

S.B.



\* MN 2000 EB- 244

c. 2

**FREEZING**  
\*  
**Foods**

UNIVERSITY OF MINNESOTA  
DOCUMENTS

for OCT 4 1982  
**Home Use**



UNIVERSITY OF GEORGIA  
NOV 24 '58  
LIBRARY



J. D. Winter

Andrew Hustrulid

Shirley Trantanella

Woodrow J. Aunan

Milo H. Swanson

UNIVERSITY OF MINNESOTA  
*Agricultural Extension Service*

U. S. DEPARTMENT OF AGRICULTURE

This archival publication may not reflect current scientific knowledge or recommendations.  
Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

## *Tips for Freezing . . .*

For top-quality frozen products, follow closely these simple rules for preparation, packaging, and freezing.

- ★ Select products of good quality. Freezing will not improve low-grade food.
- ★ Select those varieties of fruits and vegetables which are suitable for freezing. Process at the optimum stage of maturity—generally when ready for table use. Field ripened fruits are preferable. Prompt handling is of utmost importance in retaining vegetable quality.
- ★ Chill meats promptly and thoroughly after slaughtering. Beef, for freezer storage should not be aged as long as meat intended for immediate use. A common mistake is to age beef too long before it is frozen; this greatly reduces storage life.
- ★ With few exceptions, containers or packages of frozen food should be only large enough to hold a quantity that will be used or cooked at one time.
- ★ Use good packaging and wrapping materials. Unpleasant flavors in frozen meat often can be traced to use of poor wrapping material.
- ★ In freezing the product, avoid close packing in the freezer to allow heat to escape from food. The rate of cooling depends not only on air temperature, but also on air movement and on size, shape, and distribution of the packages.
- ★ Use a storage temperature of 0° F. or lower for most foods.

Frozen meat, poultry, fish, and eggs equal the fresh product in nutritive value. Retention of the nutritive value of fruits and vegetables depends largely on their treatment before freezing, on the storage temperature, and on the method of cooking and serving—much the same as with the fresh product. Retention of palatability usually results in retention of nutritive values.

# FREEZING FOODS

## For Home Use



J. D. Winter, Andrew Hustrulid, Shirley Trantanella, Woodrow J. Aunan,  
and Milo H. Swanson

**F**REEZING preserves a great many foods with very little change in flavor, color, texture, and nutritive value. Freezing is one of the simplest methods of home food preservation, and most foods can be prepared quickly and with relative ease.

If desired, complete, well-balanced meals can be prepared at almost a moment's notice from the freezer to the table, in some instances with little more preparation than heating or just thawing. Preliminary time-consuming preparation has been done before the products are frozen.

Frozen fruits and vegetables are popular because they add "out-of-season" foods to year-round menus. The homemaker will find almost endless possibilities in the freezing of ready-to-eat cooked foods, bakery goods, and school lunches. With a variety of frozen foods in a home freezer or locker drawer, marketing can be an occasional pleasure instead of a daily routine for the homemaker. Farmers can slaughter their animals at their prime condition instead of feeding them until

cold weather comes. City families can purchase meat in wholesale cuts at quantity prices.

Gardeners can freeze home-grown fruits and vegetables in their peak seasons while others may purchase these foods in season at a saving. Hunters and fishermen find freezing an ideal way to preserve their game and fish.

A common belief is that "quick frozen" foods must be frozen very rapidly to retain their quality. But "quick freezing" really means getting the product frozen before deterioration sets in. With most foods, no loss of quality has been noted in the laboratory when the product temperature is reduced to 20° F. within 10 to 15 hours after starting to freeze them. It is important, however, to lower the food temperature below 40° F. within 4 hours



FIG. 1. Freezer burn shown on bird at left is result of poor packaging. Water-vapor-proof plastic bag (right background) or aluminum foil are recommended for packaging poultry. Note the fresh appearance of the bird frozen in plastic bag (right).

to reduce the growth rate of spoilage organisms.

Retention of quality depends chiefly on (1) proper handling of the food before it is frozen, (2) good packaging, (3) storage at a temperature no higher than 0° F., (4) proper handling and cooking after removal from freezing storage.

**With most foods the rate of freezing, if fast enough to retard the growth of spoilage organisms, has relatively little effect on quality retention.**

Freezing does not sterilize the product, but the low temperature prevents the growth and development of harmful yeasts, molds, and bacteria. Many of these microorganisms are killed by freezing storage, but some survive. Consequently, cleanliness and sanitary methods are just as important in handling foods for freezing as in preparing foods for immediate table use.

Make sure that the water supply is clean and pure. See that all utensils are clean. Wash hands thoroughly.

## Packaging Materials

Undesirable flavors in frozen meat, poultry, and fish usually result from rancidity.

Rancidity in meats is most commonly caused by exposure of the natural fats and oils to atmospheric oxygen. The exclusion of oxygen from the package is an important factor in storing red meats and fish.

When a package is properly wrapped, the major loss of moisture is through the packaging material itself, rather than through the folds. Oxygen moves into the package in the same way.

"Freezer burn," a surface discoloration apparently caused by loss of moisture, may or may not be associated with rancidity. Freezer burn appears as light gray spots or areas on the surface of meat. On poultry, it appears as light-colored circular spots around feather follicles or as larger discolored areas on the skin surface.

To prevent freezer burn, proper freezing technique demands a wrapping material which will protect the product from loss of moisture. The wrapping should be pliable enough to make a tight wrap and prevent air pockets. Unless the wrap is snug and tight the quality of a good product may be lowered even though a good wrapping material is used. A wrap that permits "freezer burn" should be discarded.

Wrapping materials differ widely in their ability to exclude oxygen and retain moisture. Such differences are most important for red meats and fish **when the storage period at 0° F. exceeds 3 to 4 months.**

A good wrapping material for meats should be odorless, possess high wet strength, be greaseproof, and not tend to adhere to the meat. It should resist puncturing, be easy to mark, and not become brittle or crack at low temperatures.

A **single** wrap of one of the better materials will give better protection than a double wrap of an ordinary waxed locker paper, and will require less labor and less material. It costs lit-

tle if any more, per 100 pounds of meat wrapped, to use the best materials. The additional cost seldom exceeds 50 to 75 cents per 100 pounds of meat.

### Aluminum Foil

Numerous tests indicate that aluminum foil is one of the very best of the wrapping materials. It may be purchased as plain foil or as a wrapping with foil on one side, and paper, glassine, or other material on the other side. The latter type is known as laminated foil and is used with the foil side placed next to the meat. Both types are suitable for frozen foods.

For locker use, the best thickness of plain foil is .0015 inch (known as locker foil). For wrapping at home, .001 inch gauge may be used. Household foil or lighter gauge is not strong enough and may be too permeable due to pinholing.

### Cellophane

Of the many types of moisture-proof cellophane, very few are recommended for wrapping moist foods such as meat. For meats, use only types recommended by the manufacturer for this purpose. Unfortunately, the wrong types of cellophane are frequently sold for freezer wrappings.

Cellophane requires an outer wrap of stockinette or paper to protect it from breakage at low temperatures. To keep cellophane soft and pliable, it should be stored in a damp cellar or room. If it has become dry and brittle, place it in the cellar at least

---

FIG. 2. Left—Foil may be used for wrapping poultry and other unevenly shaped products. In making the lock seam, do not draw the foil too tight; allow surplus to press and mold tight around the product. Press while the ends are still open.

Right—Close a foil wrap by pressing the ends of the wrap, starting next to the product. Then fold over to make a lock seam and press snugly against the product. No tape or twine is needed.

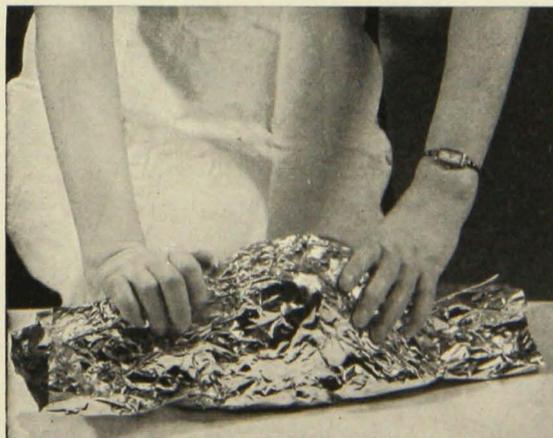




FIG. 3. Polyethylene bags are easy to fill. Bags made of transparent film may be closed by twisting and tying the tops with soft twine, rubber binders, or Twist-ems.

24 hours, or lay it between two damp towels several hours before using.

Cellophane may also be obtained in laminated form—cellophane laminated to kraft paper. This provides a stronger sheet. Place the cellophane side next to the product.

The proper types of cellophane are effective barriers to oxygen and water-vapor and are very satisfactory as a freezer wrap.

### **Polyethylene and Other Transparent Films**

New transparent films, most of which will stand more handling at low temperatures than cellophane, have been developed. They are available in sheet and in bag form. These films are sold under various trade names. Also, there are excellent wraps made by combining two films such as cellophane and polyethylene into one coated or laminated sheet.

Polyethylene bags are suitable for poultry, fruits, vegetables, and bakery goods, and they may be used for beef

and pork for storage periods of a few months. For longer periods a better oxygen barrier is preferred such as a cellophane-polyethylene combination or one of the saran-type films.

Transparent wraps used for fresh meats are not suitable for prolonged freezer storage.

### **Laminated Papers**

Many types of laminated papers are available. These may consist of two sheets of paper laminated together to form one sheet, or a plastic such as a pliofilm-type of film laminated to kraft paper. Most of these papers made for wrapping frozen foods are very satisfactory for this purpose.

### **Plastic Coated Papers**

New locker papers coated with various plastic formulations are being developed. These plastics provide a good water-vapor barrier and thus prevent freezer-burn if a tight wrap is made. No doubt the various formulations differ

in their effectiveness as a barrier to oxygen, although they are superior to ordinary waxed locker papers in this respect.

A single wrap of polyethylene coated kraft paper has been very satisfactory for ground beef and pork for storage periods up to 3 or 4 months. A longer storage period may be anticipated for poultry, and meat that is not ground.

### Wax Coated Papers

Ordinary waxed locker papers are not recommended for storage periods longer than about 60 days at 0° F. Some are better than others, but none tested was as effective for beef and pork as the packaging materials previously described, even when double wrapped.

A double wrap should be used for most locker papers of this type.

### Packaging in Ice

One of the best ways to freeze small fish such as smelts and panfish is in a block of ice. Place the dressed fish in any clean, water-tight container such as a cake pan or two pound coffee can and cover them with water. Ice is a very good barrier to oxygen in the air. When ready to use, thaw under a slow stream from the cold water faucet.

## How to Wrap

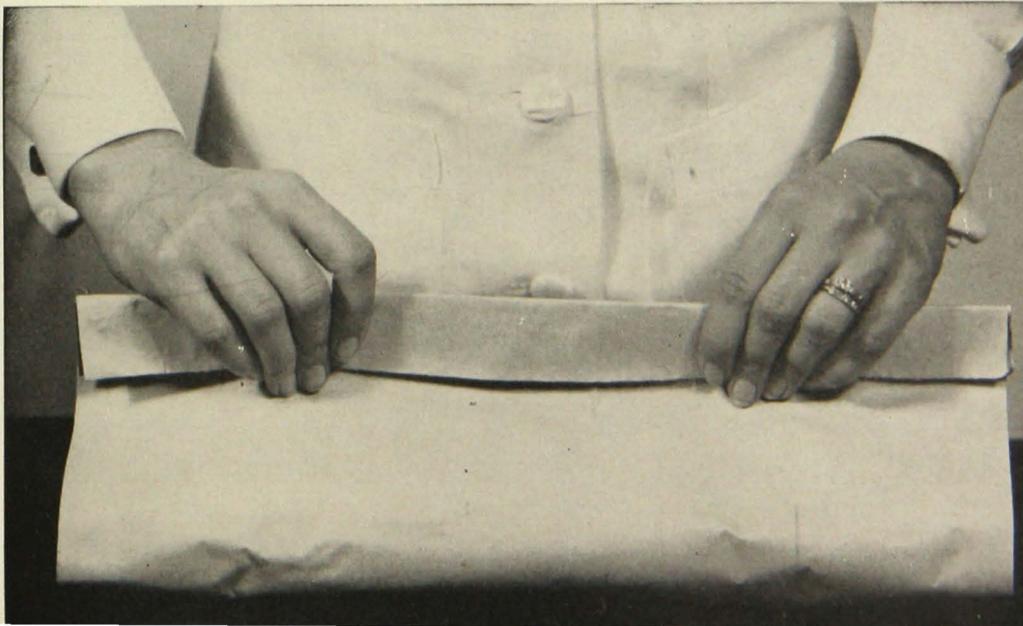
Freezer burn and rancidity may develop wherever air pockets exist in frozen food packages, even when the best wrapping materials are used. Tight wrappings, therefore, cannot be stressed too strongly.

The "freezer wrap" is the easiest method of making tight folds and a close, tight wrap. This wrap also takes about 20 percent less wrapping material than the "butcher" type of wrap.

To make the freezer wrap, place the product in the center of the paper. Bring the two longest sides of the paper together over the product and fold these edges over about one inch. Fold again as many times as necessary to bring the paper tight and flat against the top of the product. To avoid waste of wrapping material, the paper should be only long enough to make two folds.

---

FIG. 4. Start a "freezer wrap" by folding edges over, usually twice, to make a tight lock seam. A tight, snug lock seam should be made. Except when using foil, use locker tape or twine to hold the end folds in place. Tape is preferred because it holds down the ends very securely.



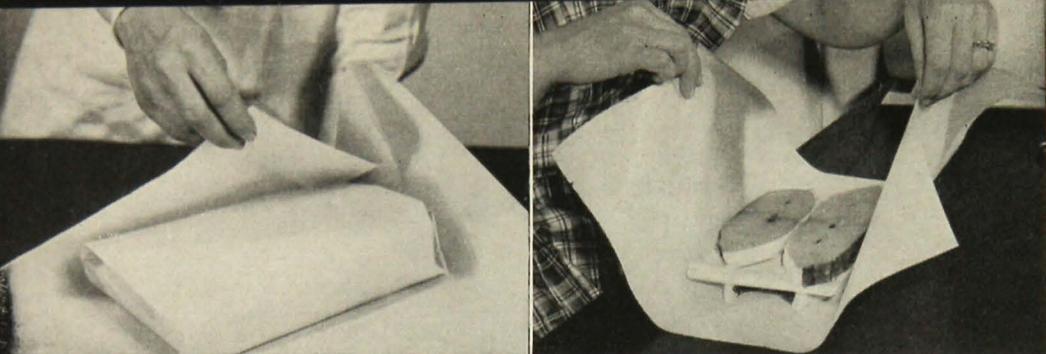


FIG. 5. Left—The butcher-type wrap is started by placing the meat close to one corner of the paper. A double wrap should be used with waxed locker paper.

Right—Use locker paper between layers of fish, chops, steak, or cut poultry, so that the pieces may be separated easily after the product is frozen. Note that the product is placed in the center of the wrapping when starting a druggist's wrap.

Turn the package over and fold end corners toward each other; then fold the ends over, stretch tight, and secure with locker tape or twine. Plain aluminum foil needs no tape or twine because the ends can be folded and rolled tightly into place.

The **butcher wrap**, commonly used at meat markets, is started by placing the product close to one corner of the paper. Then fold all sides over and roll the package over and over until all the paper is used. Secure with tape or twine. Tape will make a tighter seal.

