bottom. (14), (15) Cartons used by commercial frozen food companies. (16), (17) Cellophane-lined cartons. Note windows permitting inspection of contents. (18), (19) Cartons with cellophane bags used as liners. Bags may be filled before being put into the cartons.

Heavily-paraffined or waxed cartons, either cylindrical or tub-shaped, are satisfactory if the lids are practically airtight. The cellophane linings in cartons may easily be sealed at the top with a hair-curling iron. Metal containers either hermetically sealed or with tight friction or snap-on covers are satisfactory. Square or rectangular containers are more economical of space than round or round-conic ones.

Although very little corrosion occurs at the low temperatures in a locker, a lacquer or enamel lining of metal containers prevents discoloring of fruits and vegetables.

The time required to freeze a fruit or vegetable does not vary widely for containers of different types, but the quantity of the product in each container is important in this regard. Pint and quart size containers are preferred for ordinary use for quick freezing. The use of containers holding over five pounds is not recommended because too long a period is required for the products to freeze.

Fruit juices can be stored in the same types of containers as fruits and vegetables, but more space should be allowed within the container for expansion. Containers that taper toward the top should be avoided. If 10 to 15 percent space for expansion



FIG. 2.—Containers used in storing fruit juices in frozen food lockers. (1) Wide-mouthed fruit jar with a small shoulder. (2) Bottle which tapers too much. Should be filled to a point below the label. Before freezing this bottle was filled to the top of the label. Note the amount of expansion. (3) Glass jug. Before freezing this jug was filled to top of label. Note the amount of expansion of apple juice.

sion has been allowed, breakage due to freezing will be lessened by laying containers on their sides.

Products for freezing.—Only the best quality fruits should be stored in freezer lockers. Over-ripe, immature, blemished or spoiled fruit will be even worse when removed from the locker. The degree of maturity, the condition of the fruit and the methods of handling are more important than the variety. The varieties that are listed are those that have been tested in Kansas. Many others, no doubt, are desirable.

BLACKBERRIES

Varieties.—Eldorado was the only blackberry tested and it has proved in every way desirable.

Preparation.—Pick at peak of ripeness. Handle carefully and quickly. Select the well-shaped berries, wash and drain thoroughly. Soft and poorly-formed berries can be sliced or crushed.

Packing.—Use dry sugar, 1 pound to 3 or 4 pounds of berries or 40- to 50-percent syrup. Place in a chill room for several hours for penetration of sugar. Pack in paraffined paper cartons, cellophane-lined cartons, lacquered tin cans, or glass jars. If syrup is used, allow 1 to 1½ inches for expansion in rigid containers.

Storing.—Freeze in sharp room at 0° to -10° F., and store at 0° to +10° F.

BLACK RASPBERRIES

Varieties.—Black Pearl and Cumberland were the varieties stored and both yielded an excellent product.

Preparation.—Pick at peak of ripeness and handle carefully to avoid crushing. Discard poorly-colored, immature berries and over ripe, seedy ones. Wash and drain.

Packing.—Pack whole without sugar or with 1 part sugar to 3 or 4 parts of berries. Black raspberries are excellent when crushed with sugar. A 30- to 40-percent syrup dilutes the flavor somewhat but is satisfactory for covering black raspberries. A heavier syrup tends to make the berries “seedy.” Pack in paraffined cartons, cellophane-lined cartons, lacquered tin cans, or glass jars.

Storing.—Freeze in sharp room at 0° to -10° F., and store at 0° to +10° F.

BUSH CHERRIES

Varieties.—Keyapahs, Oahe, Teepee and Wampum have been tried and all were fair.

Preparation.—Pick when fully mature but before they get soft. Sort, wash and pack either whole or pitted. The pits are difficult to remove unless the fruit is fully ripe.

Packing.—Pack whole with 50-percent syrup or pit and pack with 1 part sugar to 3 parts of cherries. Paraffined car-

tons, cellophane-lined cartons, lacquered tin cans, and glass jars were all satisfactory.

Storing.—Freeze at 0° to -10° F., and store at 0° to +10° F.

DEWBERRIES

Varieties.—Young and Boysen have been tried and, although they are soft in texture, they were satisfactory.

Preparation, packing, and storing.—The same as for blackberries.

GOOSEBERRIES

Varieties.—Houghton, Glendale, and Pixwell have been tried and all were satisfactory.

Preparation.—Gooseberries should be harvested when fully grown and when the ripest ones show some red color. The berries are sorted, stemmed and washed,

Packing.—Pack whole with 50-percent syrup. The berries are so dry that a sugar pack is not satisfactory with gooseberries, unless the fruits are chopped or crushed.

Storing.—Gooseberries should be allowed to stand for two or three hours in a cool room and then be frozen at 0° F. to -10° F. and stored at 0° F.

GRAPES

Varieties.—Concord and others.

Preparation.—Harvest when full-ripe on vine. Remove berries from cluster. Sort and wash.

Packing.—Pack whole with 40-percent syrup.

Storing.—Allow to stand two or three hours in a cool room and then freeze at 0° F. to -10° F. Store at 0° F.

PURPLE RASPBERRIES

Varieties.—Columbian, Ruddy, and Sodus. These varieties ranked very good, but were somewhat soft when removed from the freezer locker.

Preparation.—Harvest when fully mature but before the berries become soft or the drupelets start shattering. Purple raspberries must be handled carefully and quickly to avoid bruising. Sorting is best done at picking time to avoid re-handling. Wash thoroughly and place in containers.

Packing.—Pack whole without sweetening or with 40- to 50-percent syrup, or with 1 part of sugar to 4 parts of berries. Purple raspberries are excellent if crushed with sugar. Paraffined cartons, cellophane-lined cartons, lacquered tin cans and glass jars were all satisfactory.

Storing.—Freeze at 0° to -10° F., and store at 0°.

RED RASPBERRIES

Varieties.—Latham and Chief have been tried and found very desirable.

Preparation.—Pick when fully mature but before the ber-

ries soften or shatter. Careful handling is necessary to avoid bruising the fruit.

Packing.—Pack, without treatment, with 1 part of sugar to 4 parts of berries or with 40-percent syrup. The sugar pack is perhaps the most satisfactory as it does not dilute the delicate flavor and the sugar penetrates the fruits while in storage. Crushed red raspberries with 1 part of sugar to 4 or 5 parts of berries make an excellent product.

Storing.—Freeze at 0° to -10° F., and store at 0° to +10° F.

SOUR CHERRIES

Varieties.—Early Richmond and Montmorency. No doubt other varieties of sour cherries are equally desirable. Great quantities of this fruit are frozen annually for commercial use.

Preparation.—Pick when fully mature and avoid bruising, as bruised fruits discolor. Sour cherries may be packed whole or pitted. For most uses the pitted fruits are more desirable.

Packing.—The whole fruits can be packed with 50-percent syrup. Pitted cherries are packed with 1 part of sugar and 4 parts of cherries or may be covered with 50-percent syrup. Pack in container of any desirable size.

Storing.—Freeze at 0° to -10° F., and store at 0° to +10° F.

STRAWBERRIES

Varieties.—Howard (Premier), Blakemore, Dorsett, Progressive, Fairfax, Rockhill, Aroma, and Dunlap. Whole berries of Aroma and Dunlap are somewhat soft when removed from the freezer locker, but fruits of these varieties are excellent when crushed and packed with sugar. Other varieties give a desirable product.

Preparation.—Pick when mature but before the berries get soft. Sort to remove deformed berries. The deformed berries can be crushed for storage. Wash thoroughly and place in containers.

Packing.—Pack whole without sweetening or with 1 part of sugar to 4 parts of berries or with 40- to 50-percent syrup. The sugar pack seems the most desirable as it does not dilute the flavor and the sugar penetrates the fruits well.

Storing.—Freeze at 0° to -10° F., and store at 0° to +10° F.

FRUIT JUICES

Juices of apple, pear, cherry, and rhubarb have been successfully preserved by freezing. They may be sweetened to taste or packed without sugar. Since fruit juices expand considerably when frozen, they should be stored in paraffined cartons or in glass containers which are not tapered inward at the top. Sufficient space should be allowed at the top for expansion.

FLESHY TREE FRUITS

Tree fruits such as apricots, peaches and plums have been satisfactorily preserved by freezing.

Varieties.—Only a few varieties of these fruits have been tested, but most of the common varieties grown in Kansas, if properly handled, yield a satisfactory product.

Preparation.—Tree fruits should be fully mature on the tree in order to reach the best flavor. The customary sorting, washing, halving and pitting are necessary for best results. Peeling is not necessary unless the consumer objects to the skins. To peel easily, apricots and peaches may be scalded or treated with a weak lye solution and then rinsed with water slightly acidified with citric acid after the lye treatment to remove or neutralize the lye. Otherwise, oxidative browning might result. These fruits may be cut into smaller pieces than halves if so desired. The fruits should be packed immediately and covered with syrup to avoid discoloring. As the fruits are halved or cut into pieces they should be dropped into heavy syrup to protect the fruit from the air. The addition of a tablespoonful of lemon juice per quart of syrup helps in preserving color of fleshy fruits. Some housewives prefer slicing the fruits into a ½ to 1-percent citric acid solution before packing in syrup.

