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PRESERVING FOOD IN HOME FROZEN FOOD CABINETS

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FOREWORD

About 500,000 Kansans now obtain all or part of their supply of fruits, vegetables, meats, and other foods from frozen food locker plants or home cabinets. Additional thousands are interested in this comparatively new method of food preservation but are unable to secure refrigerated storage space. Students of the frozen food industry estimate that there will be a demand for one and a half million to two million home cabinets in the United States within two years after full production of such equipment is resumed. If the estimates are correct, there will be a demand for 20,000 to 30,000 home units in Kansas in the near future.

PRESERVING FOOD IN HOME FROZEN FOOD CABINETS

By G. A. FILINGER

This circular is intended to aid prospective buyers in the selection of home cabinets and to explain briefly their economical management. It presents some of the advantages and disadvantages of home frozen food preservation and gives the essential information on the selection processing and storage of food frozen in commercial locker plants or in home units.

There are many advantages in preserving foods by freezing and storing them in home units and some disadvantages.

ADVANTAGES OF A HOME CABINET

1. Frozen home-produced foods are more palatable than home-canned or cured products.
2. Preserving food by freezing involves less labor.
3. There is less spoilage of food if preserved by freezing.
4. It makes possible an improved diet since this method preserves the fresh taste and vitamin content of foods.
5. Food is preserved without being overcooked.
6. It permits wider latitude in selecting the time to slaughter farm animals or dress poultry since meat can be frozen any time of year.
7. Home cabinets are more convenient than commercial frozen food lockers.
8. Food conveniently can be taken out in quantities needed.
9. One need not enter a cold room to store or get frozen food.
10. Commercially frozen foods can be stored at home.
11. Foods can be purchased in large quantities at lower prices and preserved at their prime.
12. Surpluses of cooked foods and leftovers can be frozen and preserved.

DISADVANTAGES OF A HOME CABINET

1. Initial cost may be high.
2. Operation costs may be high.
3. Electric current may not be available.
4. Electric current may be interrupted or mechanism may break down and permit spoilage.
5. A home unit will occupy considerable space in a basement or kitchen.
6. Design may be inconvenient to fit space available.
7. Sometimes difficult to remove food desired.
8. Capacity may be insufficient to freeze a large bulk of food quickly enough to prevent spoilage.
9. The owner may package food improperly.
10. Excessive desiccation or drying of foods may result.

TYPES OF CABINETS

There are three general types of cabinets intended for use in storing quick-frozen foods at home.

1. *Home storage units* are intended by their manufacturers to be used for the storage of foods frozen by commercial companies specializing in frosted foods, or food processed at home and frozen in

a locker plant. Since the "freezing capacity" of such units need not be high, the cabinets should not be excessively expensive to buy or to operate. (Fig. 1.)

2. *Home freezer units* will have one or more compartments for storage of food at zero and will also have a quick-freeze space capable of freezing a limited volume of food at home. Such cabinets probably will be the most numerous on the market and should be studied carefully by the prospective buyer. (Figs. 2 and 3).

3. *Dual temperature units* will have one or more compartments for storage of frozen food at zero or below and the rest of the space will be held at a temperature above freezing generally recommended

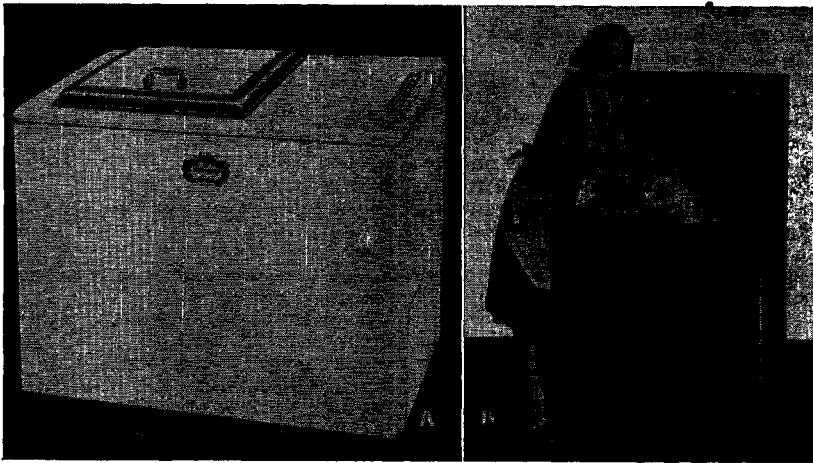


FIG. 1.—Home cabinets intended mainly for storage of frozen foods. They will freeze foods in small quantities. (a) Schaefer. (b) Jewett Refrigerator Company.

for perishable foods such as milk, cream, butter, and fresh vegetables. Two of these, illustrated in Figure 4a and b, are combination kitchen refrigerators with built-in zero compartments. These will be popular and satisfactory for the freezing and storage of a limited quantity of food.