An 18-inch width of paper will be satisfactory for wrapping most meats at home, although some large cuts of meat and large chickens will require a 24-inch width.

You will want to place "steak paper" between layers of meat and fish so that the layers can be separated while still frozen. Any frozen-food wrapping material or parchment paper will serve this purpose. Unless waxed both sides, fold paper double to make separation easy. Package all cuts flat, so that cooking can be started, if desired, before the meat is thawed out. Do not roll steaks. Wrap meat promptly after cutting.

Label all packages with the name of the product and the date. Use a soft crayon, china-marking pencil, or a special pen or brush.

## Wrapping Costs

A single freezer wrap will require about 80 square feet of paper per 100 pounds of meat, or 70 square feet of foil. A double butcher wrap will require about 200 square feet.

Wrapping and freezing meat at home costs about \$1.75 to \$2.25 per 100 pounds for the wrapping material (at retail cost) and for electricity used in freezing.

## Containers

Unwaxed or lightly waxed cartons made for ice cream, cottage cheese, and other purposes are unsatisfactory for freezing foods. Good results have been obtained with almost all types of frozen-food containers now on the market, so buy these for your home freezing. Select any container you prefer on the basis of convenience for use, space occupied in the locker or home freezer, and cost. Wide mouth glass canning jars may be used in a home freezer but are not recommended for locker plant use.

A clean, used can with tight cover is satisfactory. If without lid, cover with circle of locker wrap, hold in place

with binder, and secure snugly with locker tape. Remove binder. Special snap-on lids to fit Number 2 and Number 303 cans may be purchased for this purpose. Re-use only enamel-lined cans for fruits and vegetables frozen in the can. The cans should be cleaned and dried immediately after use.

Bulky vegetables, such as corn-on-the-cob, may be frozen and then stored in used potato chip or pop corn cans.

Polythylene plastic bags are excellent for bread, rolls, and similar baked foods.

The different types of containers vary in the amount of space they occupy in the home freezer or locker. Approximately 40 pint cartons, either rectangular or cube shape, can be stored in one cubic foot. A cubic foot will also hold 27-30 cylindrical or tub-type waxed containers of the pint size. About 25 glass freezer jars (pint) will fit into the same space.

Most bag containers may be closed satisfactorily by twisting the tops and tying with soft twine, rubber binders, or 4-inch Twist-ems. The latter, used by florists for tying, are inexpensive and easy to use.

Under home conditions, heat-sealing does not approach the effectiveness of factory heat-sealing. Twisting and tying, therefore, is usually to be preferred, even though the material can be sealed with heat.

## Freezing Operations

Foods may be frozen satisfactorily at temperatures of 0° to -10° F., or lower. The rate at which heat can escape from the product is more important than the air temperature.

Packages of unfrozen food should be spaced at least an inch apart to facilitate the escape of heat. In single-compartment chest units, the packages should be spread out in the lower third of the storage space, in contact with refrigerated surfaces if possible.

Home freezers have a limited freezing capacity. In well designed commercial units a freezing load of 2 to 3 pounds per cubic foot of storage space is allowable. For example, 24 to 36 pounds of unfrozen food may be placed in a 12 cubic foot freezer. With the packages spread out and in contact with refrigerated surfaces whenever possible, all the food will be frozen in 10-12 hours or less.

A few pounds of food may be frozen in a home unit at the regular storage temperature at 0° F., but for larger quantities it is advisable to set the cold control at -10° F., or lower, about 24 hours in advance. This temporary lowering of temperature will have no ill effect on the frozen food already in storage, and it will facilitate more rapid freezing. There is no gain in the rate of freezing by setting the temperature control to a lower value at the time that the unfrozen food is placed in the box.

Small home freezers are not satisfactory for freezing a quarter of beef or similar quantities of food at one time. Large quantities should be taken to a locker plant for freezing, or they can be frozen outdoors if the temperature is low enough.

In home freezers, the packages should remain in the freezing position for 24 hours before they are packed close together. At locker plants, the packages usually are held in the sharp-freeze room overnight.

A separate freezing compartment in a home freezer is sometimes convenient, but it is not a necessity because foods may be frozen satisfactorily in a single-compartment home freezer. In both instances, the condensing unit must be large enough to handle the added heat load.

## Storage Temperatures

Many persons believe that frozen foods will keep indefinitely if kept "frozen hard." This is not true. For example, noticeable loss of quality and

vitamin content is likely to occur in 10 to 20 days with many foods stored at about 25° F. in an "open-at-one-end" ice cube compartment of a household refrigerator.

Similar results may be expected from many foods after three to four weeks of storage in household refrigerator "freezer compartments" which maintain temperatures of about 15 to 18° F., or after 3 months in compartments that maintain temperatures of about 10° F. Such compartments will not store foods properly for long periods unless 0° F. or lower is maintained.

Most modern locker plants and home freezers are designed to maintain a temperature of 0° F. Some are designed to operate at -5° to -10° F. which is even better than 0° F., especially for pork, seafoods, and some precooked foods.

Most frozen vegetables held at 10° F. lose their vitamin C value at a rather rapid rate, but the loss is very slow at 0° F. or lower. Store fish and pork in the coldest part of the freezer (usually near the bottom in chest types), because they will keep better at a few degrees below 0° F. than at 0° F. The operating temperature of a home freezer should be checked with an *accurate* thermometer placed on top of the food packages.

Frozen foods do not store well at temperatures above 0° F. because higher temperatures permit undesirable enzyme activity. Enzyme action speeds up undesirable chemical changes which result in the development of unpleasant flavors in most foods, changes in color, and the destruction of vitamin C. Enzymes are very much more active at 10° F. than at 0° F.

Loss of quality *during* storage does not result from bacterial action when the food is held at 0° F. Although temperatures as low as 10-15° F. are required to check all growth of microorganisms on stored beef, comparatively few grow to any appreciable extent below 19° F. In fact, the destruction of bacteria in frozen beef and pork is more rapid at 20 to 25° F.

than at 0° F. Food which has been properly prepared and frozen may become unpalatable during frozen storage due to enzyme action if the temperature has been too high or if it has been stored too long. Such food is not likely to be dangerous to eat if it has remained frozen. The dangerous botulinum toxin is not known to develop below 40° F.

### Storage Time

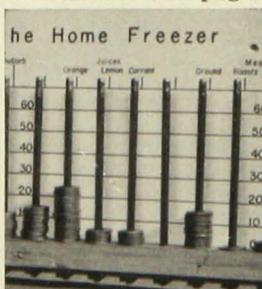
The length of time that various frozen foods may be expected to keep without appreciable loss of quality is shown in table 7 on page 47. The foods must be prepared and packaged according to the instructions in this bulletin and stored at 0° F.

Improper handling of the food before freezing, poor packaging, and a storage temperature higher than 0° F., all will reduce the indicated storage time. The rate of freezing, as explained on page 3, will make little difference.

Every effort should be made to have a fairly rapid turnover of frozen foods in storage. Storage periods should not be longer than those indicated in table 7. Some method of keeping an inventory of frozen foods in storage is very helpful.

### Frozen Food Register

A simple device for keeping a record of the food in storage is shown here. It consists of labeled pegs on which steel washers are placed to serve as counters. One peg is needed for each



kind of food in storage. This device gives a picture as well as an actual count of the food in storage. Detailed construction plans may be

obtained from the Bulletin Room, University of Minnesota, Institute of Agriculture, St. Paul 1, Minn.

## Capacity

The accepted standard of capacity is 35 pounds of frozen food per cubic foot of usable space. Actually, this amount will vary from about 15 to 25 pounds for vegetables to 30 to 42 pounds for meats, or 20 to 50 pounds for fruits. Average, 25 to 35 pounds.

## Utensils to Avoid

Because copper destroys vitamin C, foods should not be allowed to come in contact with this metal. Contact with copper, aluminum, or nickel however,

does **not** result in any form of food poisoning. Contact with iron will cause darkening of sweet potatoes.

Because of the danger of zinc poisoning, acid foods or juices should not be cooked in galvanized iron kettles. Do not place acid foods or juices in cadmium-plated utensils.

## Foods Not Suitable for Home Freezing

Sponge cake batter	Custards
Bananas	Cream pie fillings
Celery (raw)	Custard pie
Lettuce	Cooked egg whites
Watermelon	Mayonnaise

Table 1. Thawing Time for Frozen Foods

Product	Room temperature*	Household refrigerator	Other
	(hours)		(minutes)
Bread .....	3		20-25 (in 325° F. oven)
Cakes .....	1-2		
Pies, baked .....			See page 42.
Pies, unbaked .....			See page 42.
	(hours)	(hours)	(hours)
Fruits (pint) .....	3-4	5-6	½-¾ (in running water)
Meat (per pound) .....	2-2½	5-8	
Poultry, 3-4 pounds .....	5-6	18-20	1½-2 (in running water)
Poultry, 5-6 pounds .....		24-26	2-2½ (in running water)
Turkey, 12-18 pounds .....		48-72	4-6 (in running water)

\* Food should not be thawed at room temperature for longer than six hours.

# Freezing Fruits . . .

**F**RUIT FOR FREEZING should be slightly riper than for canning, but not soft or mushy. Tree- or vine-ripened fruits contain more vitamins and a richer flavor than fruits picked green and allowed to ripen before freezing. Freezing fruit at just the right stage of ripeness is important, even though it may mean some delay in freezing. Freezing fruits before jellymaking results in greater yields of juice.

The varieties of fruit best adapted to freezing differ according to the region in which they are grown. In each region there are certain varieties which retain their original color, texture, and flavor exceptionally well when frozen.

## Packing Methods

In packing fruit for freezing, sort, wash, and prepare as for table use. Most fruits to be used for dessert are best packed in sirup, although a dry-sugar pack is preferred for sliced strawberries and is optional for a number of other fruits. Most fruits intended for jam, pies, and similar cooking purposes should be packed in dry sugar and some without any sweetening.

### Sirup Pack

1. Dissolve needed sugar in cold water. Stir occasionally and allow to stand until sugar is completely dissolved. Do not heat. Sugar sirup may be held in refrigerator for two days. Sirup pack best preserves vitamins.

2. Replacing one-third of the sugar with light-colored corn sirup, cup for cup, sometimes results in improved texture, flavor, and color of fruits.

3. When freezing peaches, apricots, sweet cherries, and figs, add  $\frac{1}{2}$  teaspoon ascorbic acid for each quart of water used, just before pouring sirup over fruit. Mix the ascorbic acid (citric acid, also, if recommended) with 2-3 tablespoons of the sirup and add to remainder of sirup. Mix thoroughly, but avoid beating air into the sirup.

4. Place the prepared fruit in containers and cover with sirup. Allow about  $\frac{1}{2}$  inch at top of container for expansion. For fruits that darken, place crumpled locker paper between lid and fruit to keep fruit submerged.

### Sugar Pack

1. Place prepared fruit in a bowl. To avoid crushing berries, do not place more than about three boxes of berries in the bowl.

2. Sprinkle required amount of sugar over fruit and allow to stand until sugar begins to dissolve in fruit juice.

3. Gently stir fruit until each piece is coated with sugar and juice.

4. Pack fruits tightly into containers but do not crush.

### Dry Pack

1. Wash and clean fruit.

2. Pack fruit in containers **without** sugar, sugar sirup, or other liquid.

**For those who cannot use added sugar,** apricots, peaches, raspberries, and strawberries may be frozen in water mixed with one teaspoon ascorbic acid per quart. Most berries may be crushed and frozen in their own juice. Blueberries may be frozen whole. Losses

Table 2. Approximate Quantity of Sirup Needed for Packing Fruits

Fruit	Amount of Fruit	Water	Sugar	Containers Filled
		(Quarts)	(Cups)	(Pints)
Apricots .....	14-lb. crate	3	9	24
Peaches .....	16-lb. crate	3	9	24
Raspberries .....	24-pint crate	3	9	28
Sweet Cherries .....	15-lb. crate	3	9	24

of vitamin C are greatest when fruits are packed without sugar.

Sweetening materials should be used when possible as they best preserve the quality of almost all fruits.

### Fruit Purée

Crush or chop fruit. Add 1 cup sugar to 6-8 cups purée according to taste. Show on label sugar used. Package and freeze.

### Use of Ascorbic Acid

Ascorbic acid (vitamin C) is added to sugar sirups when packing such fruits as peaches, apricots, figs, and sweet cherries to help preserve their

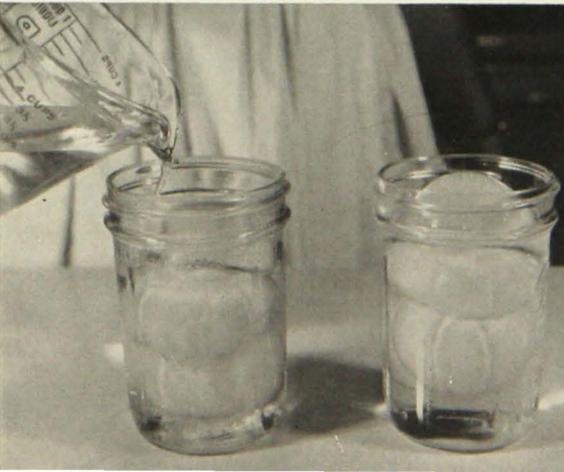
fresh color and flavor. These fruits would otherwise darken rapidly and lose flavor when thawed. Ascorbic acid also enriches the vitamin content.

Ascorbic acid is a natural constituent of fruits and vegetables. The pure ascorbic acid may be purchased in crystalline or powdered form in 25- or 50-gram bottles from a druggist or other distributor. A 25-gram bottle will pack six to seven 16-pound crates of peaches. Vitamin C tablets may be used, but the cost will be considerably higher. About 100-150 milligrams of ascorbic acid should be added to 1 pint (1 pound) container filled with fruit ( $\frac{1}{2}$  teaspoon ascorbic acid equals 1,000 milligrams.) See page 12 for instructions.

There are commercial preparations of ascorbic acid for frozen fruits on the market. These generally contain added sugar or citric acid. Because of the acidity of citric acid, large proportions of this ingredient as used in some of these preparations may mask delicate natural flavors of fruits. When using commercial mixes, follow manufacturer's directions and be sure to use enough liquid to cover the fruit.

FIG. 6. Left—In packing with sirup, place the fruit in the container and cover with liquid. Leave a space one-tenth the volume of the container for expansion.

Right—A wad of waxed paper under the cover keeps peaches, sweet cherries, and apricots immersed and helps to prevent discoloration.



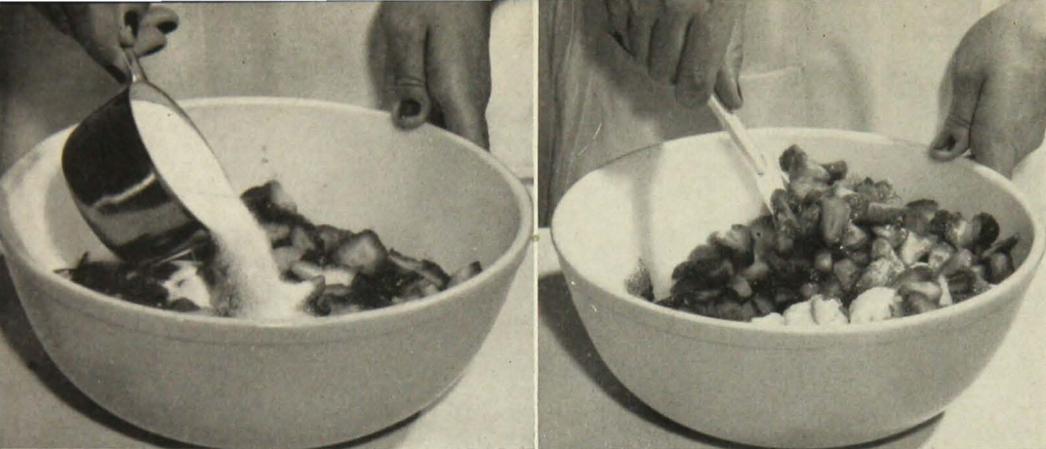


FIG. 7. Mixing sugar with strawberries. Left—Sugar is first sprinkled over fruit. Right—After waiting a few minutes for the sugar to dissolve, the mixture is stirred carefully until each berry is coated with dissolved sugar and fruit juice.