Sliced peaches dipped in a solution of thiocarbamide, 1 level teaspoon per gallon of cold water, and drained keep their color when frozen in syrup better than if not treated with thiocarbamide.

Packing.—Pack the quarters or halves in 40- or 50-percent syrup using sufficient syrup thoroughly to coat and cover the fruit.

Narrow strips of stiff, white paper bent in the shape of a U placed on top of the fruit under the lid will keep fruit submerged in the syrup.

Sugar packs are not desirable because the fruit tissues discolor and collapse upon being removed from storage. The packing of unsweetened fleshy fruits is not recommended.

Storing.—Freeze at 0° to -10° F., and store at 0° to +10° F.

VEGETABLES

The different kinds of vegetables are not all equally satisfactory for freezing. As a rule, those which are eaten raw and are prized for their firmness and crispness, such as cucumbers, tomatoes, lettuce and radishes, are not very desirable for freezing. Freezing changes the flavor and physical character of these vegetables making them undesirable. Vegetables usually cooked before being eaten yield an excellent product when preserved by freezing. Among these vege-

tables are asparagus, beans, beets, broccoli, cauliflower, corn, parsnips, peas, rhubarb, spinach, and Swiss chard.

Varieties of vegetables vary in their desirability for preservation by freezing. Varieties listed in this circular are those which have been tested and found satisfactory. Many other varieties grown in Kansas, no doubt, would be equally good. The degree of maturity, proper processing, and storing are more important as a rule than the choice of varieties. An excellent variety if harvested after it has passed its optimum degree of maturity or if improperly handled, yields a less desirable product than a variety which is not highly prized for freezing but which was picked at the proper time and carefully processed. Most varieties which grow well in Kansas can be preserved by freezing.

Blanching.—All vegetables must be blanched or scalded before freezing because they contain enzymes which, if not destroyed, would materially change the flavor of the vegetables even when frozen. Vitamins are not destroyed by the blanching, but break down rapidly if the products are not placed in the sharp-freezing room promptly. Some vitamins and soluble minerals, no doubt, are lost in the blanching process especially if products are over-blanched. Leaching of valuable vitamins and minerals will continue in the cooling process. The products should not be left in the cold water any longer than is necessary to cool them.

Blanching consists of a short heating or cooking in boiling water or with steam followed by quick cooling in fresh, cold running water or in a large volume of cold water. The vegetables are placed in a wire basket or perforated metal container and submerged in the boiling water for a period long enough to heat the material through, but not long enough to soften the products. The volume of boiling water should be eight to ten times the volume of the products blanched so the boiling temperature may be maintained during the blanching period. A quart or two pounds is about the maximum amount of most vegetables that should be blanched at one time. Larger quantities tend to lower the temperature of the blanching water too much. (Fig. 3.) Commercial processing plants may prefer to use live steam for blanching. If steam is used for this purpose in a container which is not tight enough to build up a pressure, the recommended blanching period should be doubled. Steam blanching is not recommended for home use.

There are two general methods of packing vegetables:

1. **Packed dry.**—Many vegetables such as peas, corn and beans may be packed dry. These vegetables are sorted, washed, blanched and packed into containers as soon as they are cooled.

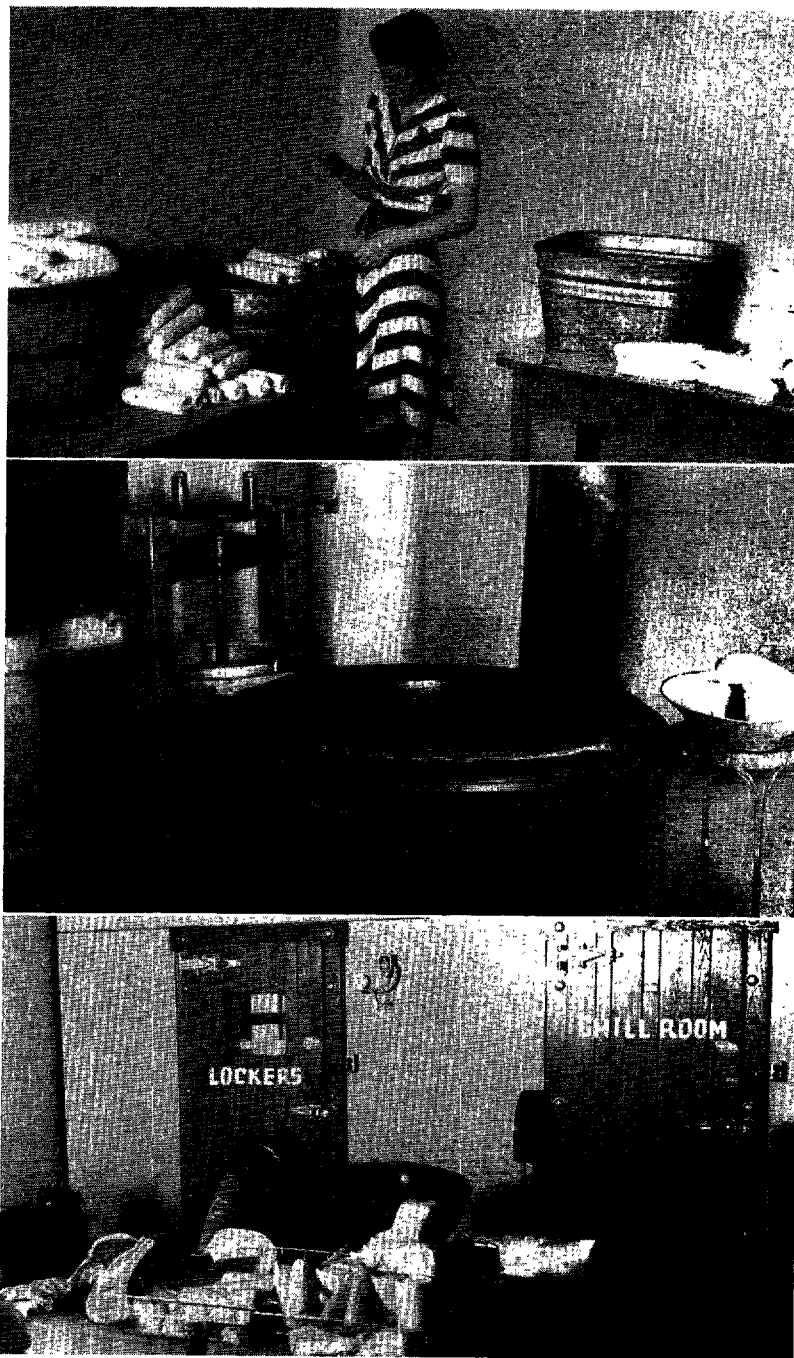


FIG. 3.—Many Kansas locker plants are equipped to process foods, and also operate retail markets in connection with the plant. A room for blanching vegetables is shown at the top of this page; corn is being cooled after blanching. A lard-rendering kettle provides more service (center). A retail market may be operated in connection with the plant (bottom).

2. **Packed with brine.**—Vegetables like asparagus, cauliflower, and broccoli, which tend to get too soft and lose their shape when blanched, are often packed with a 2-percent brine. This tends to keep them somewhat firmer. The brine solution commonly used is prepared by dissolving 1 level teaspoon of salt in 1 cup of cold water or 4 level teaspoons of salt for 1 quart of cold water. This makes approximately a 2-percent solution and is about the amount of salt usually added when the products are cooked.

Although vegetables packed by commercial concerns are practically all packed dry, the addition of a 2-percent salt solution has some advantages for products intended for home use. Brine prevents the desiccation of products which are packed in containers that are not moisture tight. Some vegetables hold their shape, flavor, and color better if packed in brine. Brine tends to keep the vegetables from becoming warm while being hauled to the locker and the frozen brine prevents rapid thawing out while the products are being transferred home from the locker. The brine pack also has some disadvantages. If the concentration of brine is more than two percent the products may become tough. There is always a possibility of leaks developing in cartons or around the lids of other containers. The brine adds weight to the products handled. Then, too, there is danger of using too much brine and the containers, especially glass jars, are subject to breakage when frozen.

Products for freezing.—Only the best quality vegetables should be stored in freezer lockers. The proper degree of maturity is the same as that of vegetables for immediate table use. Over-ripe, immature, or spoiled vegetables will be of even lower quality when removed from the locker. Vegetables do not improve in the freezer locker. Due to the rapid loss of vitamins from vegetables and other changes, it is necessary to avoid all delays between harvesting and blanching and between packing and freezing. This is especially true during warm summer days.

The blanching periods recommended in the following discussions are for boiling water. Double the period for live steam not under pressure.

ASPARAGUS

Varieties.—Martha Washington and Mary Washington.

Preparation.—Harvest asparagus tips while tender and wash thoroughly. Cut into lengths to fit container, or into one-inch pieces for soup or creaming. Blanch small stalks 2 minutes, medium stalks 3 minutes, and large stalks 4 minutes; cool thoroughly.