Another dual temperature unit is illustrated in Figure 4c and d. It is the so-called "walk in" cooler and frozen food storage combination. Such a cabinet would cost \$800 or more depending on size and would provide room for chilling and aging meat, and storing perishable foods as well as freezing foods. Ranchmen and large farm operators will be interested in such equipment.

SELECTING A HOME FROZEN FOOD CABINET

A prospective buyer of a home cabinet should consider several factors before deciding whether to buy a unit and, if so, what type to get.

1. For best results, foods must be frozen quickly. The temperature of the products should be reduced so fast that large ice crystals will not form within the tissues during the freezing process. Slow freezing of fruits and vegetables disrupts the cell structure of the products causing a loss in flavor and firmness. A wise prospective buyer will know the freezing capacity of the home unit if he intends to freeze the foods at home.

2. Foods stored at low temperatures tend to dehydrate or lose moisture. The difference in temperature between the products stored and the refrigerating surfaces causes air currents to be set up because the cooler air adjacent to the coils or plates is heavy and sinks whereas the air surrounding the food, being warmer, rises. Moisture is taken up from the food stuffs and is deposited on the cooling units. Satisfactory freezer units have a large refrigerating surface in proportion to the space and amount of products to be frozen.

3. Home units vary in their capacity to freeze food products. Except for some of the so-called "walk in" types, the cabinets are not intended to freeze large quantities of food at a time. A unit with a freezing capacity sufficient to freeze a whole beef or hog at one time would be very bulky and expensive, whereas, one intended merely to store frozen food would occupy less space and cost less to buy and operate. The storage compartment should have a temperature of 0° F. and the sharp freeze compartment -10° F. to -20° F.

4. The quality of frozen food is materially reduced if thawed and refrozen. The reformed ice crystals increase in size and cause changes similar to those caused by slow freezing. Home freezer units depend upon a constant supply of electric current and dependable working mechanism for proper operation. If for some reason the current is interrupted due to a storm or if the mechanism fails, refrigeration stops and the whole season's supply of food may be in danger of spoiling. An alert frozen cabinet owner will be on friendly terms with the management of a commercial frozen food locker plant where he can store his frozen food temporarily if necessary. He will want to buy his unit from a concern with a dependable service department and get a standard make cabinet which is not likely to become an "orphan."

5. Home frozen food cabinets vary in their original cost and in their cost of maintenance. The cheapest units may not necessarily be the most economical in the long run. Dependable, adequate mechanism, sufficient insulation and satisfactory outside finish should be insisted upon. The cost of operating a home cabinet will vary depending upon use, exposure, and type but should not exceed