## Fruits for Freezing

### Apples

**Variety**—Firm-fleshed cooking varieties suitable for pie or sauce. Freezing tends to soften textures. Apples held in storage for long periods may darken after freezing.

**Preparation**—Peel apples and cut into pie slices. To prevent darkening, submerge the slices for not less than 5 minutes in a sodium bisulfite solution prepared by dissolving 1 teaspoonful of sodium bisulfite (U.S.P. grade) in a gallon of water at about 60-70° F. Mix solution in a glass, earthenware, stainless steel, or enameled container. The same solution may be used to treat about ½ bushel of apples. *Do not use sodium sulfide or sodium sulfate.*

Stronger solutions will result in a distinct toughening of the slices and a sulfur taste after cooking. Two ounces of sodium bisulfite (11 level teaspoonfuls) will treat about 7 bushels of apples at a cost of less than 5 cents a bushel.

Sliced apples used in *baked* frozen pies need no special treatment.

**Packing**—After the 5-minute dip, remove slices from solution and drain. Pack in sugar, using 5 to 7 pounds of

slices to 1 pound of sugar (1 cup sugar to 10 to 12 cups apples). Sprinkle the sugar evenly over the slices, allow to stand for a few minutes or until the sugar is dissolved into fruit juice, then stir carefully until each slice is coated with sugar solution before filling the containers. Freeze immediately. The sugar may be omitted for those who do not eat sweetened fruits.

**Other Treatments** — Wash apples. Without peeling or slicing, place apples in polyethylene or similar plastic bags. Freeze. These apples are suitable for pie, sauce, or other cooked desserts, but they are not desirable as fresh eating apples. To prepare, run cold water over each frozen apple just before peeling. Peel and slice as you would a fresh apple and use immediately. Do not thaw the apples before peeling as they will darken readily.

An alternative treatment is to soak the apple slices for 15 minutes in a weak brine solution, using ½ cup of salt to each gallon of water. Drain. Pack the apple slices in a sugar sirup, mixing two cups of sugar, ½ teaspoonful ascorbic acid with one quart of water.

### Apple Sauce

Freezing may not produce as good an apple sauce as does canning. Apple

sauce may be prepared in the usual way, sweetened to taste after cooking, then cooled and frozen.

## Apricots

**Varieties**—Blenheim (Royal), Moorpark, Tilton.

**Selection**—Well-ripened fruits of uniformly golden-yellowish color.

**Preparation** — Follow instructions given for peaches. Unless apricots are peeled before freezing, the canned product is considered superior for dessert use. Unpeeled frozen apricots are satisfactory for pies.

Soft ripe fruit, which has best flavor, may be halved, steamed 4 minutes, then crushed and packed with sugar. Use 1 pound sugar to 5 pounds fruit. Ascorbic acid is not needed when the fruit is steamed.

## Blackberries, Boysenberries, Dewberries, Loganberries, Youngberries, and Nectarberries

**Selection** — Firm berries with rich flavor and bright appearance.

**Preparation**—Discard any green, off-colored, soft, or bruised berries. Wash carefully in iced water, lift fruit from water, and drain. For dessert use, pack in sugar sirup using 3 cups of sugar to 1 quart of water. For pies, pack dry without sweetening. The berries may be crushed and packed in sugar, using 4 pounds of fruit to 1 pound of sugar. Freeze immediately.

## Blueberries

**Preparation**—Remove leaves, stems, and inferior berries. Wash in iced water. Drain. For best quality, pack berries in a sugar sirup, using 3 cups of sugar to 1 quart of water, or pack in sugar, using 1 pound of sugar to 5 pounds of fruit. Freeze immediately.

For pie, use blueberries frozen without sugar or sugar sirup.

## Cantaloupe

See Muskmelon

## Pie Cherries

**Varieties**—Any good quality cherry.

**Preparation**—Wash, stem, and pit. For pie, mix 4 pounds of fruit with 1 pound of sugar. To improve color retention, mix  $\frac{1}{2}$  tablespoonful of ascorbic acid with each pound of sugar.

## Sweet Cherries

**Varieties**—Bing (preferred), Schmidt, Lambert, Black Tartarian, Windsor.

**Selection**—Bright, fully-ripened cherries of dark-colored varieties.

**Preparation**—Chill in water to keep cherries from bleeding when pitted. Lift from water, and drain. Discard inferior cherries; stem and pit. Pack in sugar sirup, using 2 cups of sugar for 1 quart of water, plus  $\frac{1}{2}$  teaspoon ascorbic acid. (See page 12.) The natural fruit flavor will not be retained unless ascorbic acid is added. The addition of 1 teaspoon of citric acid or 4 teaspoons of lemon juice plus ascorbic acid is recommended to give a desirable acidity to the frozen product. Freeze. Suitable for salads.

## Citrus Fruits

Citrus fruits are on the fresh fruit market during much of the year. Their best use for freezing is when mixed with other fruits. See page 19.

## Coconut

Cut into pieces or shred, cover with liquid from the nut, and package.



FIG. 8. Left—Peaches do not darken when ascorbic acid (vitamin C) is added to the sirup. Right—When ascorbic acid is not used, sliced peaches will darken on standing at room temperature after thawing.

## Cranberries

**Varieties**—Any available variety.

**Selection**—Firm, plump berries with glossy skins.

**Preparation**—Sort, discarding off-colored berries. Wash in iced water, lift berries out of water, and drain. Pack without sugar. Freeze immediately. Cranberries may also be pureed and sweetened to taste or made into a relish by grinding cranberries, oranges, and lemons together and sweetening to taste. Storage life of the relish is about one month.

## Currants

**Varieties**—Red Lake and similar large-fruited varieties.

**Preparation**—Stem, wash in iced water, lift fruit from water, and drain. Gently mix 1 pound of sugar to 4 pounds of currants. For better sugar penetration crush slightly. Currants may also be packed dry with no sugar. Freeze immediately.

## Gooseberries

**Varieties**—Any good cooking variety.

**Preparation**—Remove blossom ends and stems. Wash, lift from water, and drain. Pack without sugar or sirup and freeze immediately.

## Grapes

**Varieties**—Thompson Seedless and Tokay.

**Selection**—Ripe, firm, sweet grapes.

**Preparation**—Sort, stem, and wash. Lift from water, and drain. Pack Thompson Seedless whole or halved; remove seeds from Tokays and pack halved or quartered. Pack in sugar sirup using 3 cups sugar to 1 quart water. Freeze immediately.

## Muskmelons

**Varieties**—Honey Dew, Hearts of Gold, Iroquois, and other firm-fleshed varieties.

**Selection**—Firm, ripe, fine-textured muskmelons of top quality with well-developed netting or veining. If the melon is slightly immature, quality when frozen will be inferior.

**Preparation**—Wash, halve, and remove seeds. Cut flesh into  $\frac{1}{2}$ - to  $\frac{3}{4}$ -in. cubes or balls, pack in sugar sirup using 2 cups of sugar to 1 quart of water. Whole seedless grapes may be added. Freeze. Serve partially frozen.

## Peaches

**Varieties**—Dixigem, Redhaven, Southland, Sunbeam, Triogem (these are non-browning varieties and do not need

ascorbic acid); Elberta, July (Early) Elberta, Fireglow, J. H. Hale, Halehaven, Sunhigh, and others.

July Elberta, a top freezing variety, comes into midwest markets before Elberta. It is superior to Elberta and J. H. Hale for freezing. The latter is superior to Elberta in color and texture. Cling stone varieties are not recommended unless they are to be used for such products as preserves or pies.

**Selection**—Well-ripened fruits, slightly riper than for canning. Unripened shipped-in peaches ripen best when held at about 75° F.

**Preparation** — Prepare sugar sirup using 3 cups of sugar to 1 quart of water plus ½ teaspoon pure ascorbic acid. (See page 12 for instructions.) Dip only 3 or 4 peaches (or about 6 apricots) at one time into boiling water for 15 to 20 seconds until the skins loosen; chill quickly in iced cold water. Peel, halve, and remove pit. Work rapidly. For **nectarines**, follow same directions in preparation and packing.

**Packing**—Use containers with lids. Fill containers about one-third full of prepared sirup and pack halves or slices directly into the sirup. Delay at this stage may result in darkening of the outer layer of the fruit. Completely

cover the fruit with sirup, but leave about ½ inch for expansion. Top slices should be kept submerged in the sirup by placing a generous piece of crumpled locker paper under the lid. This will keep top slices from darkening. For better retention of color and flavor, use glass or other airtight containers.

If peaches cannot be packed immediately, the cut fruit may be submerged for a short time in cold water containing 1¼ level teaspoonfuls of ascorbic acid per gallon of water to prevent darkening. This treatment may also be used on sliced peaches for table use.

Some varieties of peaches, especially the non-browning types, may be frozen in sugar. Mix ½ teaspoon of pure ascorbic acid with 4 cups sugar, then mix with 8 pounds (about 4 quarts) of sliced fruit. Do not use this method for Elberta.

If ascorbic acid is not available, pack peaches in glass containers using a sugar sirup made with 4 cups of sugar per quart of water for best results.

## Pears and Plums

It is better to can pears and most plums instead of freezing them.

## Pineapple

**Selection**—Bright appearance, dark orange-yellow color with fragrant odor. If tops pull out easily, pineapple is ripe for freezing.

---

FIG. 9. When packing raspberries in sugar, the berries may be mixed in a shallow pan to reduce crushing of the fruit.



**Preparation**—Peel and core. Dice, slice, or cut into wedges. Pack pineapple in sugar sirup or sugar. For the sugar sirup pack, use 3 cups of sugar for 1 quart of water. For the sugar pack, use 1 pound of sugar to 5 pounds pineapple. Freeze immediately. If pineapple is to be used in gelatin molds, it must first be cooked to inactivate the enzyme bromelin which would otherwise prevent jelling.

## Prunes

**Variety**—Italian, Stanley.

**Preparation**—Wash, halve, and pit. Pack into containers and cover with sugar sirup, using 3 cups of sugar to 1 quart of water. Freeze immediately.

Whole prunes may be frozen without sugar or sirup for cooking purposes.

## Raspberries

**Varieties**—Preferred varieties are: *red*—Cuthbert, Madawaska, Taylor, Viking, and Washington; *purple*—Sodus; *black*—Logan. Others are: *red*—Chief, King, Latham, and Newburgh. Some of the varieties listed are not suitable for growing in Minnesota.

**Selection**—Firm, fully-ripened berries of good bright color.

**Preparation**—Pick out immature and moldy berries, wash in iced water, do not allow to soak, lift berries from water, and drain. Pack raspberries in sugar sirup or sugar—many persons prefer a sugar pack using the method shown in Fig. 9. For the sugar sirup pack, use 3 cups of sugar for 1 quart of water—for sugar pack use 1 pound of sugar to 4 to 5 pounds of fruit according to sweetness of the berries (1 cup sugar to 7 to 8 cups of berries). A 24-pint crate will yield about 17 pounds of berries or about 28 pints of frozen berries. Freeze immediately.

Black raspberries for dessert use should be packed in sirup; for jam, pack without sweetening.

## Rhubarb

See vegetable section.

## Strawberries

**Varieties**—Burgundy, Dorsett, July-morn, Marshall, Midland, Redheart, Red Rich, Sparkle (preferred varieties); Blakemore, Dunlap, Gem, Superfection, and Wayzata.

Beaver and Premier are acceptable varieties for home freezing but not as good as those listed above. Some of the varieties listed are not suitable for growing in Minnesota.

**Selection**—Firm, ripe berries of a bright red color, of rich aromatic flavor and free from rots.

**Preparation**—Pick out immature and defective berries. Wash and hull in cold water. Slice each berry into about 3 pieces. Select smaller berries if frozen whole, but sliced berries will be more flavorful. The berries may be chopped instead of sliced, using a chopper with stainless blades.

Use 1 pound of sugar to 4 to 5 pounds of fruit, depending on the sweetness of the berries. This is equivalent to 1 cup sugar to 8 or 9 cups of hulled strawberries. A sirup pack, 3 to 4 cups of sugar to 1 quart of water, is equally desirable for whole berries.

A 24-quart crate of berries will yield about 28 pints of frozen berries. Unsweetened strawberries are much less desirable except for persons who do not eat sugared products.

## Variations

### Fruit Cocktails and Salads

Mixed fruits frozen for cocktails and salads give variety to menus. Select fruits which contrast in color, flavor, and texture. Each fruit will retain most of its original flavor. Choose well-ripened fruits. Sort, wash, and prepare

each as you would for table use. Cut the fruits into attractive sizes and shapes.

### Fruits for Mixes

Apricots—sliced or cubed; cherries—Bing, quartered; Maraschino—halved or quartered; grapefruit—segmented; oranges — segmented or crosscut; peaches—sliced or cubed; pineapple—cubed or wedge cut; pomegranate seeds; Thompson Seedless grapes—whole; Tokay grapes—halved or quartered.

Pack fruits in sugar sirup using  $\frac{1}{2}$  teaspoon ascorbic acid and 2 to 3 cups of sugar to 1 quart of water, depending on desired sweetness and on the natural sweetness of the fruits.

For citrus fruit sprinkle sugar over each layer of fruit, sweetening to taste. When all the sugar is added, allow the fruit to stand in the refrigerator until the juice that forms covers as much fruit as possible. Pack into containers and freeze. If the fruit mix is to be kept for any length of time,  $\frac{1}{4}$  teaspoon of ascorbic acid should be added to the sugar used for each 2 pints of fruit.

Maraschino cherries and pomegranate seeds should be used sparingly and only for color effect. Muskmelon, raspberries, and strawberries usually do not blend well in frozen fruit mixes. Nuts or fresh fruits, such as bananas and apples, may be added at time of serving.

**Thawing fruit mixes:** Thaw fruit mixes in original sealed containers. The amount of thawing will depend on how the fruits are to be used.

### Uses of Frozen Mixed Fruits

**Cocktails:** Serve cocktail fruits while ice crystals still glisten in the fruit.

**Salads:** Completely thaw fruit, but use while still chilled. Drain, and mix with dressing or whipped cream.

**Gelatin Salads:** Completely thaw fruit and drain. Add to gelatin as usual. If

mix contains pineapple, the pineapple must first be cooked to inactivate the enzyme bromelin which would otherwise prevent jellifying.

### Frozen Fruits for Jam and Preserves

Freshly-made jam and preserves prepared from frozen fruit are better in quality than jam made in season and stored for several months. When frozen fruit is used, the jam or preserves can be made at your convenience.

### Frozen Fruits Purchased in Large Containers

For easier handling on a household basis, these large-quantity pack of frozen fruits can be repacked into smaller frozen food containers and returned to the freezer.

The fruits should be allowed to stand at room temperature in the original container. When the ice crystals between the fruit defrost enough so that the individual pieces can be separated from the original pack without damage to any of the fruit, repack.