Packing.—Place tips carefully into the container to avoid breaking the tender tips. Cover with 2-percent brine but allow sufficient space for expansion. Packing the stalks with

the tips down will assure the covering of tips with brine without filling the containers too full. Use containers from which contents can be removed without thawing.

Storing.—Take to the locker plant as soon as possible. Freeze in a sharp room at -10° to -20° F. and store at 0° F.

BEANS, GREEN AND WAX

Varieties.—Kentucky Wonder, Full Measure, Burpee's Stringless Green Pod, U. S. Refugee No. 5.

Preparation.—Harvest young tender pods, wash thoroughly and drain. Snip and cut to suitable lengths. Blanch 2 to 3 minutes and cool.

Packing.—Pack dry or in 2-percent brine but allow sufficient space for expansion. Brine over 2-percent tends to make beans tough. Pack the same day harvested.

Storing.—Freeze in a sharp room, -10° to -20° F. and store at 0° F.

LIMA BEANS

Varieties.—Green Prolific, Henderson Bush, Burpee's Improved.

Preparation.—Harvest while seeds are in green stage. Wash pods and drain. Shell by hand or use hand pea sheller or tight clothes wringer. (Pods blanched 1 minute in boiling water shell easier.) (Fig. 4E.) Place in wringer stem first. Blanch small beans 1 to 2 minutes, medium 2 to 3 minutes, and large 3 to 4 minutes; cool thoroughly.

Packing.—Pack dry. If container is not moisture-proof, cover with 2-percent brine.

Storing.—Freeze in a sharp room, -10° to -20° F. and store at 0° F.

EDIBLE SOYBEANS

Varieties.—Bansei.

Edible soybeans are harvested when seeds are in the green stage and handled like lima beans.

BROCCOLI

Varieties.—Italian Green Sprouting.

Preparation.—Harvest only tender flower parts. Wash and drain. Blanch 3 to 4 minutes; cool quickly.

Packing.—Pack into water-tight containers and cover with 2-percent brine.

Storing.—Freeze in a sharp room, -10° to -20° F. and store at 0° F.

CAULIFLOWER

Varieties.—Perfection, Forbes, White Mountain, Snowball.

Preparation.—Cut heads into desirable pieces. Trim and wash carefully. Blanch 3 to 4 minutes and cool.

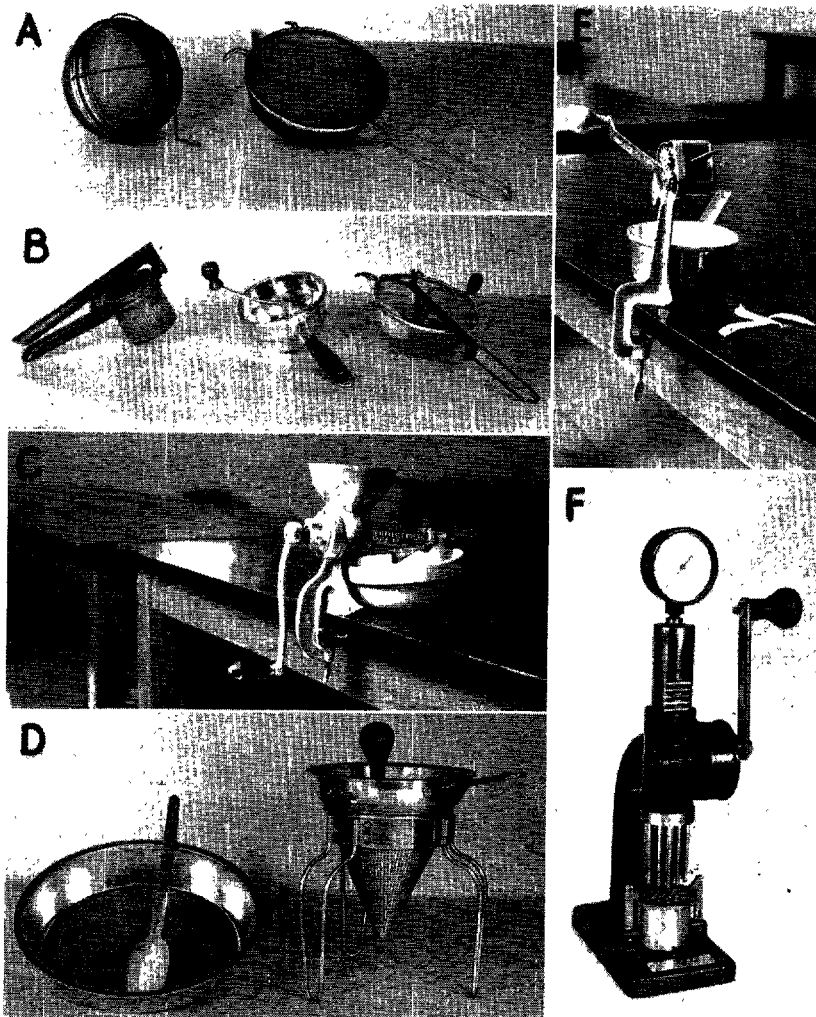


FIG. 4.—Equipment used in connection with preservation of frozen foods. A. Screen baskets used in blanching vegetables. B. Types of juice extractors that are slow and not very effective. C. A desirable fruit and vegetable juice extractor. D. Perforated "strainers" useful in draining fruit and vegetable juices. E. Handy small pea huller. F. Texture-meter, an apparatus for determining the toughness of vegetables.

Packing.—Pack into water-tight containers and cover with 2-percent brine.

Storing.—Freeze in a sharp room -10° to -20° F. and store at 0° F.

SWEET CORN

Varieties.—Golden Bantam, Golden West, Country Gentleman, Whipple's Early Yellow, Golden Cross Bantam, Golden Country Gentleman.

Preparation.—Harvest before grains become starchy. Husk and trim ears. On the cob, blanch small ears 5 minutes, medium ears 8 minutes, large ears 10 minutes. Cool thoroughly. Corn cut from the cob saves about 60 percent space. Blanch on the cob 4 to 5 minutes. Cool and cut from cob.

Packing.—On the cob, pack dry in suitable moisture-proof containers, or in double wrap of moisture-vapor-proof cellophane. Corn cut from cob, pack in moisture-proof containers dry or in 2-percent brine. Pack and freeze the same day harvested.

Storing.—Remove to storage plant quickly to avoid loss of sugar and quality. Freeze in a sharp room -10° to -20° F. and store at 0° F.

FIELD CORN

Field corn if harvested in full milk stage and handled as sweet corn, cut from the cob, yields a fair product. A teaspoon of sugar added to a cup of the 2-percent brine improves the flavor of field corn.

DILL

Dill often matures early in the season before cucumbers are ready for pickling. It can be preserved by freezing.

Preparation.—Harvest before going to seed. Cut leaves and stems into suitable lengths. Blanch 1 minute.

Packing.—Pack dry.

Storing.—Freeze in sharp room, -10° to -20° F. and store at 0° F.

OKRA

Varieties.—Dwarf Green.

Preparation.—Harvest when pods are young and tender and wash. Blanch 3 minutes and cool thoroughly.

Packing.—Pack dry in moisture-proof containers.

Storing.—Freeze in sharp room -10° to -20° F. and store at 0° F.

PEAS

Varieties.—Alderman, Early Alaska, Little Marvel, Laxtonian, Thomas Laxton.

Preparation.—Harvest peas when the pods are filled with young, tender peas but before they become starchy. Wash and drain. Shell by hand or use hand pea sheller or tight

clothes wringer. Blanching pods 1 minute in boiling water facilitates shelling. Place in wringer stem first. Blanch small peas 2 minutes, large 3 minutes. Cool thoroughly.

Packing.—Pack dry. If container is not moisture-proof cover with 2-percent brine.

Storing.—Remove to storage plant the same day as harvested. Freeze in sharp room, -10° to -20° F. and store at 0° F.

RHUBARB

Varieties.—Ruby, MacDonald, Canada Red.

Preparation.—Harvest early tender stalks. Wash and cut into pieces about 1 inch in length. Blanch small stalks ½ minute, large 1 minute. Drain and cool. Do not over-blanch. Rhubarb may be packed without blanching.

Packing.—Pack in water-tight containers. Cover with 50-percent syrup, (see table under fruits) or pack dry.

Storing.—Freeze in sharp room, -10° to -20° F. and store at 0° F to 10° F.

SPINACH

Varieties.—Long Standing Bloomsdale; New Zealand.

Preparation.—Harvest young tender leaves before flowering starts. Wash thoroughly. Blanch 2 minutes and stir while blanching. Cool quickly and thoroughly.

Packing.—Pack dry in moisture-proof containers.

Storing.—Freeze in sharp room, -10° to -20° F. and store at 0° F.

SWISS CHARD

Varieties.—Lucullus.

Select tender leaves and stalks. Cut into suitable lengths and process like spinach.