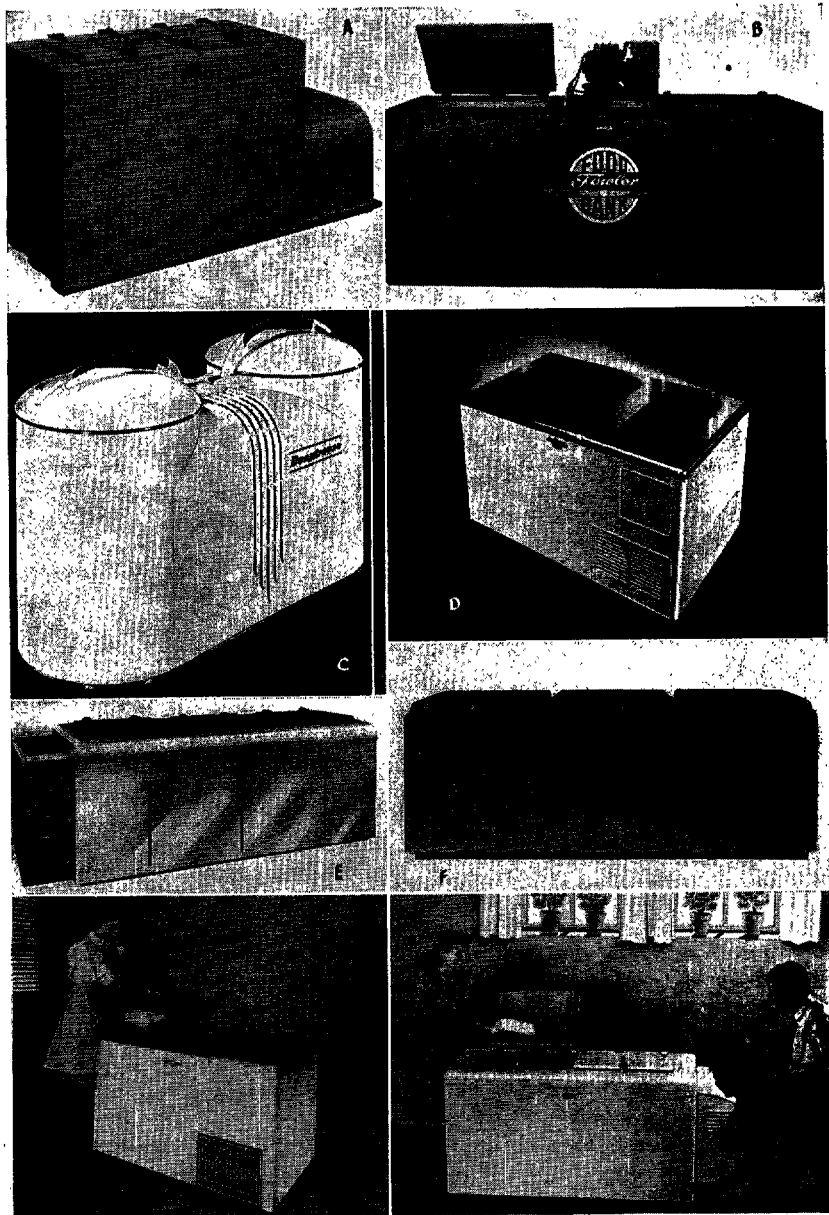


FIG. 2.—Examples of top-opening home cabinets. (a) Robbins and Burke, Inc. (b) Fowler Equipment Company. (c) Deepfreeze Division Motor Products Corporation. (d) Anheuser-Busch. (e) Emil Steinhorst & Sons. (f) Victor Products Company. (g) Frigidaire Division General Motors Corporation. (h) Sanitary Refrigerator Company.

two dollars per month per six cubic feet or four dollars per year per cubic foot.

6. The shape and size of home cabinet to buy may be determined by the space available for housing the unit and access to the space. The doors in the average home will accommodate a cabinet 30 inches wide. A cabinet that is too long may be difficult to move around corners or down curved stairs. A top-opening cabinet should not be more than 30 to 36 inches deep or it will be difficult to reach food containers on the bottom.