### Nuts

The storage life of fresh unprocessed nuts, shelled or unshelled, is greatly prolonged by storage at 35° F., and even longer at 0° F. Initial freshness is important. Unsalted nuts will keep about 9 to 12 months. Salted nuts may be stored about 6 months.

### Thawing Frozen Fruits

Thaw all fruits in their original containers. Quality and nutritive values are best retained by fairly rapid defrosting, so thawing at room temperature is preferred. If faster defrosting is desired, place packages in front of an electric fan or submerge them (if watertight) in cool or lukewarm water. Serve as soon as defrosted, preferably while a few ice crystals remain.

# Freezing Vegetables . . .

**S**PEED in getting vegetables from garden to freezer is one of the most important factors in attaining top-quality frozen vegetables for your home freezer or locker drawer.

During hot weather it is wise to harvest vegetables in the early morning before they have absorbed much heat from the sun. Select vegetables at optimum maturity—when they have reached their best flavor and texture—the same as you would select them for immediate table use.

Process and freeze all garden products with as little delay as possible. If it becomes necessary to store vegetables for a short time after harvesting, spread them out loosely in a cool, well-ventilated place, or pack loosely in refrigerator. Prompt cooling in ice cold water of many freshly picked vegetables such as asparagus or unshelled peas, followed by storage in a refrigerator, will help retain flavor and quality and greatly reduce loss of vitamin C. For longer periods of storage, pack in crushed ice.

Never store vegetables after shelling or cutting. Souring may result from delay between preparation and freezing, improper cooling after scalding, or stacking packages too close when freezing.

Varieties known to be suitable for freezing are listed in this bulletin. However, there are many other varieties of good quality that will be found satisfactory for home freezing.

## Methods of Preparation

### Scalding

To prevent loss of quality and to preserve the vitamin content of vege-

tables for freezing, scald them in boiling water or steam. The boiling water method is recommended for home use because household equipment is generally not adequate to perform a satisfactory steam scald.

Nutritive values are best retained when the water is brought to a boil quickly, when the scalding period is as short as possible, and when the vegetable is chilled quickly and removed from the cold water promptly.

The scalding (or blanching) process is necessary to inactivate enzymes. If these enzymes were left in their active state, the frozen vegetable would lose quality after a storage period of 1 to 2 months or less. "Off" flavors would develop, and the vegetable would tend to lose its garden-fresh color, vitamin content, and texture. When enzymes are inactivated by heat, the storage life of the vegetable is lengthened to 9 to 12 months, depending on the individual vegetable.

Use the following procedure:

1. Place water in large kettle (aluminum, enamelware, or stainless steel) and bring to rolling boil. Use 1 gallon per pound of vegetable; 2 gallons for leafy greens.
2. Clean and prepare vegetable.
3. Place prepared vegetable in a wire basket or large loose cheesecloth bag and submerge into boiling water. (The small amount of vegetable in proportion to the large amount of water is necessary to provide proper heat penetration in the required length of time. The internal temperature of the vegetable must be brought up to about 180° F.)

4. Keep the kettle covered during scalding and keep the heat on high. The use of two sets of baskets and kettles saves time.
5. The scalding water may be used over again but the water should be kept at the proper level.

### Timing

Each vegetable requires a different scalding time. The scalding directions given with each vegetable should be followed exactly. Too long a scalding period will result in softening of texture and in unnecessary loss of water-soluble vitamins and other nutrients. Underscalding will produce results similar to no scalding. *Start counting scalding time as soon as the vegetable is put into the boiling water.*

Complete cooking prior to freezing is not recommended for most vegetables, since flavors developed by cooking are more readily lost during freezing storage than flavors of the uncooked, scalded product. Completely cooked vegetables tend to have a warmed-over flavor when re-heated.

Additional scalding time is required at altitudes greatly above sea-level. At 2,000-4,000 feet, add ½ minute; 4,000-6,000, add one minute; over 6,000 feet, add 2½ minutes.

### Chilling

The scalded vegetable should be placed immediately in running cold water or iced water. About one pound of ice is necessary to cool one pound of vegetable. The chilling stops any further cooking and also prevents loss of quality. To conserve water-soluble nutrients, the chilling should be only long enough to cool the vegetable.

Test coolness of the vegetable by biting into several pieces. If the product is cool to the tongue, it is cool enough to pack.

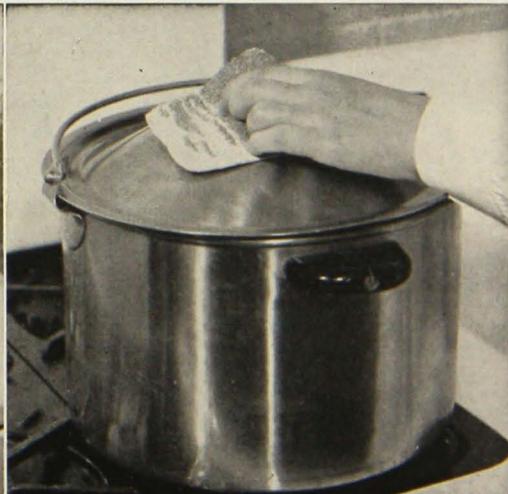
If vegetables are to be taken to a locker plant, place in refrigerator for not more than two hours until you are ready to make the trip to the locker.

### Steam Scalding

For steam scalding, place about 1 inch of water in the bottom of a large kettle and bring to a rolling boil. Place a thin layer of vegetable in a wire basket or in a loose cheesecloth bag and suspend over the rapidly boiling water. Keep the cover on during the entire process. This method is recommended only for broccoli.

FIG. 10. Left—A simple method of scalding (blanching) vegetables. Do not scald more than about 3 pounds at one time.

Right—Keep the kettle covered during scalding. Count the time from the instant when the vegetable is first immersed.



## Vegetables for Freezing

### Asparagus

**Varieties**—Martha Washington, Mary Washington, and F<sub>1</sub> Hybrid.

**Harvesting**—Pick bright-colored, brittle stalks which snap when broken and which have tight, compact tips. Harvest early in morning if weather is hot.

**Preparation** — Discard woody and blemished stalks. Wash in running cold water. Sort into medium and large stalks. Break off fibrous ends. Pack whole or cut into 1- to 2-inch lengths. Process as quickly as possible; asparagus becomes woody and loses vitamins rapidly after harvesting. Fibrous ends may be completely cooked and puréed for soups.

**Scalding**—Medium stalks: water, 3 minutes. Large stalks ( $\frac{1}{2}$  to  $\frac{3}{4}$  inch diam.): water, 4 minutes. Chill in iced or cold running water. Drain, package, and freeze immediately. Asparagus tips are a rich source of vitamin C.

### Snap Beans

(Green Podded)

**Varieties**—Kentucky Wonder (pole), Stringless Green Pod, Improved Tendergreen, Tenderlong, Topcrop, and Wade. It is important to select a suitable variety.

**Harvesting**—Pick young, tender beans which snap when broken. Pick while seeds are still small and tender.

**Preparation**—Discard off-colored and blemished beans. Wash in running cold water. Snap off tips and sort for size. Cut or break beans into about  $1\frac{1}{2}$ -inch lengths. Freeze small beans whole, if desired. Do not delay processing the cut beans. One bushel packs 25-30 pints.

**Scalding**—Scald in water,  $3\frac{1}{2}$  minutes. Chill in iced or cold water. Drain. Package and freeze immediately.



FIG. 11. Quick cooling is important in preparing vegetables for freezing. Iced water or cold running water is best for this purpose.

### Snap Beans

(Yellow Podded)

**Varieties**—Brittle Wax (Round Pod Kidney Wax), Pencil Pod Black Wax, Cherokee, and Pure Gold.

**Processing**—Process the same as green podded beans.

### Soy Beans

**Varieties**—Giant Green, Bansei, and Sousei.

**Harvesting** — Pick well-developed pods which contain green beans.

**Preparation**—Wash in cold running water. Scald in pods.

**Scalding**—Scald in water, 5 minutes. Chill before shelling. Shell and discard blemished beans. No further scalding is necessary. Package and freeze immediately.

### Beets

**Varieties**—Detroit Dark Red, Gould's Early Bunching, and other garden varieties of good color and quality.

**Harvesting** — Pick smooth, tender beets of small to medium size.

**Preparation** — Discard blemished beets, remove tops and wash.

**Scalding**—Cook until tender. Chill thoroughly in iced or cold running water. Remove skins, and slice or dice larger beets. Freeze immediately.

## Broccoli

**Varieties**—Italian Green Sprouting, Waltham 29, and Green Mountain.

**Harvesting**—Firm, tender stalks with compact heads.

**Preparation** — Discard off-colored heads or any which have begun to blossom. Remove tough leaves and woody butt ends. Cut stalks to fit container. Cut through stalks lengthwise leaving heads about 1 inch in diameter. This gives more uniformity for scalding and more attractive pieces for serving. Before processing, soak stalks, head down, for ½ hour in salt brine (¼ cup salt to 1 quart water) to drive out small insects. Rinse in fresh water and drain.

**Scalding**—Water, 4 minutes; steam, 5 minutes. Steam usually preferred. Chill in iced or cold running water. Drain. For more compactness, pack heads and stalk ends alternately in the container. Freeze immediately.

## Brussels Sprouts

**Varieties**—Half Dwarf Improved and Long Island Improved.

**Harvesting**—Pick firm, compact heads of good green color.

**Preparation**—Discard any discolored heads. Wash thoroughly and trim. Before processing, soak sprouts for ½ hour in salt brine (¼ cup salt to 1 quart water) to drive out small insects. Rinse in cold water, and drain.

**Scalding** — Medium heads: water, 4 minutes. Larger heads: water, 5 minutes. Chill in iced or cold running water

and drain. Package and freeze immediately.

## Carrots

**Varieties** — Nantes, Emperor, and Chantenay.

**Harvesting**—Pick smooth, tender carrots before the roots become woody. Plan time of planting so as to harvest in cool weather. Small immature roots harvested during hot weather usually are not of good quality when frozen. These contain less carotene.

**Preparation** — Remove tops, wash, and scrape. Dice or slice ¼ inch thick.

**Scalding**—Water, 3½ minutes. Chill and drain. Package and freeze immediately.

## Cauliflower

**Varieties**—Snowball, Snowdrift, and Early Select Snowball (preferred varieties).

**Harvesting**—Pick well-formed, compact, white heads, with fresh leaves.

**Preparation** — Trim, discard leaves, and wash thoroughly. Split heads into individual pieces about 1 inch in diameter. Before processing, soak pieces for ½ hour in salt brine (¼ cup salt to 1 quart water) to drive out small insects. Rinse in cold water and drain. Work rapidly to prevent discoloration.

**Scalding**—Water, 4 minutes. Chill and drain. Package and freeze immediately.

## Celery

**Varieties** — Although celery is not generally recommended for freezing, especially where freezer space is limited, green varieties can be frozen.

**Preparation**—Trim, and discard tough and blemished stalks. Wash and dice or cut into 1-inch pieces.

**Scalding**—Water, 4 minutes. Chill and drain. Package, and freeze immediately. Use only in hot dishes.



FIG. 12. Left—When wrapping with laminated foil, use the aluminum side next to the product. Right—Make a snug, tight wrap. Label and date the package.

## Sweet Corn

**Varieties**—Golden Freezer, Cream O' Gold, and Golden Bantam types are preferred for corn-on-cob. Almost any good table corn is suitable for cut corn. Hybrid corn is desirable because of its more uniform maturity.

**Harvesting**—Harvest in early morning if weather is hot. Corn is at optimum maturity (73 to 75 percent moisture content) for only a short period of time, usually 48 hours. A rough test for maturity is to press the thumbnail into a kernel. If milk spurts out freely, the corn is at or near the proper stage of maturity. If corn is picked when immature, it will be watery when cooked; if it is too mature, it will be doughy. Process as rapidly as possible. A delay of more than a few hours may result in a significant loss of quality unless the corn is held under refrigeration.

**Preparation**—Husk corn, remove all silk and trim ends. Scald, using a canning kettle or other large container holding at least 12 to 15 quarts of boiling water. Keep kettle covered. Whole

kernel corn to be cut from the cob should be scalded  $4\frac{1}{2}$  minutes before cutting. Follow schedule below for corn on the cob.

Chill the corn thoroughly, drain, pack, and freeze. Or freeze chilled, unwrapped ears on a tray, then pack into clean potato chip or popcorn cans.

## Eggplant

**Varieties**—Any good variety.

**Harvesting**—Pick before eggplant becomes too mature, and while seeds are still tender. Heavy, firm eggplant of uniformly dark color is desirable.

**Preparation**—Peel; slice into  $\frac{1}{4}$ - to  $\frac{1}{3}$ -inch slices, or dice. To retain light color, drop the pieces at once into cold water containing 4 tablespoonsful salt per gallon. Also, add the same proportion of salt to the water used to scald the vegetable.

**Scalding**—Scald in water for  $4\frac{1}{2}$  minutes. Chill in iced water. Drain and package in layers, separated by sheets of locker paper. Freeze immediately.

Table 3. Scalding Time for Sweet Corn-on-Cob

Size of ears	No. ears scalded at one time with each 12 quarts of water	Diameter at large end after trimming	Scald (minutes)
Midget	24	$1\frac{1}{4}$ inches or less	8
Small to medium	14	Between $1\frac{1}{4}$ and $1\frac{1}{2}$ inches	8
Medium to large	10	Over $1\frac{1}{2}$ inches	11

**Alternate method of preparation—**Precooked eggplant usually is more satisfactory for freezing than the scalded product. French fried eggplant freezes well.

## Garden Herbs

A number of garden herbs may be preserved by freezing. Wrap a few sprigs or leaves in foil or seal in film bags and store in a carton or glass jar. Wash, but do not scald the leaves.

## Kohlrabi

**Varieties—**Any good garden variety.

**Harvesting—**Pick young and tender kohlrabi.

**Preparation—**Cut off tops, wash, peel, and dice in ½-inch cubes.

**Scalding—**Scald in water, 2½ minutes. Chill and drain. Package and freeze immediately.

## Lima Beans

**Varieties—**Burpee's Improved, Fordhook No. 242, Baby Fordhook, Triumph.

**Harvesting —** Pick well-filled pods containing green, young, tender beans (white beans are overmature).

**Preparation —** Wash and remove beans from pods. Use kitchen shears to snip tough pods. Do not wash after shelling. Discard blemished beans. Prepare immediately, as shelled beans lose flavor rapidly.

**Scalding—**Scald small and medium beans 3 minutes in water; larger beans 4 minutes. Chill in iced or cold running water. Drain, package, and freeze.

## Mushrooms

**Harvesting—**Pick young, firm mushrooms.

**Preparation—**Process with as little delay as possible to prevent bruising and deterioration. Wash and remove base of stem. Freeze small mushrooms whole. Cut larger ones into four or more pieces. To prevent darkening, add citric acid (or lemon juice or ascorbic acid) to the scalding water.

Use 1 teaspoon citric acid or 3 teaspoons lemon juice, or ½ teaspoon ascorbic acid per quart of water.

**Scalding—**Water scald is recommended. Scald medium or small whole mushrooms for 4 minutes, and cut pieces for 3 minutes. Chill and drain. Package and freeze immediately.

Steam scalding sometimes may be desirable to preserve the flavor of very mild flavored mushrooms.

**Alternate method of preparation—** Slice ¼-inch. Saute in butter for two minutes. Cool, pack into containers. Any excess butter may be poured over mushrooms in container.