CARROTS, KOHLRABI, PARSNIPS, AND TURNIPS

Preparation.—Harvest while tender, of medium size, and mild flavor. Wash thoroughly. Trim roots and tops. Peel or scrape. Slice into one-half inch slices or dice into cubes. Blanch 2 to 3 minutes. Cool and drain.

Packing.—Pack dry or in 2-percent brine.

Storing.—Freeze in a sharp room, -10° to -20° F. and store at 0° F.

TOMATO JUICE

Select full-vine-ripened tomatoes. Wash and cut into quarters or eighths. Place in a kettle over a low flame and simmer 5 to 10 minutes. Pour into a screen basket and drain juice. Work with a ladle to free the juice. Some fine pulp in the juice is desirable. (Fig. 4.) Add 1 teaspoon of salt for each quart of juice. Pour into glass liquid-tight containers. Allow at least 10 percent head-room for expansion. Freeze in a sharp room, -10° to -20° F. and store at 0° F. to 10° F.

A summary of preparing vegetables for freezing is presented in Table 2.

TABLE 2.—PREPARATION OF VEGETABLES FOR FREEZING.

Vegetable and Variety.	Maturity.	Preparation.	Blanching period.	Pack.
Asparagus; Martha Washington, Mary Washington.	Tender tips.	Cut 6-inch lengths or 1 inch for soup.	Small stalks.....2 min. Medium stalks...3 min. Large stalks.....4 min.	In 2% brine.
Beans; Green and Wax, Kentucky Wonder, Full Measure, Burpee Stringless Green Pod, U. S. Refugee No. 5.	Young, tender.	Snip, cut suitable lengths.	Small .....2 min. Large .....3 min.	Dry or in 2% brine.
Beans; Lima, Green Prolific and others.	Green, firm.	Shell.	Small .....2 min. Medium .....2½ min. Large .....3 min.	Dry or in 2% brine.
Beans; Edible Soy, Bansel.	Green, firm.	Shell.	2 to 3 min.	Dry.
Beets; Early Blood, Detroit Dark Red and others.	Young, tender.	Wash, leave tip roots and one inch of tops.	Cook until soft, cool, trim roots and tops, remove skins.	Small beets whole, large sliced or diced; 2% brine.
Broccoli; Italian Green Sprouting and others.	Tender flower parts.	Wash, cut to suitable lengths.	3 to 4 min.	In 2% brine.
Cauliflower; Perfection Forbes, White Mountain, Snowball.	Solid heads.	Cut heads into desirable pieces, trim and wash.	3 to 4 min.	In 2% brine.
Corn; Sweet, on cob, Golden Bantam, Golden West, Country Gentleman, Whipple's.	Before grains become starchy.	Husk, trim, cut to suitable lengths.	Small ears .....4 min. Medium ears .....6 min. Large ears .....10 min.	Dry.
Corn; Sweet, cut from cob (Save about 60 percent space).	Before grains become starchy.	Husk, trim, blanch before cutting from cob.	4 to 5 min.	Dry or in 2% brine.
Dill.	Before going to seed.	Cut leaves and smaller stems to suitable lengths.	1 min.	Dry.
Peas; Laxtonian, Alderman, Thomas Laxton, Early Alaska, Little Marvel.	Sweet, before peas become starchy.	Shell, discard old peas.	Small .....1 min. Large .....2 min.	Dry or in 2% brine.
Rhubarb; Ruby, MacDonald.	Early, tender stalks.	Trim, cut stalks 1-inch lengths.	Small .....½ min. Large .....1 min.	In heavy syrup or dry.
Spinach; New Zealand, Savoy types.	Young tender leaves.	Wash thoroughly.	2 min.	Dry or in 2% brine.
Swiss Chard.	Tender leaves and stalks.	Wash, cut into 1 inch pieces.	2 min.	Dry or in 2% brine.
Tomato Juice.	Fully ripe fruit.	Cut into pieces, simmer 5-10 min. Extract juice through colander or screen basket. Include some fine pulp.		Salt to taste.

TOUGH VEGETABLES

There are five reasons why vegetables which have been in a frozen food locker may be tough when taken out for use.

1. The products were over-mature and too tough when processed. For best results vegetables should be at optimum maturity for immediate table use.

2. The vegetables may not have been sufficiently blanched and the products continued to ripen and toughen in the locker because all the ripening enzymes were not destroyed.

3. Storage temperature may be too high. Various chemical changes take place unless products are kept at 0° F., or only slightly above.

4. If vegetables are covered with a brine solution stronger than 2 percent, the products may become tough.

5. Vegetables kept in containers that are not moisture-proof may lose enough water to wilt. Wilted vegetables may be tough if cooked without first being soaked in cold water long enough to become turgid. (Fig. 4F.)

ADDITIONAL SUGGESTIONS

Fruits and vegetables used for freezing should be of the best quality and should be properly matured. Fruits should be ripe enough for immediate use and yet not soft. Vegetables must be "table-ripe," tender, succulent, and free from serious defects. Over-ripe vegetables are tough and flavorless.

Fruits and vegetables should be processed and placed in the freezer the same day they are harvested, preferably within an hour or two after picking.

Containers should not be filled more than within three-fourths to one inch of the top where liquid is added to the products. Containers that are narrower at the top used for liquids are subject to breakage unless laid on their sides until contents are frozen.

Fruit and vegetable preservation by freezing is a relatively new industry and unless one has the necessary equipment and access to low temperatures for quick freezing and storage, he may be disappointed in results.

Labeling.—Careful labeling of each container, stating the kind and variety of fruit or vegetable, the treatment (if any given), date, and the locker number will greatly assist the locker renter in quickly locating what he has in the locker.

Waxed cartons and waxed paper can be marked with such pencils as Dixon's Phano for Glazed Surfaces No. 77 Eberhard Faber Weather-proof Lead Pencil No. 6639 and Blaisdell No. T173 for China marking.

Cleansing agent.—A solvent prepared by dissolving 2 ounces of calcium chloride in one-half pint of water to which is added a half pint of denatured alcohol is useful in removing food juices which may have been spilled in lockers or

have oozed out of containers that were too full. Pour the solvent over the spilled juices, allow to stand for a few minutes and mop up with a dry cloth.

USES OF FROZEN FRUITS AND VEGETABLES

In general, frozen fruits and vegetables can be used in the same manner as the fresh products. The frozen products contain virtually the same vitamins that are found in fresh fruits and vegetables and retain much of the fresh flavor. Frozen vegetables will require less cooking time than fresh vegetables. Vegetables frozen in brine are thawed over a low flame and cooked in the original brine. Those packed "dry" are placed in boiling water, seasoned, and cooked for a short time. The same precautions exercised in using canned vegetables should be observed with frozen products.

PRESERVING MEATS IN FROZEN FOOD LOCKERS

By DAVID L. MACKINTOSH

Meat and meat products constitute a large part of the foods now stored in frozen food lockers. The standard commercial locker contains about six cubic feet of space, and will accommodate between 250 and 300 pounds of meat if it is carefully packaged and packed. The average family of five will consume about 700 pounds of meat during the year, which means that if the locker is to be used for poultry, fruit and vegetables, as it should be, the handling of the products to be stored must be distributed throughout the year as much as possible. Because fruit, vegetable and poultry harvests are seasonal, it may become advisable to rent additional space for a short period to care for this peak load.

Some livestock are raised on nearly all farms, and where livestock are produced, at least part of the home meat supply should also be produced.

Healthy, well-finished animals provide the best quality meat for storage. Only animals showing good quality and finish should be slaughtered for home use. Suggestions as to the weight and time of year to slaughter if a variety of meats is to be maintained in storage throughout the year, are contained in Table 3.

TABLE 3.—APPROXIMATE YIELDS OF EDIBLE MEAT AND BY-PRODUCTS OF LIVESTOCK CARCASSES.

	Slaughter.	Live weight.	Dressed weight.	Pack'g'd weight.	Lard.
Hog	October	225	180	130	35
Beef	February	750	410	325	.....
Hog	March	225	180	130	35
Lamb	June	90	45	35*	.....
Veal	June	200	110	90*	.....
Poultry	Summer .....				.....

*Either or both lamb and veal may be used. (If veal, slaughter in August or September.)

SLAUGHTERING

Slaughtering may be done on the farm or at the locker plant, but the most important precautions to insure good keeping qualities are:

1. Sanitary conditions.
2. Immediate and thorough chilling of the carcass. During the warm months the carcass should be taken to the plant immediately in order to insure proper chilling.

Sanitation should be the watchword wherever food products are concerned. The Kansas State Board of Health in-

spects all frozen food locker plants operating within the state and requires each plant to meet certain sanitary standards, therefore each locker patron may feel fairly secure insofar as the sanitation and proper handling of food products in Kansas are concerned. With adequate sanitary precautions, there is no danger from food poisoning. The Kansas State Board of Health sanitary regulations for frozen food locker plants appear as an appendix to this circular.