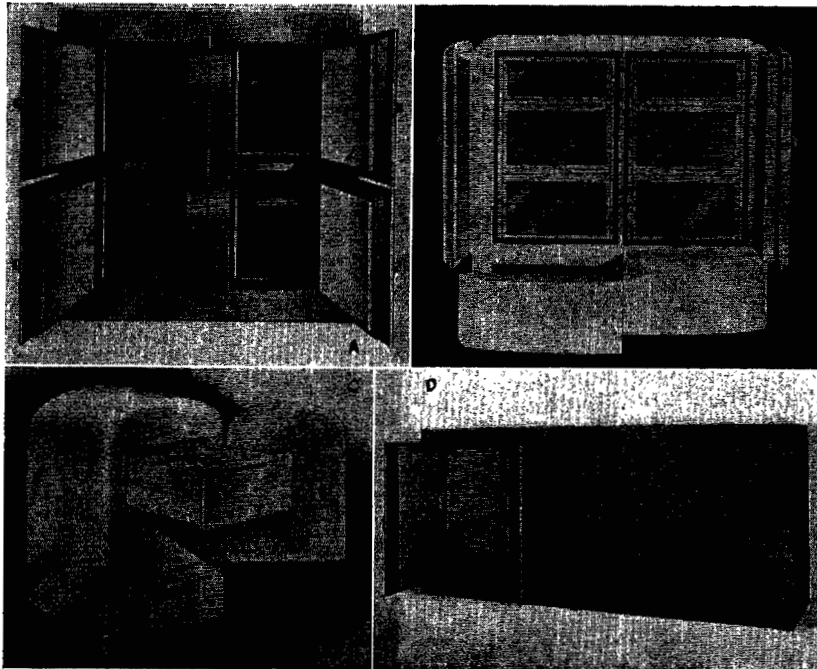


FIG. 3.—Examples of side-opening, home cabinets. (a) Wilson Cabinet Company. (b) Refrigerator Division, Portable Elevator Company. (c) Seeger Refrigerator Company. (d) Fowler Equipment Company.

7. The relative merits of top- versus side-opening doors are open to debate. (Figs. 2 and 3.) Since cold air is heavier than warm air, it tends to settle down. Cabinets opening at the top do not lose as much cold air when opened as do side opening or drawer type cabinets. However, the side opening and drawer types permit access to the frozen products more easily and many have glass inside doors enclosing small compartments to prevent the loss of cool air. In the drawer type the back end of the drawer closes the opening when the drawer is pulled out.

8. The proper size of the cabinet to store an adequate supply of food for the family is difficult to determine. Since the common experience of the housewife with her refrigerator has been a lack of sufficient storage space, there may be a tendency to buy large units. Those who have experience with the commercial frozen food lockers,

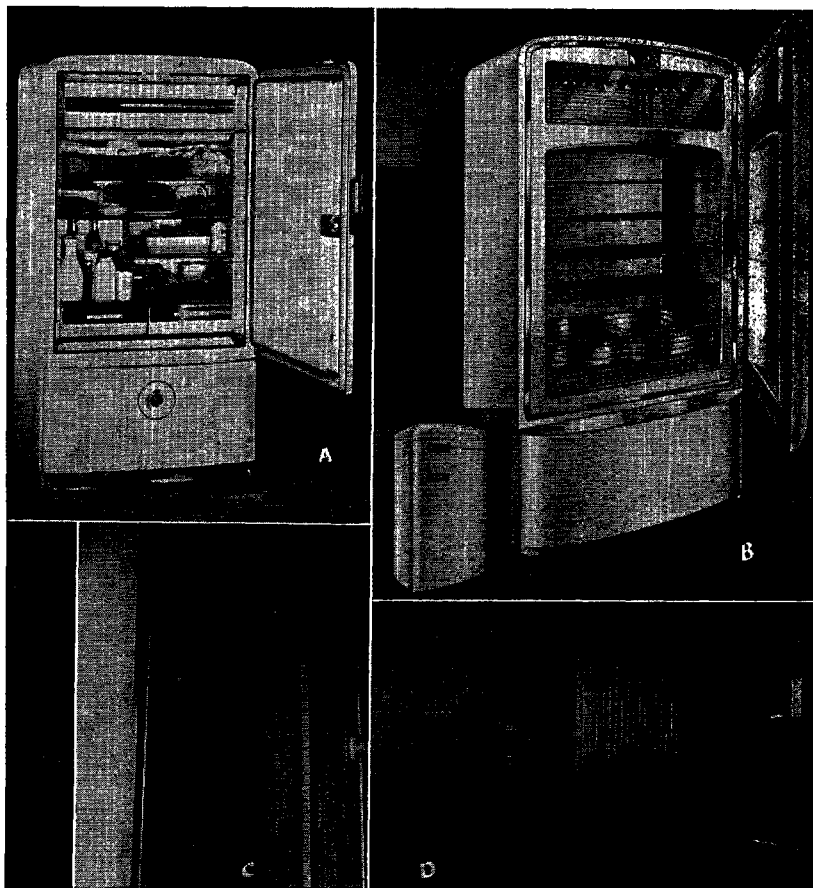


FIG. 4.—Examples of the dual-temperature home cabinets. (a) Frigidaire. (b) Admiral, open to show arrangement of compartments. (c) Walk-in type, open showing coils and quick freeze compartments. (d) Walk-in type, closed showing compressor (Courtesy, Texas A and M. College).

which average about six cubic feet of space, and accommodates 250 to 300 pounds of food, may also be tempted to “over buy.” Table 1 presents the average amounts of food included in a medium cost, good diet. Adding the columns of food that can be preserved by freezing shows that an average family of five would require 3,135 pounds of

such food for a year, Since about one-half of this can be obtained and used fresh, only about 1,500 pounds will be stored in the unit. The units being in the home, permit a rapid turnover of food and with careful management, a 12-cubic-foot cabinet will accommodate 1,500 pounds of food in a year. (See schedule p. 13.) The more rapid the turnover the more economical the operation per pound of food stored. The frozen food cabinet does not replace but supplements the household refrigerator.