## Okra

**Varieties—**Any good garden variety.

**Harvesting —** Select young tender pods, 2 to 4 inches in length.

**Preparation—**Remove stem and wash.

**Scalding—**Scald under water, 3 to 4 minutes. Large podded types grown in west coast regions require 4 to 5 minutes. Chill and drain. Package and freeze immediately.

## Parsnips

**Varieties —** Any garden variety of good quality.

**Harvesting —** Select smooth, firm roots of good quality, free from woodiness. In northern regions, parsnips may be harvested either in late fall or early spring.

**Preparation —** Remove tops; wash thoroughly; and peel. Slice, dice, or cut lengthwise.

**Scalding**—Scald in water, 3 minutes. Chill and drain. Package and freeze immediately.

## Peas

**Varieties**—Freezonian, Little Marvel, Thomas Laxton (preferred varieties); Burpeana Early Dwarf, and Laxton's Progress. Alaska and other starchy peas should be avoided.

**Harvesting**—Pick bright green, crisp pods, with peas which are tender and sweet but not overmature. Peas are at their optimum maturity for a short period of time, usually only 24 hours. One bushel will pack 15 to 20 pints.

**Preparation**—If peas are hard to shell, scald pods in boiling water for 1 minute; dip in iced cold water for 1 minute. Shell a small amount at a time. Do not wash after shelling. Discard small, poorly formed peas. Before scalding, overmature peas may be separated from the tender peas by floating the peas in cold salt brine (about ½ cup salt per gallon water at 55° F.). After 10 seconds, remove the floaters which are the tender peas. Process with as little delay as possible. Delay between shelling and freezing toughens the skins. Some persons like to mix 2 to 3 teaspoons of sugar with each pound of peas after scalding and chilling.

**Scalding**—Scald in water, 1½ to 2 minutes. Black eyed peas require 2 minutes. Chill and drain. Package and freeze immediately.

## Peppers

(Green and Pimiento)

**Variety**—Any good variety.

**Harvesting** — Pick crisp, well-developed peppers of deep green or red.

**Preparation**—Wash thoroughly. Cut out stem end and remove seeds of green peppers. Halve, slice, or dice. Peppers lose their crispness when frozen, but are excellent for hot dishes.

Pimiento peppers may be peeled by roasting them in an oven at about 400° F. for 3 to 4 minutes until peel is charred. Cool and pack dry without additional heating.

**Scalding**—Scald halved green peppers in water for 3 minutes; 2 minutes if sliced or diced. Chill and drain. Package and freeze immediately. May be frozen without scalding for use in uncooked foods.

## Sweet Potatoes

**Varieties**—for pies—Porto Rico and Nancy Hall. For table use—Porto Rico, Nancy Hall, and Yellow Jersey.

**Selection**—Pick smooth, firm roots of bright appearance.

**Preparation**—Wash thoroughly. Bake in oven at 350° F. until soft. Dry varieties such as Yellow Jersey will be slightly better if steamed under pressure (10 pounds pressure for 10 minutes or more, depending on size of potato). Cool, peel, and slice into ½-inch slices. To help preserve bright color, dip slices in solution of 4 tablespoons lemon juice to 1 pint of cold water. For candied sweet potatoes, drain and roll in granulated sugar. Color is less bright when brown sugar is used.

Sweet potatoes may also be puréed. Steam or bake the potatoes, cool, scoop flesh from skin, and purée through ricer. Add 5 teaspoons lemon juice for each 10 cups (5 pounds) of purée to help preserve color. Add also ½ pound of sugar. For pie mix, purée may be mixed with milk, egg, and spices (except cloves) before freezing.

## Pumpkin

**Varieties**—Any good pie pumpkin.

**Harvesting**—Pick at optimum maturity, indicated by good color and stem that breaks loose easily.

**Preparation**—Wash thoroughly. Cut or break into fairly uniform pieces and

remove seeds. Bake at 350° F. or steam until tender. Cool, scoop pulp from rind, and mash or put through ricer. If desired, prepare pie mix from favorite recipe by adding milk, egg, sugar, and spices before freezing.

## Rhubarb

**Varieties**—Valentine, Chipman's Canada Red, and McDonald Red.

**Harvesting**—Select stalks in early spring. Stalks should be crisp, tender, and of good red color.

**Preparation** — Remove leaves and woody ends. Discard blemished and tough stalks. Wash thoroughly, and cut into 1-inch lengths. Do not scald.

Cover with sugar sirup, 3½ cups sugar to 1 quart cold water. A dry pack without sugar may be used for only a few months storage. When freezing rhubarb for pie, pack with sugar, 1 cup to 4 cups of rhubarb. No additional sugar will be needed when making the pie.

## Rutabagas

**Varieties**—American Purple Top and Long Island Improved.

**Harvesting** — Tender young rutabagas.

**Preparation**—Wash and remove tops. Peel and slice or dice ¼-inch cubes.

**Scalding**—Scald in water, 3 minutes. Chill and drain. Package and freeze immediately.

## Spinach

### and Other Greens

**Varieties**—Spinach—Bloomsdale Long Standing America (preferred variety); King of Denmark, and Nobel. Swiss Chard—Fordhook and Lucullus. Beet greens, kale, mustard greens, and turnip tops are also satisfactory for freezing.

**Harvesting** — Pick young, tender leaves. Harvest early in the morning if weather is hot.

**Preparation** — Cut off large tough stems. Discard all infected leaves. Wash thoroughly in cold running water.

**Scalding**—Scald all leafy greens in water, 2 minutes; except collards and stem portions of Swiss chard, 3 to 4 minutes. Very small, tender spinach requires only 1½ minutes. Chill and drain. Package and freeze immediately.

## Summer Squash

**Varieties**—Summer Crookneck, Zucchini, and Summer Straightneck.

**Harvesting**—Pick when 5 to 7 inches long, while rind is tender and seeds small.

**Preparation**—Wash, peel, and cut into pieces not over 1½ inches thick.

**Scalding**—Scald in water, 3 minutes for ¼-inch slices, 6 minutes for 1½-inch slices. Chill and drain.

## Winter Squash

**Varieties**—For pies—Banana, Golden Delicious, Hybrid R, and Greengold. For table use—Buttercup, Greengold, Rainbow, and Hybrid R.

**Harvesting** — Pick fully mature squash, with shells hard enough so that thumbnail cannot be pushed through them. "Dry" types of squash are recommended.

**Preparation**—Wash and cut or break into fairly uniform pieces and remove seeds. Bake in oven at 350° F. or steam until tender. Cool. Scoop pulp from rind and mash or put through ricer. Pie mix may be prepared for favorite recipe, if desired, by adding milk, egg, sugar, and spices (except cloves) before freezing. Two or more varieties may be blended, or squash blended with pumpkin.

## Tomatoes

Whole tomatoes may be wrapped and frozen for cooking within 3 months. For

Table 4. Time Table for Cooking Frozen Vegetables in Covered Pan\*

Vegetable	Time after water returns to a gentle simmer	Vegetable	Time after water returns to a gentle simmer
	Minutes		Minutes
Asparagus .....	7 to 10	Kohlrabi .....	7 to 10
Green or Wax Beans .....	8 to 12	Lima Beans (large) .....	12 to 15
Beet Greens .....	6 to 12	Lima Beans (small) .....	8 to 10
Broccoli .....	5 to 8	Mixed vegetables .....	6 to 10
Brussels Sprouts .....	4 to 8	Mushrooms (sauté) .....	10 to 15
Carrots .....	7 to 10	Peas (except black-eyed) .....	5 to 8
Cauliflower .....	5 to 10	Soybeans (garden type) .....	8 to 12
Corn, whole kernel .....	4 to 6	Spinach .....	4 to 6
Corn on the cob (thaw partially) .....	3 to 5	Swiss Chard .....	7 to 10
Kale .....	10 to 15	Turnip Greens .....	8 to 12

\* Beets, winter squash, pumpkin and sweet potatoes have already been completely cooked and need only be heated to serving temperature.

best results, the tomatoes may be stewed according to a favorite recipe, but omit bread or crackers until preparing stew for serving. Cool tomatoes by partially submerging the kettle in cold water. Pack in containers and freeze.

Uncooked tomato pulp may be frozen and stored for a few months.

**Ground Cherries (Husk Tomatoes):** Husk, scald 2 minutes, pack in sugar sirup, 3 cups sugar to 1 quart water.

## Turnips

**Varieties**—Purple Top, White Globe.

**Harvesting**—Young, tender turnips.

**Preparation**—Remove tops and wash. Peel, slice, or dice (½ inch).

**Scalding**—Scald in water, 2½ minutes. Chill and drain. Package and freeze immediately.

## Mixed Vegetables

Each vegetable should be prepared and scalded separately according to instructions. The vegetables may be frozen separately and mixed later after the pieces have been defrosted only enough to separate.

Table 5. Average Weight Ready for Freezing Obtained from 10 Pounds of Fresh Product Purchased on Market

Product	Prepared product (pounds)
Lima Beans, Peas, Sweet Corn .....	3½ to 4
Broccoli, Muskmelon .....	4½ to 5
Asparagus, Cauliflower, Pineapple .....	5 to 5½
Apples (small) .....	6 to 6½
Apples (large), Brussels Sprouts, Carrots, Spinach, and Leafy Greens .....	7 to 7½
Pears, Plums, Rhubarb .....	8 to 8½
Beans (bush and pole), Peaches, Strawberries .....	8½ to 9
Blackberries, Blueberries, Raspberries .....	9½ to 10

## Vegetable Puree

Scald as directed, cool, put through a purée or chopper. Package and freeze.

### Cooking Frozen Vegetables

All vegetables can be cooked from the frozen state except corn-on-the-cob, which should be partially defrosted. Vegetables frozen in a solid block may be allowed to defrost slightly so that individual pieces may be separated easily, but the vegetable itself should not be allowed to defrost. If you prefer, the solid block of vegetable may be put into the boiling water and separated with a fork after it has begun to thaw.

Do not overcook the vegetables—cook only until tender. Most of the vegetables have already been partially cooked (some completely) and therefore require less cooking time than fresh vegetables.

Cook the vegetables (except purées) in a small amount of water—about  $\frac{1}{2}$  cup is sufficient. Add salt to taste. Have the water boiling before adding the vegetable. Keep the heat high until the water returns to a boil after adding the vegetables, then reduce heat so that the water simmers gently for the remainder of the cooking time. Keep the cover on while cooking.

Cooking times given in table 4 should be used merely as guides. The length of cooking time for the various cooking methods will vary with the variety of the vegetable, with the maturity, size of pieces, length of scalding time before freezing, and amount of defrosting

before cooking. Follow instructions on the package for commercially frozen vegetables.

Serve the cooked vegetables immediately, while piping hot. If the vegetables are held warm or reheated, they lose valuable nutrients and attractiveness. Serve the cooking liquid with the vegetable or save it for soup stock.

Partially or completely defrost the corn-on-the-cob before cooking. Follow general cooking instructions. The cooking time should be very short because the ears were almost completely cooked during the scalding process. Serve immediately. Delay causes sogginess which gives the corn an unattractive appearance. For best results, a second serving should be cooked separately instead of being held in the hot water until ready to eat.

### Other Methods of Cooking

**Pressure saucepan.** Add frozen vegetables to a small amount of boiling water in pressure saucepan and break apart with fork. Follow manufacturer's directions for use and length of cooking time, if given. Careful timing is necessary to prevent overcooking.

**Oven cooking:** Many vegetables may be seasoned, buttered, put into a covered casserole dish, and cooked in a 350° F. oven.

**Double Boiler:** Puréed or mashed vegetables may be warmed in the top of a double boiler. If vegetable seems dry, add milk or melted butter. Season to taste. Frozen vegetables may also be used in deep-fat frying, pan frying, creamed dishes, hot dishes, souffles, fritters, and soups—the same as fresh vegetables.

# Fruit and Vegetable Juices . . .

**M**ANY FRUIT JUICES and a few vegetable juices may be frozen very successfully. Blends of different fruit juices offer an unlimited field for mixing juices (before freezing or after thawing) to suit individual tastes; for example: apple-plum, apple-cherry, or apple-raspberry.

Fruit juices should be completely thawed and then stirred before being served. The part that thaws first contains a large share of the soluble solids and if poured off, it may be too rich and the remainder too dilute.

## Apple Juice

Apple juice blends well with almost all other juices. Some varieties of apples make better juice than others. If four to six varieties are mixed, however, the juice is likely to be of very satisfactory quality. Do not use the varieties Duchess (Oldenburg), Hibernian, Patten Greening, or Virginia.

The natural flavor of unpasteurized apple juice is best preserved during storage by the addition of  $\frac{1}{2}$  teaspoon of pure ascorbic acid per gallon.

## Raspberry Juice

Blends of purple and black raspberries or red and black raspberries produce the best juices. Sort and wash the berries; stir in 1 pound of sugar with each 10 pounds of fruit. Pack into earthenware crock or other suitable container, cover, and allow to freeze hard. Then thaw the unopened container at room temperature. Crush the thawed fruit, strain out the juice, and pour into containers for refreezing.

This method preserves the natural flavor of the juice better than any method using heat. It also yields more juice of better color than cold-pressing fruit without freezing. If the frozen berries are held until the apple season, the pulp left after pressing out the juice may be mixed with an equal quantity of apple juice. Heat to  $145^{\circ}$  F., and extract additional juice. After thawing, dilute with half the volume of light sugar sirup, or blend with twice the volume of apple juice.

## Rhubarb Juice

This juice is most useful for diluting with equal quantities of water and blending with other fruit juices in proportions not over 25 percent.

Harvest the rhubarb in the early part of the season. Later, the stalks become tough and fibrous and hard to press. The red-colored varieties produce the most attractive juice. Wash stalks and cut into 4- to 6-inch pieces. Add 4 cups of water per 5 pounds, and simmer for a few minutes at  $175^{\circ}$ - $180^{\circ}$  F. Press while hot, and add  $\frac{1}{2}$  cup of sugar per gallon.

## Citrus Juices

It seldom pays to attempt the home-freezing of citrus juices now that high-quality concentrated frozen juices are on the market. It is difficult to retain high quality with single strength juices, except lemon juice. The latter may be frozen after adding one-half pound of sugar per pint of juice.

Reconstituted juice, when held for 2 days in refrigerator, will retain more than 90 percent of its vitamin C.

# Freezing Meats . . .

**M**UCH OF THE SPACE in a home freezer or in a locker drawer is devoted to the storage of meat. Meat, like other products for freezing, has to be handled properly in order to retain its original fresh qualities and flavor.

Important steps in handling meat are:

## SELECTION OF MEAT

Freezing will not change a tough steak into a tender one.

The official United States grades of beef are Prime, Choice, Good, Commercial, and Utility. Cows generally grade no higher than commercial; however, if the carcasses are from young beef type cows with sufficient finish they may go into the choice grade. Beef carcasses from stags and bulls are labeled as such and are not graded Prime. Veal carries the same grade designations as beef; sex is not a factor. Lambs, yearling mutton, and mutton are identified as such and may be graded as Prime, Choice, Good, and Utility. There is no Prime grade on mutton carcasses.

Commercial grading is done by the packer, and brand names are indications of quality. Your retailer or locker operator is familiar with these brands and grades and can guide you in your purchases. In addition, he is equipped to slaughter, chill, cut, wrap, and freeze your meats for a reasonable charge. He also has facilities for curing, sausage making, and smoking meats.