All carcasses should be allowed to chill for 24 to 48 hours at a temperature of 34° to 36° F. before cutting. Pork and veal should be cut, packaged and placed in storage as soon after chilling as possible. Quality beef and lamb are improved by aging, and should be allowed to age or ripen in the chilling room for a period of 10 to 21 days. This ripening process increases the tenderness and develops flavor. Recent studies indicate that freezing has a tenderizing influence upon fresh beef. There seems to be no increase, however, in tenderness resulting from freezing following aging.

PACKAGING

Meat should be cut and packaged according to the family needs. The rough cuts may be boned or partially boned in order to conserve locker space.

TABLE 4.—CONSERVATION OF LOCKER SPACE BY BONING CUTS.

Boned cuts		Lbs.	Regular cuts		Lbs.
Outside chuck, potroast.....	4.6		Shank soup bone	3.8	
Outside chuck, potroast.....	3.9		Shank soup bone	3.5	
Boned bread and butter potroast	5.1		Brisket boil	3.75	
Stew	2.2		Brisket boil	4.25	
Stew	2.1		Shoulder knuckle	4.8	
Stew	2.2		Boiling meat	4.7	
Boned brisket (boil)	5.5		Bread and butter cut	3.6	
Inside chuck, roast	5.0		Top chuck, potroast	8.3	
Inside chuck, roast	5.6		Chuck rib, potroast	5.1	
Shoulder arm, potroast.....	5.9		Shoulder arm, potroast	5.6	
Ground beef	10.0		Shoulder arm, potroast	4.4	
			Chuck rib, potroast	5.9	
			Chuck rib, potroast	10.0	
Total	52.1		Ground beef	5.0	
Bones	20.3				
Loss in trim	2.6				
			Total	72.7	
Total	75.0		Loss in trim	2.3	
Volume, cu. ft.	2.3		Volume, cu. ft.	3.1	

The right side was cut in the regular manner and yielded 72.7 pounds of packaged meat, which occupied 3.1 cubic feet of space, or about one-half of the space in the average locker. In terms of costs on a yearly basis that would be nearly 7 cents a pound and only three-fourths of the meat packaged was edible, the balance being bone.

The forepart of the carcass, sometimes known as the Kosher chuck, and including the square cut chuck, the brisket and shank, offers an opportunity to conserve much space by boning. The three cuts named represent nearly one-third of the entire side of beef and that one-third contains approximately one-fourth bone.

In order to show what may be accomplished by boning this part of the carcass, the opposite sides from a carcass grading low-good were used. The three cuts combined from each side weighed 75 pounds. One side was cut in the regular style, leaving practically all the bone in the cuts, while the opposite side was boned and packaged as bone-free roasts, pot roasts, stewing and ground beef. A list of the resulting cuts from the two chucks and the weight and storage space saved are presented in Table 4.

The left side was boned and rolled. It yielded 52.1 pounds of edible meat which occupied 2.3 cubic feet of space in the locker. The cost per pound for storage in this case is slightly higher than in the first, but it is for edible meat—not meat that is only three-fourths edible, and in addition 0.8 of a cubic foot of space in the locker was saved for other products. (Fig. 5.)



FIG. 5.—These two chucks weighed the same. The one on the right was cut in the regular manner, yielded 72.7 pounds of packaged meat which occupied 3.1 cubic feet of space. The one on the left was boned and rolled; it yielded 52.1 pounds of edible meat which occupied 2.3 cubic feet of locker space, at a saving of nearly 1 cubic foot of locker space.

The cutting costs per pound on the carcass basis would be the same, but boning work should be charged as an additional service. The time required to cut and package the bone in the chuck was 25 minutes, whereas one hour was required for boning, tying and packaging of the opposite side, therefore requiring an additional 35 minutes of time. Figuring the operator's time at \$1 per hour, 52 pounds were boned, tied and packaged in slightly over one-half hour of time or at approximately a cost of 1 cent per pound the patron saved storage on 20 pounds of bones which at 7 cents per pound would mean \$1.40 and at the same time had 0.8 of a cubic foot additional space to use for other products.

Under such conditions, boning meat is a justifiable service for all concerned. The bones removed from the right side produced two quarts of soup stock, which of course did not need to be stored in a frozen condition.

WRAPPERS

Only paper recommended and proved as suitable for packaging meat for storage should be used. The chief requirements for such a paper are that it be tough, moisture-proof, and prevent the absorption of outside flavors and odors. The paper should not absorb blood, water, oil or grease, impart flavor to the meat or become brittle and crack at low temperatures. Because of these many requirements, it is only within recent years that real good locker paper has been available. Today there are a number of papers available, any one of which fulfills nearly all of these requirements.

Everyone has his own individual technique for wrapping a package, but there are a few points that should be carefully observed when wrapping foods, particularly meat, for storage in a freezer locker. Some of these are:

1. Use a sufficient amount of paper to permit enveloping the meat completely. The ends should be carefully creased and folded so as to make the package as nearly airtight as possible.
2. Always use two wrappers. This gives added protection, aids in reducing shrinkage, and helps to make the package airtight.
3. Use only recommended papers for both inside and outside wrappers. In order to reduce the cost of packaging, some individuals use ordinary wrapping paper for the outside wrapper. Such a practice offers no added protection to the meat unless the inside wrapper is a moisture-vapor-proof cellophane.
4. Tie securely with cord or gummed tape. Wire staples should be avoided as stapling punches holes in the wrapper, and permits air to enter the package.

5. Mark each package plainly, giving the kind of meat, the cut of meat, date of packaging and locker number:

Beef
 2 T-Bone steaks
 February 6, 1943
 Locker No. 215

Suitable wrapping paper is available in different colors, and it is sometimes convenient to wrap each kind of meat in a different colored paper so that less time will be taken in locating beef, pork, veal or lamb as the case may be.

Many plants use 18-inch rolls of paper for wrapping. A 16-inch roll of cellophane such as No. 300 Sp. M.S.T. for the first wrap and an 18-inch roll of butcher paper for the outside make a good combination.

FREEZING

The meat should be frozen immediately after wrapping, otherwise the meat juices will tend to soak the wrapper. All products should be frozen as rapidly as possible. Where available, a "sharp freeze" (-20° to -30° F.) should be used. If a sharp freezer is not available, the packages of meat should be spread out in the coldest space available and allowed to remain there until completely frozen. Meat should never be placed in the locker until it has been frozen hard. Failure to take this precaution frequently results in unnecessary losses.

The storage room temperature should be 0° F. or lower, for most satisfactory results. In the case of vegetables, the loss in vitamin content is considerable at temperatures higher than 0° F.

All fats tend to become rancid in storage, and some, such as pork fat, develop rancidity sooner than others. Since a rancid flavor makes meat unpalatable to the majority of persons, there should be a consistent turn-over in the locker contents. Careful wrapping with good paper and a storage temperature of 0° F. will do much to prevent the development of rancidity. The following suggestions are offered with reference to the length of time meat can be stored safely.

Fresh pork—Three to five months
 Beef—Six to 12 months
 Lamb—Six to nine months
 Veal—Six to nine months
 Ground beef—Maximum of three months
 Poultry—Six to 12 months
 Fish—Three to four months

Poultry.—Poultry should be handled according to the suggestions given for other meats. Only high quality poultry should be used for storage. It should be remembered that freezing does not improve the quality of any food product. All classes of poultry are readily adapted to storage in a frozen food locker. Birds to be stored in this manner should

be killed, thoroughly bled, and plucked either by the dry or "slack scald" method. Chill over night, then singe, wash, draw and cut up as desired. There are three styles of dressing poultry for storage.

(a) Roasters.—Large, meaty birds fully-cleaned and drawn but not cut into pieces. This method of storing uses an undue amount of storage space, and the birds should be glazed before wrapping.

To glaze a fowl (or fish), it should be frozen without wrapping, then dipped into cold water two or three times. This will produce a thin film of ice over the entire surface of the meat, which should then be wrapped in the prescribed manner and stored in the locker. Glazing helps to prevent excessive drying.

(b) Broilers.—Young, soft-boned, soft-meated birds, fully cleaned, split down the back and drawn. The bird is divided into two equal pieces, and two or four pieces may be packed in one package.

(c) Fowl and fryers are fully cleaned, drawn, and disjointed into 12 pieces. These are usually packed in jars or cartons. The giblets should always be removed from the bird, and packaged separately. All poultry, unless glazed, should be wrapped or packaged before freezing, and all packages should be clearly labeled and dated. Use a sharp freezer and store at a temperature of 0° F. for best results. The availability of poultry and its suitability for different purposes is so distributed throughout the 12 months that poultry in some form should always be available in the locker.

Game.—Fish, game, and cured meat may all be stored in a locker if desired, provided the regular precautions regarding packaging and sharp-freezing are observed. When storing game, one should be familiar with the regulations regarding the legal period of storage for each kind of game and the amount that may be stored.

It is always advisable to "glaze" fish before storing in the locker. Because fish, like pork fat, tends to develop rancidity easily, fish should not be stored for a period longer than four months.

Eggs.—Egg production is seasonable, but an ample supply of eggs for family use may be had at a minimum cost by freezing eggs when they are plentiful and the market price is low.