9. The space available for housing the home cabinet should be considered carefully by the prospective buyer. If the unit is to be

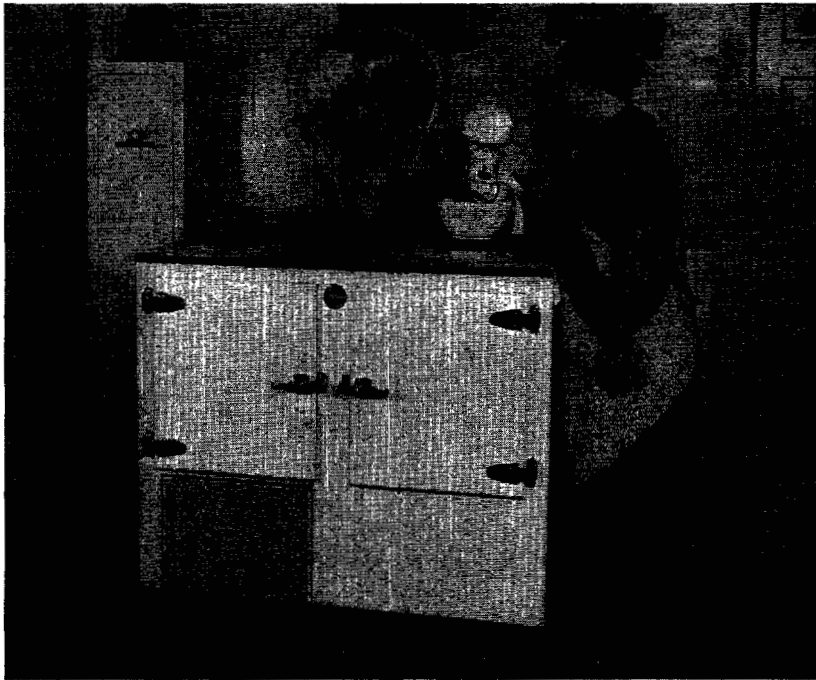


FIG. 5.—An attractive home frozen food cabinet.

placed in the kitchen, its shape and size must not interfere too much with the housewife's work and the finish should be in keeping with other equipment. (Fig. 5.) It should be remembered that for greatest economy of operation, the compressor must have plenty of circulating air and that the heat taken out of the cabinet and the food products in the process of freezing will be expelled into the room housing the unit and will remain there unless provision is made to take the warm air out. If the cabinet is to be located in the basement, one should consider the effects of moisture on the finish and on the accumulation of frost around the doors and on the cooling units.

TABLE 1.—A MEDIUM-COST GOOD DIET*

| FAMILY MEMBERS. | Milk, qt. | Potatoes, Irish and sweet, lb. | Dry Legumes and nuts, lb. | Tomatoes and citrus fruits, lb.† | Leafy green and yellow veg., lb.† | Other veg. and fruits, lb.† | Eggs, doz. | Meat, poultry, fish, lb.† | Flour and cereals, lb. | Butter, lb.† | Other fats, lb. | Sugar, lb. |
|---------------------------------------|-----------|--------------------------------|---------------------------|----------------------------------|-----------------------------------|-----------------------------|------------|---------------------------|------------------------|--------------|-----------------|------------|
| Children 3 years or under | 312 | 70 | | 80 | 105 | 100 | 22 | 20 | 53 | 8 | | 10 |
| Boys 4 to 19 years average | 365 | 138 | 9 | 90 | 172 | 268 | 27 | 108 | 135 | 23 | 28 | 42 |
| Girls 4 to 19 years average | 365 | 112 | 6 | 85 | 177 | 210 | 29 | 90 | 110 | 22 | 15 | 30 |
| Men—average | 206 | 197 | 11 | 96 | 166 | 310 | 23 | 163 | 200 | 25 | 43 | 66 |
| Women—average | 270 | 134 | 8 | 94 | 250 | 312 | 27 | 136 | 136 | 25 | 27 | 49 |
| Family of five | 1,518 | 651 | 34 | 445 | 870 | 1,200 | 128 | 517 | 634 | 103 | 113 | 197 |
| (One of each above group.) | | | | | | | | | | | | |

* Condensed from U. S. D. A. year book, 1939.
 † Can be preserved by freezing.