## SELECTION OF ANIMALS

Animals selected for slaughter should be physically sound and free from disease. In cases where there is doubt as to the relative health of the animal, a veterinarian should be consulted. The degree of finish, age, conformation, and

type of animal you select depends upon the quality of meat you prefer.

## SLAUGHTERING

Less bruising, better bleeds, and ease in dressing are the results of keeping animals calm, in comfortable quarters, and off feed (with water) for 24 hours before slaughter.

## CHILLING AND AGING

After slaughtering, the carcass should be hung where it will cool rapidly without freezing. Prompt and thorough chilling is very important to prevent spoilage and inferior quality in the meat. The proper temperatures of chill rooms range from 32° F. to 34° F.

It is desirable to have separate chilling and aging rooms so that incoming warm carcasses are separated from chilled carcasses. The usual temperature for an aging room is 36° to 38° F., with humidity at 85 to 90 percent.

## CUTTING THE CARCASS

Instructions for cutting meat may be obtained from the Department of Animal Husbandry, University of Minnesota, Institute of Agriculture, St. Paul 1, Minn. Tougher or less desirable cuts such as brisket and shank may be boned and cut into stew meat, or ground. Cuts with a large percentage of bones may be boned to conserve freezer space, save wrapping material, and lessen danger of the bones puncturing the wrapping. Removal of bones prior to freezing has no effect on the flavor or juiciness of the cooked meat.

Specify thickness of steaks, number of steaks or chops per package, and proportion of stew meat and ground meat desired. It is economical to remove the tail ends of T-bone and porterhouse

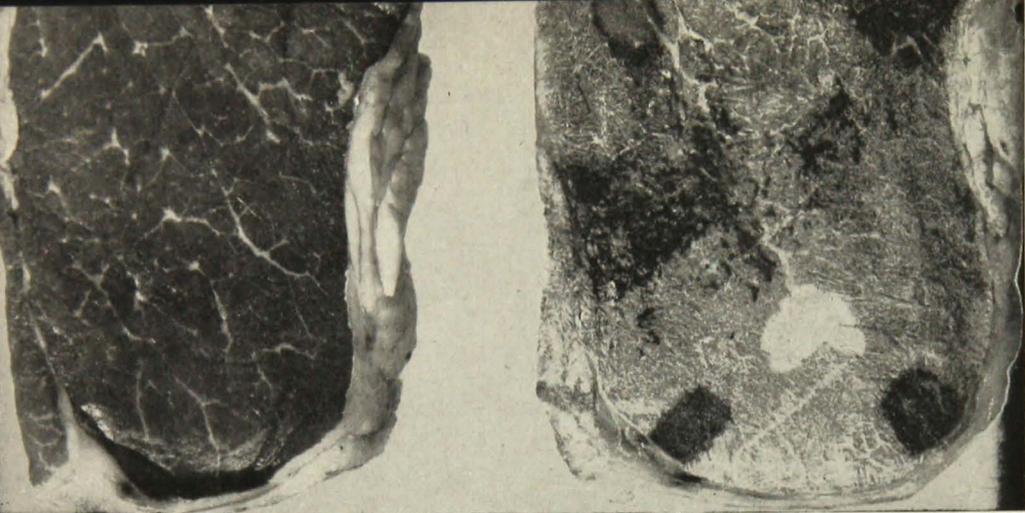


FIG. 13. Beef steak held for 7½ months at temperatures fluctuating between 0° and -20° F.

Left—This steak was wrapped in a single thickness of laminated aluminum foil. It shows no freezer burn.

Right—A single thickness of waxed locker paper was used to wrap this steak. Note the severe freezer burn.

steaks (often wasted) and use them in the ground meat. Chops and steaks should be at least ¾-inch thick for broiling.

#### WRAPPING

Use good wrapping material, especially for ground meat. Consult pages 4-7.

### Yield of Meat

Front quarters are more economical in price and yield. Choice and lower grade fronts will yield about 90 percent of their weight in retail cuts and ground beef. Prime and Choice hind quarters yield about 75 percent; a grade of Good or lower yields about 82 percent of the wholesale cut.

### Meats for Freezing

#### Beef

Hind quarters of good quality may be aged at 36° to 38° F. for 10 to 12 days after slaughter; front quarters only 6 to 7 days. Beef of young cattle in stand-

ard and utility grades or lower should be aged for only 5 to 6 days after slaughtering. Beef may be aged longer for persons desiring the "aged" flavor, but this greatly reduces the storage period at zero and causes larger weight losses in trimming. In cases where beef has been aged a long time prior to freezing it is recommended that external fats exposed to air be carefully trimmed to remove rancid flavors which are likely to develop during the aging period. Fat so trimmed should not be included in the meat which is to be ground.

As the storage period lengthens, the aging period becomes less of a factor in making the meat tender. This is because zero storage, over a period of several weeks or longer, has a tenderizing effect.

Meat should not be purchased for freezing if the chilling and aging period has been much longer than recommended, except in cases where the meat will be held at zero for only a relatively short period.

#### Pork

A hog carcass is hung whole and chilling requires about 24 hours at 34°

**Table 6. Approximate Yield of Edible Meat**

	Live Weight	Dressed Carcass Yield before Cutting		Packaged Meat Yield after Cutting	
	Pounds	Pounds	Percent*	Pounds	Percent†
Beef .....	750	410	55	325	80
Pork .....	225	180	80	130‡	78
Veal .....	200	110	55	90	82
Lamb .....	90	45	50	35	78

\* Percent of original live weight. Lower yields may be expected from some top grades of beef.

† Percent of dressed carcass. Lower yields may be expected from some top grades of beef.

‡ Not including about 35 pounds of lard.

F. To speed cooling, the body cavity should be opened and leaf fat pulled loose from the pork carcass and left attached to the ham. Failure to chill promptly to 38° F. at the ham bone is likely to result in bone souring and spoilage in the pickling process. Pork should be cut, packaged, and frozen as soon as it is chilled to the bone. Never hold chilled pork longer than 3 days after slaughtering.

Fish oil or fish meal included in the rations fed to hogs may be expected to accelerate the development of rancidity during storage.

## Ham and Bacon

The length of time that ham and bacon can be held in freezer storage depends on degree of freshness, curing, and smoking. Salt has a very undesirable effect upon the quality of the product when stored in the freezer longer than 2 to 3 months. If pork cuts are to be stored for longer periods, it is best to freeze them fresh, then cure and smoke them prior to use. Slicing cured meats before freezing is not recommended because of a short storage life. Hams and bacon as purchased over the counter, unless freshly cured, also will have a very short storage life at zero.

## Sausage

The quality of sausage can be maintained satisfactorily for 3 to 4 months

if spices and a good wrapping material are used. Salt should be withheld until cooking time. Seasonings with antioxidants are available for this purpose from your locker plants. Smoked sausage has a longer storage life than unsmoked sausage, other factors being equal.

Bologna does not freeze very satisfactorily because of change in texture.

## Lard

Fat trim from hog carcasses should be rendered into lard as quickly as possible and may be packed into metal containers or greaseproof packaging material. Storage life of lard can be increased by mixing in an antioxidant available from your locker operator, or by mixing in a three-pound can of a hydrogenated vegetable shortening for every 50 pounds of lard, while the fat is cooling. It can be stored in a cool dry place as any other shortening or stored at 0° F.

## Veal, Lamb, and Mutton

These carcasses are also hung whole during the chilling period and require about 10-16 hours to reach an internal temperature of 38° F. **Veal** should be processed for the freezer as soon as it is chilled to the bone. **Lamb and mutton** may be held for an aging period of 4-7 days after slaughtering.

## Big Game Animals

Handle these animals much the same as beef. Bleed, dress, and cool the carcass immediately after killing. Clean blood from cavity. If weather is warm, sprinkle cavity with pepper to keep flies away. Trim parts damaged by gun shot. Hang carcass in cool, breezy place until well chilled. Sometimes it is desirable to spread the ribs apart with a stick to allow cold air to circulate.

Usually the hide should not be removed because it helps to protect the meat from contamination. In some states during warm weather, however, it is necessary to skin antelope promptly after killing to prevent spoilage. If the carcass is to be moved over dusty roads or otherwise exposed to contamination, wrap it. If in good condition, age the meat 5 to 6 days. Otherwise, cut, wrap, and freeze at once.

### Cooking of Meats

#### Defrosting

Whether the meat is defrosted or not before cooking makes little difference in the taste or juiciness of the cooked meat. Thin steaks, chops, and cutlets are often cooked from the frozen state with no previous thawing, while thick steaks and roasts should be at least partially defrosted to permit uniform cooking and shorten cooking time. Ground meat must be completely thawed before it can be made into patties.

Cutlets, liver, or any meat that will be dredged or dipped before cooking should be at least partially thawed.

Meat should be defrosted in its original wrapping material and cooked soon after thawing. It may be defrosted in a refrigerator or at room temperature. Thawing will be hastened if the package is placed in front of an electric fan. Do not thaw meat in water. However, meat may be thawed rapidly

in water if the wrapping is watertight. See page 11 for defrosting time.

#### Cooking

Completely defrosted meats are cooked the same as fresh meats. Frozen or only partially thawed meats require a longer cooking time because the meat has to both thaw and cook. Roasts will require an additional 10 to 15 minutes per pound.

Beef roasts should be cooked, without searing, in a moderate oven (300°-325° F.). The pan should be left uncovered and no water added. A meat thermometer is recommended to give the exact stage of "doneness" of the meat, especially for frozen meats.

**Pork** should be cooked until well done or to an internal temperature of 185° F. **Beef, lamb, and mutton** may be cooked to the desired stage of "doneness." Broiling should also be done at a temperature of 350° F. Panbroiling of frozen meats should be started at a low temperature until the meat is thawed. A high temperature should not be used to "hurry" the meat along. Otherwise the outside may be brown before the center has begun to cook. Roast should be allowed to "set" for 20 minutes after removing from the oven to facilitate carving before serving.

### Poultry and Game Birds

Chicken broilers or fryers at 9 to 12 weeks of age, roasters at 6 to 8 months, stewing chicken (mature hens), turkey fryer-roasters at 14 to 16 weeks, and young tom and hen turkeys at 6 to 7 months can all be frozen and stored successfully by following a few simple rules.

Select only healthy, well fleshed, and well finished birds. Young birds will be more tender-meated whereas older stock often carries more flavor. Starve the birds for 6 to 8 hours or overnight so that in drawing there will be less



FIG. 14. Water can be used to remove air from plastic bags. Submerge all but the open end, and then twist seal the bag. Tie securely.

danger of rupturing the digestive tract and contaminating the carcass.

In the killing operation suspend the birds by the legs from a shackle or rope to prevent bruising in the death struggle. This will also allow the head to hang down for better bleeding. With the head stretched out in line with the neck, make a clean cut with a sharp knife across the side of the throat just behind the lower jaw. This method is more satisfactory than either beheading or making a cut inside the throat.

To speed up the removal of the feathers, scald the birds within 40 to 60 seconds after cutting the throat for bleeding. A scald water temperature of 140° F. for 20 to 30 seconds is recommended for chickens and turkeys which are to be packaged and frozen immediately. Because this temperature removes the outer cuticle layer of skin, the surface of the birds must not be allowed to dry out if discoloration is to be avoided. Where air chilling is to be used or delays in processing are necessary, a scald water temperature in the 125-130° F. range is recommended. However, pin feather removal at this lower temperature will be more difficult. Finally, singe off the hairs with a gas flame or other suitable means and wash the bird thoroughly.

Only eviscerated (drawn) poultry should be frozen. Prompt evisceration

in a sanitary manner is important to prevent "visceral taint" and off-flavors resulting from bacterial action. After drawing, thoroughly wash the bird both inside and outside. Then lower the temperature to 36° F. or less as quickly as possible by packing in crushed ice (1 pound per pound of poultry) or in a water-and-ice slush.

To insure maximum tenderness, especially in turkeys and larger sized chickens, the birds should be allowed to age for 12 to 24 hours under ice in the container used for chilling. After the first 3 to 4 hours of chilling, continuous or frequent drainage of the chill vats is recommended to prevent excessive water absorption by the birds and leaching out of flavor factors during the remainder of the aging period.

Packaging is a key step in the successful storage of frozen poultry. Water-vapor-proof plastic films in bag form are recommended. Wrap the liver separately and use within 60 days. The remaining giblets may be wrapped and placed in the cavity of the bird. After placing the bird in the bag, push out as much air as possible before tying off with a twist seal. Aluminum foil molded tightly around the bird is also very satisfactory. Freeze immediately after packaging at zero degrees or lower. It is best to store poultry no longer than 9 months.

Young birds sometimes develop darkened bones as a result of seepage of hemoglobin from the marrow. The defect is visual only; it does not affect flavor.

### Ducks, Geese

Handle much like other fowl. Scald domestic birds at 160° F. for 60-90 seconds, with ½ cup vinegar added per 10 gallons. A commercial wax is very helpful in removing down and pin feathers. Wild birds usually are plucked dry without scalding.

### Game Birds

Game birds are handled in much the same way as poultry. Remove body

heat as quickly as possible. Birds should not be heaped together. If possible, space to allow for air circulation and quicker cooling. Birds should not be piled or stacked in a car trunk any longer than is necessary, because deterioration is rapid under such conditions. Scald pheasants at 155°-160° F. Birds may be frozen at a locker plant before returning from a long trip.

**Defrosting and cooking poultry and game birds:** Partially or completely defrost the birds in their original package at room temperature or in a refrigerator. Whole birds may be thawed in cold water. See page 11 for defrosting time. After defrosting, cook as you would freshly dressed poultry.

**Stuffing:** Stuffing poultry for home freezing is not recommended. This statement does not apply to the commercially prepared product. Freshly stuffed birds should not be held overnight in the refrigerator. Do not reheat whole birds after stuffing and roasting.

## Fish

Because fish deteriorates rapidly, it should be frozen soon after being caught. If this is not possible, pack the fish in crushed ice. Prompt freezing is very important for all sea foods. For example, frozen shrimp will be tasteless if held in ice before freezing for more than 7 days, the flavor gradually deteriorating during the 7 days in ice.

Prepare all types of fish for freezing the same as for table use. Scale, eviscerate, remove head and fins, wash thoroughly, and drain. Freeze small fish whole. Fillet or steak large fish.

Dip cut pieces of nonfatty types of fish for 30 seconds in brine made with

1½ cups of salt per gallon of water. This will reduce drip on thawing and also improve flavor. A brine dip is unnecessary for whole fish. It is undesirable for fatty fish because it may shorten storage life.

Some fatty fish, including lake herring, lake trout, and especially pink salmon lose quality after about 4 months at 0° F. A temperature of -10° F. is much better, and for long storage periods the temperature should be -20° F. Store fish in the coldest part of the freezer; near the bottom of chest types or directly on refrigerated shelves of upright models.

Package fish in aluminum foil or equally good wrapping material. One of the best ways to pack small fish, especially smelts, is to freeze them in water in any water-tight container.

Wrapped fish may be frozen without affecting the flavor of other foods in the freezer.

**Defrosting and cooking fish:** Partially or completely defrost fish in original wrapping material. If defrosted in a refrigerator, there will be less drip from the fish. Cook fish while it is still chilled. Prepare the defrosted fish the same as fresh fish, but allow additional cooking time at a lower temperature if the fish is only partially defrosted.

## Shellfish

Shellfish are very susceptible to spoilage and should therefore be processed and frozen at or near the original source of supply. Frozen shrimp, however, may be cooked and refrozen. Do not store cooked peeled shrimp longer than 2 to 3 months and cooked unpeeled shrimp no longer than 4 to 6 months. Shrimp cocktail or shrimp creole may be frozen and stored for about 6 weeks.