Fresh, chilled eggs are prepared for locker storage by breaking them into a clean bowl and beating or churning them thoroughly until the yolks are broken and well-mixed with the whites. This churning prevents an undesirable coagulation of the yolk solids during storage. The whites may be separated from the yolks and packaged without churning, but the yolks should be well beaten.

Commercial companies package liquid eggs in sterilized

air-tight cans. Waxed paper cartons, as nearly air-tight as possible, are used in most locker plants where tin is not available. Containers should be of such size that each one will contain about enough eggs for a meal of scrambled eggs, a cake, or a batch of salad dressing.

Frozen eggs may be thawed in the refrigerator or at room temperature. If the container is tight, they may be thawed in running water. Thawed eggs may be cooked or used in baking just as fresh eggs except that they should be used promptly after thawing.

COOKING FROZEN FOODS

Freezing food products does not sterilize them. It merely stops action of most types of bacteria and enzymes. When frozen foods are allowed to thaw, the enzymes which are always present and the bacteria which may be present proceed with their work with increased vigor. Therefore, all frozen foods should be cooked before they have completely thawed or soon after thawing. Cooking of thawed meat should never be delayed.

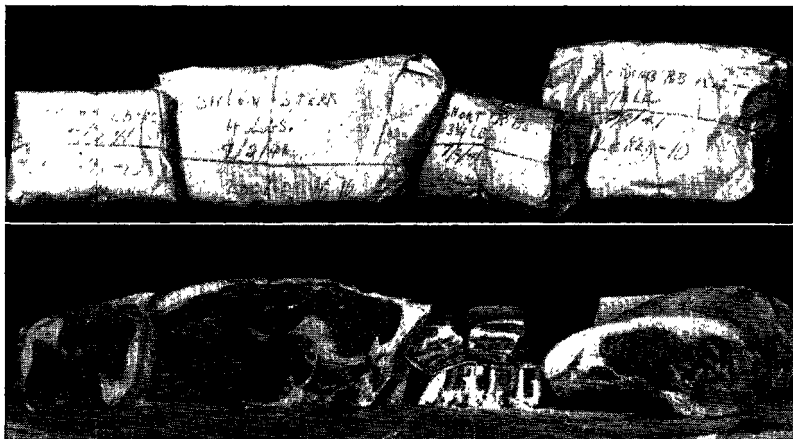


FIG. 6.—All items should be properly wrapped and plainly marked. The above illustration indicates a possible five-day supply of meat removed from the locker at one time. The pork chops should be used the first day; the short ribs would hold an extra day, the thick steak could be held in the ice box two or three days without deterioration and the roast could be held still longer. Such packages should be placed in the refrigerator without removing the wrapping paper until ready to cook.

A well-planned menu and proper use of the household refrigerator makes it possible to store a week's supply of meat. Pork chops or other small cuts of meat may be held in the ice box for 12 to 24 hours before completely thawed. Swiss steak or other thick cuts may be held an additional day, and

a fairly large roast will not be completely thawed for about three days.

All meat should be cooked at moderate temperatures. When frozen meat is cooked, low temperatures should be used and ample time allowed for both thawing and cooking. The "Time Table for Cooking Thawed and Unthawed Cuts" given in the appendix offers information from the best available source on the time necessary for cooking frozen meats.

APPENDIX

PREPARATION OF FROZEN FRUITS AND VEGETABLES
 FOR THE TABLE¹

Fruits are most satisfactorily defrosted by setting the unopened package in the refrigerator for 6 to 8 hours or until most of the ice crystals have thawed. If left under thawing conditions too long, the fruit becomes soft and loses its shape. The defrosted fruits after thawing may then be used as fresh fruit, taking into account any sugar or syrup that may have been added to the fruit before freezing.

Frozen vegetables are cooked prior to serving. They may or may not be defrosted partially before cooking. They should be cooked as soon as possible after removal from the frozen food locker. Frozen vegetables require approximately one-half the cooking time required for fresh vegetables. They may be served in the same ways as boiled or steamed fresh vegetables. The following table gives a comparison of the time required for cooking fresh vegetables and frozen vegetables.

TIME TABLE FOR COOKING VEGETABLES BY BOILING.

Vegetable	Approximate Boiling Time—Minutes	
	Fresh	Frozen
Asparagus		
Tips	5-10	3- 5
Butts	15-20	8-10
Beans		
Green Lima	25-40	16-20
Snap	25-30	12-15
Broccoli	15-20	5- 8
Cauliflower	8-10	5
Corn—cut from cob	6-10	3- 5
Corn on the cob	6-10	3- 5
Peas	15-30	6-12
Spinach	4- 5	3- 4

1. Tables on preparation of frozen fruits, vegetables and meats by Dr. Gladys E. Vail, Department of Home Economics, Kansas Agricultural Experiment Station.

PREPARATION OF FROZEN MEATS FOR THE TABLE

There is little difference in the quality of meat which has or has not been thawed before cooking begins. There is considerable difference in the cooking time as is indicated in the table below. For that reason it is often desirable at least to thaw the meat partially before cooking.

TIME TABLE FOR COOKING THAWED AND UNTHAWED CUTS¹

Cut	Method of cooking.	Thawed		Unthawed	
		Minutes per pound.	Total time, minutes.	Minutes per pound.	Total time, minutes.
Standing Rib Roast (4-7 lbs.)					
Rare	Roasting at	18-20		48-45	
Medium	300° F.	22-25		47-50	
Well-done		27-30		55-60	
Rolled Rib Roast (4-7 lbs.)					
Rare	Roasting at	28-32		53-55	
Medium	300° F.	32-38		57-60	
Well-done		40-48		65-70	
Beef Rump (3-5 lbs.)	Braising	50		60-70	
Porterhouse Steak					
1 inch thick.....	Broiling		20-25		35-40
1½ inches thick....	(rare to medium)		30-35		50-55
2 inches thick.....			40-45		60-65
Club Steak					
¾ inch thick	Broiling		12-15		24-28
1 inch thick.....	(rare to medium)		15-20		30-35
Beef Patties					
1 inch thick.....	Broiling (rare to medium)		16-20		30-35
Lamb Chops					
1½ inches thick....	Broiling		18-20		30-35
Shoulder Lamb Chops					
1 inch thick	Broiling		12		18-20
Boneless Lamb					
Shoulder (3-4 lbs.)	Roasting	40-45		50-60	
Leg of Lamb (6-7 lbs.)					
	Roasting at				
	300° F.	30-35		45-50	
Pork Chops					
¾ inch thick	Braising		45		55-60
Pork Loin (3-4 lbs.)					
Center Cut	Roasting at	35-40		55-60	
Rib or Loin End...	350° F.	50-55		70-75	

1. Cooking times given are approximations. Meat at room temperature cooks in less time than meat at refrigerator temperature. As the size of roast increases, the cooking time per pound tends to decrease. Distribution of the fat and shape of the cut also affect required cooking time. Recent experiments at the Kansas Agricultural Experiment Station and other experiment stations indicate, for certain methods of cooking, the desirability of longer cooking than was formerly recommended.

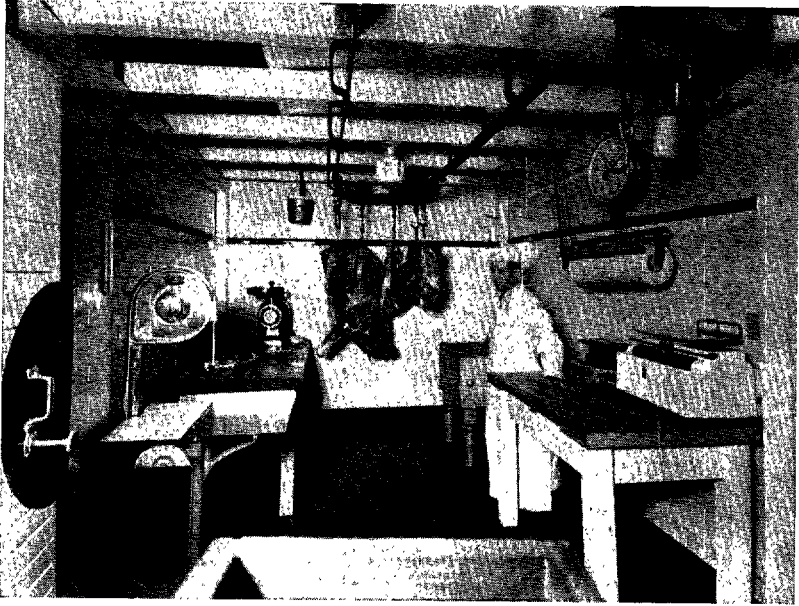


FIG. 7.—A well-equipped and sanitary processing room for meat products is essential.



FIG. 8.—A smokehouse such as this one enables the locker plant to supply more service to its patrons.

Kansas State Board of Health

Sanitary Regulations Concerning Frozen Food Locker Plants

(1) **Frozen food locker plants defined.** For the purposes of these regulations, a frozen food locker plant shall mean any plant which provides lockers, cabinets, boxes, baskets or other receptacles kept constantly under freezing temperatures for the storage of food products.

(2) **Means for cleansing and sterilizing tools and equipment.** Every frozen food locker plant shall be provided with, adequate means for washing and sterilizing tools and other equipment. An adequate supply of safe water shall be provided and if hot running water is not available, means of heating shall be provided.

(3) **Sodium hypochlorite for sterilizing tools and equipment.** All tools and utensils used for the processing of meats shall be thoroughly cleaned after processing of each patron's meat and sterilized in a solution of sodium hypochlorite or equivalent chlorine preparation containing not less than 200 parts per million of available chlorine, before being used for further processing.

(4) **Toilet and handwashing facilities.** Each plant shall be provided with adequate sanitary toilets and proper handwashing facilities. Every person handling food products in the plant shall be required to wash his hands after use of the toilets. Clean individual towels shall be provided.

(5) **Personal uncleanness prohibited.** Where patrons of frozen food locker plants are permitted to prepare their own products for storage, they shall wear clean clothing, refrain from the practice of unclean habits and from the use of tobacco within the plants.

(6) **Inspection by plant operator.** All food products shall be subject to the inspection of the plant operator. Any meat products showing obvious signs of disease or decomposition shall be rejected for storage. Any vegetable or fruit products showing obvious signs of decomposition or infestation with insects shall be rejected for storage.

(7) **Packaging for storage.** All products shall be prepared for storage in frozen food lockers by packaging in some impervious type wrapper or container. The use of newspapers, bread wrappers and other similar materials is prohibited.

(8) **Human food only to be stored.** Only food products for human consumption shall be permitted to be processed in the processing room, or stored in a locker room or locker of any frozen food locker plant.

(9) **Products to be frozen before storage.** All food products shall be completely frozen before storage in lockers.

(10) **Place for processing.** All processing shall be done in an enclosed or semi-enclosed place, used only for the purpose of processing foods and not open to persons not engaged in the processing of foods for storage.

Suggestions Regarding Use of Frozen Food Lockers

Freezer lockers in Kansas vary in type from a single storage or locker room to a complete service plant. For future plant installation a complete service plant is recommended.

A complete service plant has the following units:

1. **Locker room**.—A temperature not higher than 0° F. should be maintained.
2. **Sharp freeze**.—A maximum temperature of 0" F. or lower should be maintained. Racks should always be used on the coils.
3. **Work room**.—Should be cooled—temperature 40° to 50° F. Blocks, grinder, saw, wrapping table, etc.
4. **Chill room**.—Temperature of 32° to 36° F. should have adequate refrigeration to pull to 28° F. if necessary.

Additional Services:

1. **Rendering**.—Rendering equipment should be in separate room.
2. **Curing**.—May be done in chill room or separate cooler. Temperature of special cooler should be 35° to 40° F.
3. **Smoking**.—Smokehouse should be in rear.
4. **Slaughtering**.—Slaughtering facilities may be adjacent to plant. But most do slaughtering in the country and haul carcasses to cooler.
5. **Delivery**.—Know of no such service in Kansas.
6. **Processing fruits and vegetables**.—The rendering room may be employed for this type of service. The following items are recommended:
 - a. Sink and running water.
 - b. Source of heat. A stove capable of heating 10 to 20 gallons of water, or live steam and a closed blanching container.
 - c. Several large aluminum kettles and a few smaller containers.
 - d. Colanders to fit over kettles and several wire and screen baskets which fit into kettles.
 - e. Hand shellers for peas, lima beans and edible soybeans.
 - f. Measuring utensils and kitchen scales.
 - g. Waxed pencils for labeling containers. Eberhard Faber No. 6639 weather-proof and Dixon Phano No. 77 for glazed surfaces are good.
 - h. Trays to carry products into sharp room.
 - i. Strong cardboard boxes to carry products to and from the plant.
 - j. Properly-labeled sugar and salt containers with scoops in each.
 - k. Sharp, stainless knives, wooden ladles, long handled spoons.
 - l. Fruit and vegetable juice extractor.
 - m. A supply of containers; quart and pint sizes. Sealing devices if needed.

The following scale of charges seems typical in Kansas:

Complete service including chilling, cutting, packing, sharp freezing and placing in locker. One and one-half to two cents per pound in the carcass.

Locker rent:

(Approximately 6 cu. ft. in locker) \$9 by the year; \$1 per month. Special lockers more, smaller lockers less.

Individual charges:

1. Slaughtering—Hogs up to 250 pounds.....	\$1.00 to \$1.50
Over 250 lbs.—\$0.50 additional for each 50 lbs.	
Cattle	1.50
Calves .....	.75
Lambs .....	.50
Pick-up charges	1.00
2. Cutting, including wrapping .....	.01 per lb.
3. Grinding .....	.01 per lb.
4. Stuffing sausage .....	.01 per lb.
5. Curing and smoking .....	.01½-.02
6. Rendering lard .....	.02-.03
7. Sharp freezing only .....	.01 per lb.
8. Vegetables—complete service .....	.04-.06
9. Fruits—complete service .....	.05-.06
partial service .....	.03 per lb.
10. Poultry—sharp freeze—glaze and package .....	.03

The storage of fruits and vegetables in Kansas is advocated as a wise procedure for both locker patron and locker operator. Progress along these lines should be slow.

Types of wrapping paper:

Many varieties of freezer locker paper are now available. The chief requirements are: (1) tough, (2) moisture proof, (3) vapor proof, and (4) can be marked plainly.

- Special parchments
- Wax papers
- Special treated (Antioxidant)
- Pliofilm (Goodyear Rubber Company)
- Cellophane (Special treated)
- Cry-O-Vac (Latex)

Length of storage period:

- 1. Beef, 9 to 12 months
- 2. Pork, 3 to 5 months
- 3. Lamb, 6 to 8 months
- 4. Ground meat, maximum 90 days

Packaging:

- Pack in size pieces desired.
- Pack a minimum amount of bones.

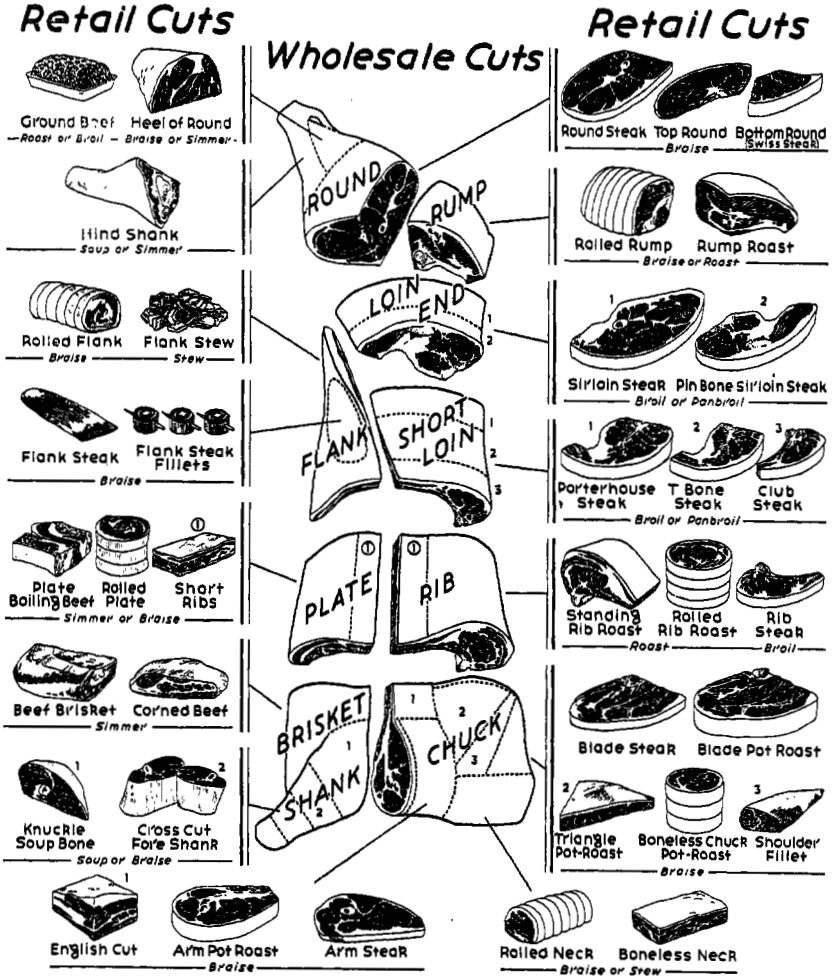
Inventory:

An inventory card for the locker contents is very desirable.

QUALITY PRODUCTS ONLY SHOULD BE STORED

Meat Cuts and How to Cook Them

BEEF CHART










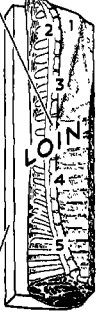








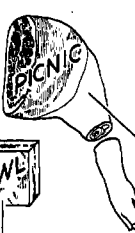























—Courtesy National Live Stock and Meat Board.