# Dairy Products . . .

## Butter

Freeze freshly-made creamery butter. Wrap in good packaging materials even if previously wrapped in parchment. Do not freeze butter made from unpasteurized cream because it may become rancid during storage.

Butter purchased at the retail market may have been in storage many months and therefore may keep only a very few months longer.

## Cheese

The Dairy Department found that Cheddar, Brick, Port du Salut, Swiss, Provolini, Mozzarella, Liederkranz, Camembert, Parmesan, and Romano will freeze satisfactorily in small lots of one-half pound or less. The rate of freezing will be too slow in large pieces or at temperatures above 0° F. Some Limburger, Colby, Gouda, and Club cheese will freeze satisfactorily while others become crumbly and mealy. Wrap all cut cheese in aluminum foil.

Cottage cheese becomes watery and grainy in the home freezer or locker plant, although it may be frozen rapidly and at very low temperatures with good results.

## Cream

For best results freeze pasteurized cream containing not less than 40 percent butterfat. However, cream of 35 percent butterfat can be frozen. Do not store at 0° F. for over 4 months. To keep longer than 4 months add about 10 percent sugar by weight and store at 10-15° F. below zero.

## Ice Cream

For top-quality desserts, ice cream should not be stored longer than about three weeks if in original containers.

## Milk

Pasteurized homogenized milk may be frozen and stored about 3 weeks at zero or about 6 weeks at -10° F. If it is stored much longer, the curd starts to flake out.

## Eggs

Eggs should be broken for freezing, preferably after cooling them to about 32° F. Just before breaking, wash eggs in water at about 120° F. and add a detergent to help loosen dirt. Dry quickly. Check the condition of each egg by breaking it into a cup before adding it to the mixing bowl.

Egg whites or yolks may be frozen separately or mixed. Egg whites need no treatment. When freezing yolks, use fork to break them, stir slightly but do not beat. Mix in 2 tablespoons sugar or corn sirup, or 1 teaspoon salt, per cup. The texture of mixed whites and yolks may be improved a little by adding one-half the above amounts of salt or sweetening per cup, but most homemakers prefer to freeze the mixture without adding salt or sweetening.

Use the thawed product promptly.

Surplus egg whites that sometimes accumulate from feeding yolks to infants may be frozen until needed.

One cup equals 5 whole eggs, 12 yolks, or 8 whites. One whole egg equals 3 T (tablespoons), one egg white equals 2 T, one yolk equals 1½ T.

# Ready - to - Eat Foods . . .

**M**ANY cooked and baked foods may be frozen at home. In fact, freezing is the only method of preserving some of these foods. Space in this bulletin does not permit complete coverage of all the ready-to-eat foods that may be frozen at home.

Special methods, not available in the home, make it possible for commercial firms to freeze many additional products successfully.

## Cooked Foods

Combination dishes and soups which require a long cooking period can be cooked in larger quantities than usual. Then cool, freeze, and store away for future use. You will save time because the heating time for these foods is only a small fraction of their original cooking time. Most soups freeze well.

All types of cooked foods should be packed as solidly as possible to avoid air spaces in the container. Gravy and sauces are desirable with meats and vegetables as they fill air spaces.

**Do Not Overcook**—Vegetables should be only partially cooked, or the subsequent freezing and heating will make them mushy and unattractive. If completely cooked before freezing, they develop a warmed-over flavor when heated. For stew, add the vegetable when the meat is nearly cooked. Do not overcook dishes containing meat. Meat should be tender, but firm.

Use reliable recipes. Simmer, do not boil the food. If only part of the recipe prepared is to be frozen, a portion of the food should be taken from the saucepan, cooled, properly packaged in containers, and frozen immediately before the food is completely cooked.

**Cooling and Freezing**—Cool the cooked foods promptly to prevent continued cooking. Loss of flavor occurs rapidly when foods are held at high temperatures. Warm foods are excellent media for the growth of bacteria. The temperatures between 130° F. and 68° F. are most conducive to spoilage. It is important, therefore, that foods which have been heated to these temperatures be cooled rapidly.

Large quantities of food are difficult to cool rapidly. To hasten cooling, partially submerge the sauce pan of cooked food in a large pan of ice water until the food is cooled. Stir occasionally, being careful not to mash or break up the food. Keep the saucepan covered to reduce loss of aroma and to prevent contamination.

After cooling, package immediately. Label and date. Freeze and store at 0° F. or colder. Do not refreeze.

When metal containers are used, the food may be packed hot and the filled container cooled promptly in water.

**Heating the Cooked Foods**—The heating process completes the cooking. Heat the food in a covered saucepan, with a small amount of melted butter or fat in the bottom of the pan, cook over medium-low heat until completely thawed and heated, or put in a covered casserole dish and heat in a moderate oven. The food may be partially thawed. Partial thawing often prevents scorching. Creamed dishes, stews, creamed soups, and similar dishes which scorch easily should be reheated in a double boiler, allowing 20 to 30 minutes. If necessary, break up large clusters of the frozen foods with a fork, but keep stirring at a minimum. Heat rapidly to prevent unnecessary loss of flavor and aroma. Do not overcook. Prolonged heating will change the texture

and cause a greater loss of vitamins. Serve foods immediately after cooking.

**Storage Life**—Do not overestimate your needs. A rapid turnover is the secret to success because many of these foods lose their distinctive flavors after 3 to 4 months of storage unless held at  $-10^{\circ}$  F. or lower.

Differences in the quality of fat used greatly affect the length of time that many cooked foods may be stored.

The ingredients for most cooked dishes can be purchased the year round, so there is little reason for using limited freezer space by stocking up with an abundant supply.

### Roasted and Fried Meats

Left-over roasted meats such as beef, pork, ham, chicken and turkey with dressing and gravy, and Swiss steak covered with gravy freeze satisfactorily. Fried foods are the least desirable for freezing because they are likely to become rancid after relatively short storage, and when heated they develop a warmed-over flavor. Meat loaf may be frozen, either cooked or uncooked.

### Gravies, Sauces, and Stews

Fat has a tendency to separate<sup>1</sup> in gravies, sauces, and stews, but is usually recombined during heating.

Thickened sauces and gravies have a tendency to become thicker with freezing but may be thinned at time of heating. Dishes containing large amounts of milk tend to curdle or separate during thawing but generally recombine when heated.

### MSG to Enhance Flavor

MSG (monosodium glutamate) may be used to enhance the flavor of vari-

ous meats, poultry, seafoods, precooked foods, and vegetables. Add  $\frac{1}{4}$  tsp. MSG to such items as meat stews, creamed chicken or seafoods, and fish fillets. Add to precooked foods while cooking or dust over both sides of fish fillets.

MSG is sold under various trade names and is commonly available.

### Casserole Dishes

Casserole dishes containing macaroni, spaghetti, noodles, or rice may be frozen. Casseroles can safely be frozen in baking dishes or in freezing containers.

To serve, bake in a  $350^{\circ}$  F. oven for about an hour. The baking dish may go directly from the freezer to the oven with little danger of breakage. Casserole dishes may become a little sticky or dry; liquid may be added when heated.

Meat and sauce combinations for such dishes as Italian spaghetti, Spanish rice, and chow mein may be frozen separately and the other ingredients added fresh cooked at the time of serving.

### Potatoes

Potatoes become mushy and grainy when frozen in stew, so it is best to add them at time of heating. Whipped and stuffed-baked potatoes, however, make tempting frozen products. To serve reheat in a  $350^{\circ}$  F. oven for about 15-20 minutes. The stuffed potato may be browned slightly under the broiler.

French-fried potatoes freeze best when cut very thin. Reheat in oven.

### Baked Beans

Baked beans freeze and store well if the salt pork is fresh.

### Seasonings

Because the flavors of cloves and garlic become stronger during storage, these seasonings should not be added before freezing. Onions gradually lose

<sup>1</sup> Separation may be prevented by thickening with flour made from waxy rice or waxy maize, but these flours rarely are obtainable. Starch made from waxy maize is best for thickening chow mein, but is not obtainable in small lots.

flavor. Nutmeg and cinnamon show little change in strength; green peppers, sage, and pimientos increase.

### Left-Overs

It seldom pays to freeze small lots, but cooking extra amounts to be frozen as "planned left-overs" is worth while. Left-overs are likely to have a warmed-over flavor when heated because they have been completely cooked. Do not allow food to stand before freezing.

### Gelatin Dishes

Whipped gelatin freezes well. Gelatin molded salads freeze successfully if 1½ cups of liquid are used instead of 2 cups. Store less than 1 month.



## Baked Foods

### Pies

It takes little extra work to make five to six pies instead of one or two. Although a frozen pie crust is not quite as flaky as that of a fresh pie, it runs a close second place.

**Pies Suitable for Freezing**—Fresh fruit pies; vegetable pies such as squash, pumpkin, and sweet potato; mince pies; and chiffon pies freeze successfully. With chiffon pies, always include egg white or whipping cream, depending on the recipe used, to prevent "weeping" on thawing. Most custard pies do not freeze successfully. Meringue toppings tend to toughen, shrink, separate, and stick to the wrappers. Baked and unbaked pie shells and graham cracker shells may also be frozen. Meat pies freeze well.

**Freezing Pies**—Pies may be frozen baked or unbaked. Both methods are satisfactory; however, the lower crust of the unbaked pie may absorb juices from the filling and become quite soggy. Deep dish pies may be frozen.

If frozen fruit is used in an unbaked pie, thaw and drain off the excess juice. Use only a small amount of the liquid; or thicken the excess juice. Cool quickly and pour over the fruit. Fill the pie and freeze immediately. If canned fruit is used, follow a similar procedure.

For a clear bright pie filling in either a baked or unbaked frozen pie, thicken with tapioca or cornstarch rather than flour.

Frozen baked pies are prepared the same as fresh pies. If frozen fruit is used, thaw and drain off a small amount of the excess juice. Then proceed as you would using fresh or canned fruit.

Cool a *baked* pie rapidly, then place the unwrapped pie in the freezer. Both baked and unbaked pies freeze faster unwrapped, and they are easier to wrap after freezing. Keep pie level while freezing. Before wrapping, place another pie plate over the top to protect the crust.

**Thawing Pies**—When ready to use, place the unbaked pie on the lower shelf of a preheated oven while still frozen. Bake at 450° for 10-15 minutes; complete baking at 375° F. The *baked* fruit or vegetable pie may be allowed to stand at room temperature for a short time, but put it in a 325° F. oven before it begins to thaw, and heat until just warm. Do not reheat chiffon pies.

**Freezing Pie Mixes**—Frozen pies are bulky, so where freezer space is limited, it is wise to package special pie-mixes in frozen food containers. A pint container holds about the right amount for an 8-inch pie.

Ingredients for squash, pumpkin, and sweet potato pies including the milk, the thickening agent, sweetening, eggs, (if needed), and spices (except cloves) may be mixed together and frozen. When ready to use, partially thaw in the original container. Add other ingredients (if necessary) and pour into pastry-lined pie plate.

**Storage**—Varies with the filling. Usually best not to store over 5 weeks,

but some pies may be stored much longer.

### Cherry Pie (Tapioca)

- 3 T. minute tapioca
- $\frac{3}{4}$  C. sugar
- $\frac{1}{8}$  t. salt
- 3 C. frozen cherries (thawed and drained)
- $\frac{3}{4}$  C. cherry juice
- 1 T. butter
- $\frac{1}{4}$  t. cinnamon if desired

1. Combine the tapioca, sugar, and salt.
2. Add the cherries which have been thawed and drained and the cherry juice.
3. Combine and mix well.
4. Allow the mixture to stand 15 minutes and then pour into a 9-inch pastry lined pie pan.
5. Dot with butter.
6. Cover with a top crust or with a lattice pastry.
7. Bake at 450° F. for 10 minutes and then reduce heat to 350° F. and bake until the top crust is a golden brown (35-40 minutes).

### Cherry Pie (Cornstarch)

- 1½ T. cornstarch
- $\frac{1}{2}$  C. sugar
- $\frac{1}{8}$  t. salt
- $\frac{1}{2}$  C. cherry juice
- 2½ C. frozen cherries (thawed and drained)
- 1 T. butter
- $\frac{1}{4}$  t. cinnamon if desired

1. Combine the cornstarch, sugar, and salt.

2. Add the cherry juice and cook until the mixture is thick.
3. Pour over cherries which have been thawed and drained, in an 8-inch pastry lined pie pan.
4. Dot with butter.
5. Cover with a top crust or with a lattice pastry.
6. Bake at 450° F. for 10 minutes and then reduce heat to 350° F. and bake until the top crust is a golden brown (35-40 minutes).

### Cakes

Most cakes and cup-cakes may be frozen satisfactorily. The cakes may be baked on a "slack" day and then frozen and stored until needed. If cake batter is frozen, the results are quite uncertain because the batter may lose some of its rising capacity during freezing and thawing. Also, it is simpler to thaw out a baked cake than to thaw out the batter, then bake, and then cool the cake. *From the standpoint of time, work, and quality of the finished product, cakes baked before freezing are more practical.*

**Freezing Baked Cakes**— Completely cool the baked cakes before packaging. The type of wrapping material is not as important for cakes to be eaten within a couple of days as it is for cake that is to be stored for a longer period. For long storage periods, package in moisture-proof materials. If desired, package in "family-size" pieces. Label and date. Cakes do not freeze solid. After wrapping and freezing, place the cake in a metal container or heavy carton to protect from being crushed.

**Thawing Baked Cakes**— Thaw baked cakes in their original wrappings to prevent formation of moisture on the surface of the cake. A large cake will thaw in about two hours at room temperature. If quicker thawing is desired, the time may be reduced about one

third by thawing in front of an electric fan. Or quicker still, thaw in a 250° to 300° F. oven for a very short time. Watch closely so cake does not dry out. *Do not thaw frosted or filled cakes in the oven.*

**Storage Life** — When properly wrapped, unfrosted, baked cakes remain in top condition about 2 to 3 months. Frosted cakes should only be stored 1 to 2 months. Fruit cakes may be stored considerably longer.

**Frostings and Fillings**—For best results, do not frost or fill cakes before freezing. Some frostings do not freeze satisfactorily, and fillings tend to make the cake a bit soggy. Confectioners' sugar frostings and fudge frostings freeze best. Boiled frostings freeze well but are difficult to wrap as the frosting has a tendency to stick to the wrapper. One method of eliminating some of the sticking is to freeze the cake before wrapping, or to insert toothpicks around the top of the cake to prevent contact of the frosting with the wrapper.

### Boiled White Frosting

- ½ C. egg whites
- 1½ C. sugar
- ¼ t. cream of tartar
- ½ C. water

1. Combine the sugar, cream of tartar, and water, and cook to 260° F. using a candy thermometer.
2. Beat the egg whites to points.
3. Add the sirup gradually, beating at high speed. Do not beat until the mixture is cool but only until it holds its shape.
4. Vanilla or other flavoring may be added.

This frosting freezes very well, and it generally does not dry out. It makes a generous amount—enough for two 9-inch layers (one cake).

## Cookies

Freeze cookies baked or unbaked, whichever you prefer. Both methods will produce excellent results.

**Freezing, Defrosting, and Baking Cooky Dough**—Freezing the cooky dough is considered the simplest method. It takes up much less freezer space, but of course requires more work after freezing than baked cookies do.

Shape dough for freezer (refrigerator) cookies into a roll of desired diameter. Wrap in locker paper and freeze. When ready to use, remove from freezer, slice with a sharp knife. Place on greased cooky sheet and bake in usual manner. Or, if you desire, chill the dough for several hours in refrigerator and slice into cookies before freezing. Package the unbaked cookies in layers in frozen food containers. Separate each layer with two sheets of waxed paper. Keep layers at a minimum to avoid crushing. When ready to bake, place the frozen unbaked cookies on a greased cooky sheet. Bake.

Pack drop-cooky dough in frozen food containers. When ready to bake, thaw dough until soft enough to drop by spoonfuls onto greased cooky sheets.

Cooky dough frozen in pans may be slipped into the oven without previous thawing. The layer of dough is so shallow that it will thaw out rapidly in the oven. Bake in usual manner. If dough is packaged in containers, thaw until product can be easily transferred into baking pan.

**Freezing Baked Cookies**—Cool the cookies after baking. Package in frozen food containers, cooky jars, or canisters with tight fitting covers.

**Thawing Baked Cookies**—Thaw cookies in original containers. The thawing period will be very short.

**Length of Storage**—Cookies and cooky doughs may be stored at least 9 months.

## Yeast Breads and Rolls

Bread and rolls may be frozen baked or unbaked. If the proper methods of packing, freezing, and storing are followed, baked rolls will be just as light and tender after freezing as they were before. If **unbaked** rolls are put into the freezer, the results cannot always be predicted. Unbaked dough may lose some of its rising capacity after being frozen and thawed, and the texture may be tougher and volume smaller. Brown 'n serve rolls may be frozen and stored for 2 to 3 months.

Bakery bread may be stored in its original wrap for about 4 months, if a good grade of wrap is used. For longer periods, use polyethylene bags.

**Freezing Baked Rolls and Bread—**Use your favorite plain or sweet dough recipe. Bake at 400° F. for 45-50 minutes instead of at 375° F. for an hour. After baking, remove from pans and cool to room temperature. Wrap in moisture-proof material. Polyethylene bags are excellent for this purpose. Bread baked at a higher temperature and for a shorter time will be less crumbly and therefore more desirable for freezing.

**Thawing and Heating Baked Rolls—**Heat rolls in oven at 250° to 300° F. for about 10 to 15 minutes.

**Thawing Baked Breads—**Thaw in original wrapper at room temperature. A one-pound loaf of bread will thaw completely in about 3 hours. Slices of frozen bread may be put into the toaster without thawing.

**Storage Life—**Do not store baked products longer than about 3 months.

**Freezing Shaped or Bulk Dough—**Allow dough to rise until double in bulk. Doughs frozen in bulk form are likely to yield acceptable products. Doughs shaped before freezing may be inferior, even when stored only two weeks. Grease all surfaces. Package in moisture-proof wrappings or containers.

Place two sheets of locker paper between layers.

**Thawing Dough—**When ready to use, allow dough to thaw in a warm, moist place away from drafts. Thaw frozen bread dough in the wrapper to prevent surface drying which may result in streaks in the baked loaf. Shape bulk dough and let rise. Place shaped rolls in greased muffin pans and shaped loaves in loaf pans and allow to thaw and rise in a warm, moist place. Bake.

**Storage Life—**Do not store unbaked dough in bulk longer than 3 months.

## Quick Breads

Quick breads such as baking powder biscuits, muffins, and nut breads may be frozen baked or unbaked. The results will be similar to those for yeast breads.

**Freezing and Thawing the Baked Quick Breads—**Cool and package the same as yeast breads. Freeze immediately. When ready to serve, thaw in original wrappings at room temperature, or warm in a 250° to 300° F. oven. Waffles may be frozen; heat in an electric toaster.

**Storage Life—**Do not store baked quick breads longer than three months.

**Freezing and Thawing the Unbaked Product—**Freeze batters in baking pans and overwrap with moisture-proof paper. When ready to bake, thaw at room temperature, but do not allow batter to stand around before baking. Bake in usual manner. Freeze cut baking powder biscuits in frozen food containers. Partially thaw before baking.

**Storage Life—**Do not store longer than 2 to 3 months.

## Sandwiches

**Sandwich Fillings—**The following are suggestions for sandwich fillings and spreads. Use them separately or com-

bine them with very small amounts of mayonnaise, salad dressing, cream cheese, or creamed butter to make spreading easy. Luncheon meats, leftover sliced roast beef, roast pork, baked ham, chicken, turkey, dried beef, tuna, salmon, sliced cheese, cheese spreads, hard-cooked egg yolks, and peanut butter make good fillings. Put egg salad through grinder before using in sandwiches. Add sliced or chopped olives, and chopped dill or sweet pickles to any of these. If desired, fillings and spreads may be frozen separately in frozen food containers for later use.

All sandwich spreads do not freeze satisfactorily. Jelly, mayonnaise, and salad dressings used as spreads soak into the bread. Hard-cooked egg whites develop off-flavors and change in texture. Do not freeze lettuce, celery, tomatoes, and carrots. Add these to the lunch after it has been taken from the freezer. The lettuce and tomatoes may be slipped into the sandwiches at the time of eating. Frozen slices of bread may be used to make sandwiches.

**Party Sandwiches and Hors d'Oeuvres**—Fancy party sandwiches and hors d'oeuvres can also be frozen. Although the fillings and spreads will be different from those used in lunch sandwiches, the rules for making, packaging, freezing, and storing are the same. Crust trims easily when bread is frozen.

**Packaging** — Wrap lunch sandwiches separately in good wrapping material. Pack party sandwiches in layers with two sheets of waxed paper in between. Pack the sandwiches in containers for protection from crushing. Label, date.

**Length of Storage**—The storage life for most sandwiches is about three weeks. Do not refreeze sandwiches.

## Candies, Marshmallows

Most candies keep fresh for one year or longer when stored at 0° F. Neither do they discolor or lose quality on re-freezing. Spun candy chips, chocolate covered nuts, and others with hard centers may crack or split.

An effective moisture-proof wrap is necessary to prevent damage due to condensation on removal to room temperature. The waxed paper wraps used for boxed candies and candy bars do not fully prevent such damage. Do not remove the moisture-proof wrap until the candy has warmed to room temperature.

## Frozen Foods for Lunches

During the fruit season, freeze sauce and juice in individual half-pint frozen food containers to add vitamins and variety to the lunch box. Pack complete lunches including foods such as sandwiches, sauce, juice, cakes, and cookies. Pack similar foods in one box and make up the individual lunches as needed, or pack the individual lunches separately and place in freezer. Pack in boxes for protection from crushing. Label and date.

**Thawing the Lunches**—The lunches will be completely thawed in three to four hours at room temperature. Frozen lunches are more appetizing because the sandwiches will be fresh and not soggy. The baked foods will be moist and fresh. The sauce or juice will be refreshingly cool. **Sandwiches should be eaten soon after thawing to prevent spoilage.**

# Your Home Freezer . . .

**H**OME FREEZERS are gradually becoming an important part of modern household equipment. They make possible more extensive use of frozen cooked foods, ice cream, frozen leftovers and other items for which a special trip to the locker plant would not be practical. These items play an important role in saving money and time for the homemaker. A home freezer is especially useful for freezing small lots of fruits and vegetables without delay.

It is desirable to ground the metal case of a freezer kept in a basement.

## Size—Power Used

Most people buy units with too little storage space. For a rural family at least 5 cubic feet of storage space should be allowed for each person if all the frozen food is to be stored at home. Farm families can use as much as 8 cubic feet per person if maximum use of frozen foods is made. Those who use a home freezer to supplement a rented locker will need less storage space at home. In fact, the use of a home freezer together with rental of a locker at a good locker plant is an excellent combination.

In general, non-rural families who use any appreciable quantity of frozen food find that a 10 to 12 cubic-foot size fulfills their *minimum* need for space. Some families prefer a small home freezer in the kitchen and a larger unit elsewhere in the house where more space is available.

Electricity used varies considerably, depending a great deal on room temperature. Records of a large number of units in use showed a range of 60 to 120 kilowatt-hours per month, averag-

ing 80 kilowatt-hours, for freezers of 15 to 18 cubic foot size.

A space of at least 1 inch should be left at the top of chest type home freezers, because it is difficult to keep the top packages at the desired temperature when the storage space is overcrowded. See page 11 for amount of food that may be stored per cubic foot.

## Defrosting

Scrape frost from chest type units when it becomes one-third inch thick. Scraping is not so easy with upright models and complete defrosting may be necessary. Lay towels at the bottom (or on top of any remaining food) to collect the frost. Remove all or most of food to other part of the freezer, or pile under a blanket outside the freezer. Use a wooden or plastic paddle for scraping, never a metal scraper. Do not shut off the electricity.

Complete defrosting will be necessary to remove frost, ice, or spilled food that cannot be removed by scraping. Shut off electricity, remove food, and leave lid or door open. Hasten thawing with pans of hot water put in the freezer. This will loosen ice which then may be scraped off. Use towels at bottom of freezer to soak up water as it forms.

After thawing, wash the inside with warm baking soda solution (3 table-spoons baking soda to 1 quart water), or with synthetic detergent added to water. Wipe dry, turn on electricity. Replace the food after remaining moisture inside has frozen.

Covering shelves of upright types with aluminum foil will make frost removal easier next time.

## Power Failure

Keep the cabinet closed in the event of power failure or mechanical breakdown. Relatively little thawing is likely to occur during the first 12 to 20 hours if the freezer is fairly full of food stored at about 0° F.

If the shutdown of power is likely to continue for longer than one day, the frozen food should, if possible, be moved to a locker plant or other place where low temperature storage is avail-

able. Most locker plants will provide this service in an emergency. If much of the food thaws out, the freezer might not be capable of refreezing a large quantity of food before spoilage starts.

Dry ice may be used to prevent thawing. A 50-pound cake of dry ice placed in a freezer fairly soon after power failure will prevent thawing of the food for 2 to 3 days.

Records indicate that in large-size freezers filled with frozen foods, it may take 50 hours or more for food in the top layer and 85 hours or more for the rest to reach 32° F.

# Refreezing Foods . . .

**D**EFROSTED FOODS should not be eaten or refrozen after they have passed through slow temperature changes and reached 50° F. in a home freezer after power failure. The time required to reach this temperature, however, is much longer than most people imagine. In large-size freezers fairly full of food it usually takes several days. Packages that still contain some ice crystals may be refrozen without risk.

Any risks that may be incurred arise from the fact that thawed foods spoil faster than fresh foods and thus thawed foods may spoil before being refrozen. Refreezing, itself, is not harmful. In fact, it is not uncommon practice in the home, if the need arises, to refreeze for short periods small packages of meat or other foods that do not toughen or lose texture on refreezing.

### Meats, Poultry, Fish

If the product temperature has remained below 45° F., the food is probably still in good condition. Incipient spoilage usually can be detected by color and odor. Thawed meats and cut poultry lose some juices.

### Shellfish, Eggs

These products spoil quickly and it is difficult to determine by odor or appearance whether they are dangerous to eat. For this reason, it is unwise to refreeze them.

### Fruits

When fruits start to spoil they ferment. This destroys their flavor but does not make them dangerous to eat. Thawed fruits may be refrozen, and if it is found that table quality has been impaired they can be made into jams, jellies, and preserves. Thawed fruits usually shrink and become mushy.

### Vegetables

Thawed frozen vegetables spoil sooner than fresh vegetables. Therefore, it is unwise to refreeze vegetables that have become completely defrosted, unless the product temperature has remained below 45° F. Thawing and refreezing toughens some vegetables.

### Fruit Juices

Some deterioration occurs when concentrated juices are refrozen. Other juices show little change.

**Table 7. Maximum Storage Periods Recommended at 0° F.**

	Months		Months
<b>Baked Foods</b>			
Brown 'n serve rolls	2-3	<b>Game animals</b>	9
Cake batter	less than 1	<b>Game birds</b>	9
Cakes, baked	6	<b>Gelatin</b>	less than 1
Cakes, frosted	2-3	<b>Margarine</b>	9-12
Chiffon pies	less than 1	<b>Meats*</b>	
Chocolate cake, baked	4	Bacon, not sliced	2-3
Cookies	9-12	Beef, except ground	9
Fruit cake	9-12	Beef, ground	4
Gingerbread, baked	less than 1	Beef liver, heart, tongue	6
Gingerbread, unbaked	4	Ham, not sliced	2-3
Mincedmeat pie	2-3	Lamb	9
Pies, baked	4	Pork, except ground	4
Pies, unbaked	2-3	Pork, ground, unsalted	2-3
Quick breads, baked	2-3	Pork sausage, no anti-oxidant	less than 1
Quick breads, unbaked	less than 1	Stew meat, cut	4
Sponge cake, egg yolk	4	Veal	6
Yeast breads, baked	9-12	<b>Mushrooms</b>	6
Yeast dough, unbaked bulk	2-3	<b>Nuts, salted</b>	6
Yeast rolls, baked	9-12	<b>Nuts, unsalted</b>	9-12
Yeast rolls, unbaked	less than 1	<b>Poultry*</b>	
<b>Candies</b>	12-18	Chicken	9
<b>Citrus fruits</b>	2-3	Broilers and fryers, whole	9-12
<b>Citrus juices, concentrate</b>	12-18	Cut up	9
<b>Dairy Products</b>		Roasters and stewers	9
Butter, fresh creamery	9	Ducks, domestic	9-12
Cheese, in small lots	6	Geese, domestic	9
Cream, 40 percent or more	4	Livers	2-3
Eggs, processed	9	Poultry, pre-cooked	4
Ice cream	less than 1	Turkeys	9
Milk, homogenized	less than 1	<b>Pre-cooked foods</b>	3
<b>Fish and Seafoods*</b>		Pre-cooked foods in sauce or gravy	6
Fish, lean	6	<b>Sandwiches</b>	less than 1
Fish, fatty	4	<b>Vegetables</b>	12-18
Oysters	6		
Shrimp, cooked peeled	2-3		
Shrimp, cooked unpeeled	6		
Other shellfish	4		
<b>Fruits, except citrus</b>	12-18		

\* Reduce time one-half or more when bought at store at indefinite time after killing.

Note—Light smoking of unsalted fresh meat, poultry, and fish greatly prolongs storage life.

# *Where to Find It . . .*

	Page
★ Freezing Foods .....	3
Packaging Materials .....	4
How to Wrap .....	7
Wrapping Costs .....	8
Containers .....	8
Freezing Operations .....	9
★ Freezing Fruits .....	12
Packing Methods .....	12
Fruits for Freezing .....	14
Variations .....	18
Thawing Frozen Fruits .....	19
★ Freezing Vegetables .....	20
Methods of Preparation .....	20
Vegetables for Freezing .....	22
Cooking Frozen Vegetables .....	29
★ Freezing Fruit and Vegetable Juices .....	30
★ Freezing Meats .....	31
Yield of Meat .....	32
Meats for Freezing .....	32
Cooking of Meats .....	34
Poultry and Game Birds .....	34
Fish .....	36
★ Freezing Dairy Products .....	37
★ Freezing Ready-to-Eat Foods .....	38
Cooked Foods .....	38
Baked Foods .....	40
Sandwiches .....	43
Candies, Marshmallows .....	44
Frozen Foods for Lunches .....	44
★ Your Home Freezer .....	45
Size .....	45
Defrosting .....	45
Power Failure .....	46
★ Refreezing Foods .....	46

UNIVERSITY OF MINNESOTA, INSTITUTE OF AGRICULTURE, ST. PAUL 1, MNNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Service and United States Department of Agriculture Cooperating, Skuli Rutford, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

25M—6-58