HINTS ABOUT BEEF

There is a cut of beef for every occasion. . . . When selecting a beef roast or pot-roast, it is wise to choose a larger one than is needed for one meal because this makes second and third day meal preparation easy. . . . Meat adds tastiness to vegetables cooked with it. . . . Beef roasts and cuts to be broiled may be cooked rare, medium or well-done, according to personal preference, but over-cooking should be avoided. . . . The fat of any meat enhances its flavor.

Meat Cuts and How to Cook Them

PORK CHART

Retail Cuts	Wholesale Cuts	Retail Cuts
 2 Sirloin Pork Roast Roast  1 Dark Tenderloin Frenched and Whole Broil or Braise		 Half Ham Butt End Bake or Simmer  Half Ham Shank End Bake or Simmer
 2 to 5 Canadian Style Bacon Broil  3 Loin Chop Broil	 LOIN  SIDE  SPARE RIBS	 Ham Butt Slice Broil or Panbroil  Center Ham Slice Broil or Panbroil
 4 Rib Pork Chop Broil or Braise  4 Frenched Rib Chop Broil or Braise  2 to 5 Butterfly Chop Broil or Braise	 BUTT  PICNIC  JOWL	 Fresh Ham Roast Roast  Rolled Fresh Ham Roast Roast
 1, 2 Loin Roast Ham End Roast  3, 4 Loin Roast Center Cut Roast	 Bacon Square Seasoning - Panbroil	 Bacon Broil - Panbroil or Seasoning  Salt Pork Broil - Panbroil or Seasoning
 5 Loin Roast Shoulder End Roast  4 Crown Pork Roast Roast		 Spareribs Simmer - Braise or Roast
 Fat Back Lard - Salt Pork  Lard Shorrering		 Fresh Picnic Shoulder Roast  Smoked Picnic Shoulder Bake or Simmer
 Blade Pork Steaks Braise  Smoked Cottage Roll Bake or Panbroil		 Cushion Style Picnic Shoulder Roast  Rolled Picnic Shoulder Roast
 Boston Style Butt Roast  Rolled Boston Style Butt Roast		 Fresh Shoulder Hock Simmer  Arm Pork Stear Braise

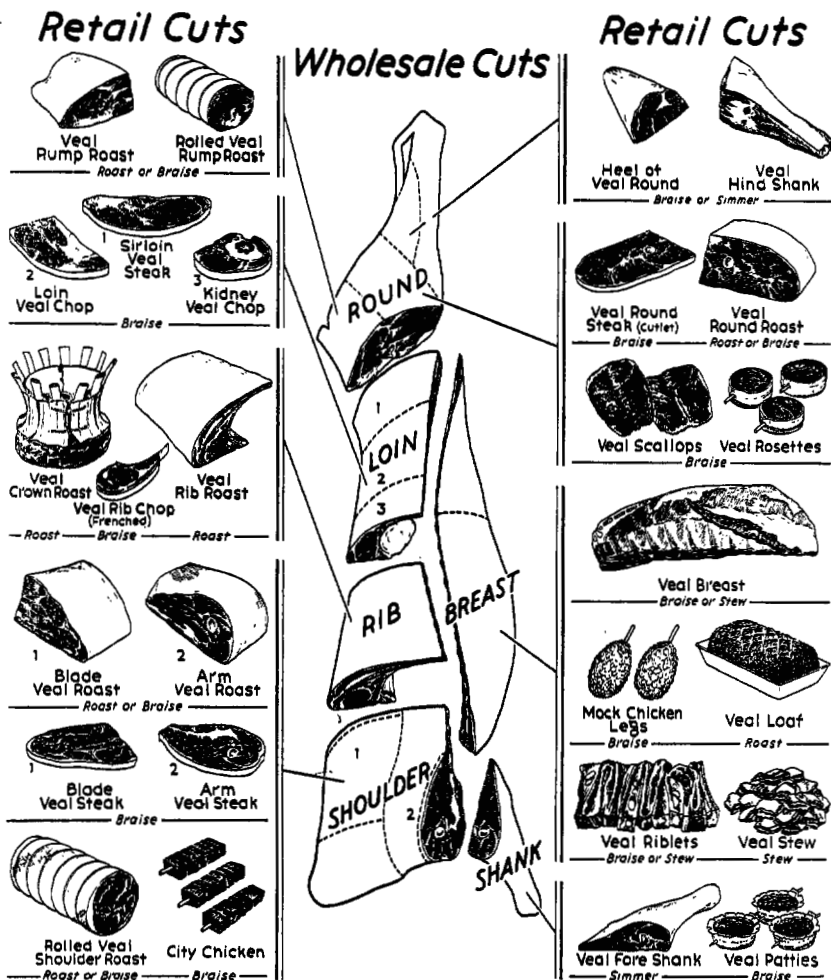
—Courtesy National Live Stock and Meat Board.

HINTS ABOUT PORK

Pork always should be cooked well-done to bring out its rich delicious flavor. . . . All pork cuts should be cooked slowly. . . . Carving a pork loin is easier if the backbone is separated from the ribs before cooking. . . . Bacon for breakfast starts the day right. In cooking, place in a cool skillet and cook slowly. . . . Do not hesitate to choose a whole or half ham, because it is good to the last bite, either hot, sliced cold, or in combination dishes.

Meat Cuts and How to Cook Them

VEAL CHART



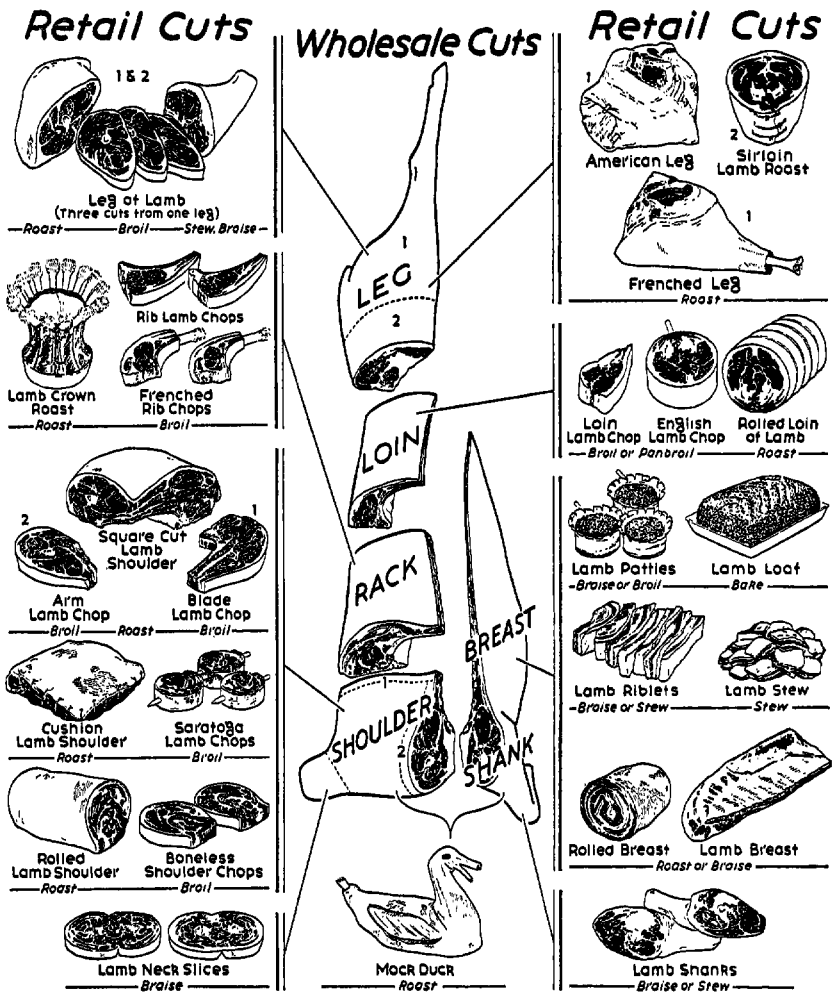
—Courtesy National Live Stock and Meat Board.

HINTS ABOUT VEAL

Veal is a very tender and delicately flavored meat. . . . Veal should be cooked slowly; veal roasts never should be seared. . . . Bacon or thin slices of salt pork may be placed on top of a lean veal roast for added fat. . . . Sour cream added to veal chops after browning gives a delightful flavor. . . . Veal birds are made by wrapping pieces of veal steak around a savory stuffing. . . . Leftover roast veal is excellent for a cold meat platter, sandwiches, salads or creamed dishes.

Meat Cuts and How to Cook Them

LAMB CHART



—Courtesy National Live Stock and Meat Board.

HINTS ABOUT LAMB

Lamb is a year around meat, always in season. . . . Every cut of lamb is tender and easily prepared. . . . The thin paper-like covering, known as the "fell," should not be removed from a leg of lamb for roasting. . . . Boning a lamb shoulder makes carving easy. The cavity may be filled with a savory stuffing. . . . Lamb is delicious if cooked just short of well-done. . . . Lamb may be served hot or cold, but never luke-warm. . . . The flavor of lamb combines well with all kinds of vegetables. . . . Lamb chops are best for broiling when cut thick, at least one inch.