10. Finally, the use to be made of the unit will help determine whether it will be an economical and practical investment. The following questions arise:

- a. Is the unit to be for the storage of food commercially frozen or food processed at home and frozen in a locker plant?
- b. Is freezing of food to be done at home and, if so, in what quantities? Will chilling and aging space be needed?
- c. Will the cabinet owner continue to rent a commercial locker to take advantage of lower processing rates? Those who buy small cabinets will need additional space and will depend on locker operators to quick-freeze their products for them. Many operators will have lower processing and freezing rates for those who rent their lockers.
- d. What are the future plans of the prospective owner? Will a possible or probable increase in farming operations in the future require additional food? Will a large garden continue to be produced?

HOME BUILDING OF A UNIT

It is possible to build a frozen food cabinet at home. Many designs have been prepared by engineers and the cabinet, no doubt, would work satisfactorily if properly constructed. The prospective owner should keep in mind, however, that he must buy the compressor, the motor, the various valves, and expansion pipes or plates from the same concerns that will probably manufacture the home units. To get a good installation would require an excellent cabinet maker and an engineer to do the work. It seems reasonable that a company set up to make home cabinets on a large scale can do it more efficiently and economically than it can be done at home. Even the so-called walk-in type of cabinets will be made up in sections by commercial companies so that they can be assembled at home.

CARE OF THE HOME UNIT

The set of instructions furnished by the manufacturer of the home cabinet should be studied carefully and followed closely. The unit should be placed in a cool, dry, well ventilated location out of direct sun rays and on a level, *solid* floor. Most of the units are automatic and all the owner needs to do is "plug in" the cord, but the wise owner will have the serviceman start the machine and inspect the mechanism for any defects.

Excess frost will accumulate on plates or coils in spite of every precaution and must be removed for most efficient operation. The frost acts as an insulator and prevents proper cooling of the compartments. *Do not* shut off the current to defrost but scrape the frost off with a dull instrument like a putty knife onto paper spread over the bottom of the compartment. The accumulation of frost can be decreased by using moisture-proof wrapping materials or containers for the food and by not opening the doors any oftener than is necessary, especially when the humidity of the air is high.

A coat of polish or wax applied occasionally will keep the outside surface clean and will preserve the finish. Directions for oiling and greasing must be followed carefully to insure long life of the motor and compressor.

ADDITIONAL SUGGESTIONS

Food products intended for freezing should be of the best quality. Storage in home cabinets does not improve the products and unless temperatures are kept low enough and the products are properly handled the food may be much poorer when taken out of the cabinet. Fruits should be ripe enough for immediate use but not soft. Vegetables should be table-ripe, tender, succulent, and free from serious blemishes. Overripe vegetables are tough and flavorless. Meat from healthy well-finished animals is the best for freezing.



FIG. 6.—Types of containers for storing food in frozen food cabinets and materials used in wrapping meats. (1) Bottle for fruit and vegetable juices (wider at top than bottom). (2) Lacquered tin can with slip-in cover made by American Can Company. (3) Tin can hermetically sealed on small home sealer. (4) Paper carton with metal top (opening too small). (5) Paper carton with pleated cellophane liner made by Sealright Company. (6) Paraffined carton made by Sealright Company. (7) Locker-Pak parchment cover with waxed inner liner made by B. C. Betner Company. (8) Dacca Pack, cubical waxed carton made by Container Corporation of America. (9) (10) Wide-mouthed fruit jars. (11) Lily-Tulip cup with disc lid. (12) Lindley carton with cellophane bag as liner. (13) Southerland carton. (14) Cellophane-covered carton made by Menasha Products Company. (15) Cellophane-lined carton. (16) Carton with waxed paper bag. (17) Stockinette used in wrapping meats, birds, etc. (18) Paper-cellophane combination wrapping material. (19) Locker paper for wrapping meats. (20) Cellophane for wrapping foods for the cabinet.

PRESERVING HOME FROZEN FOOD

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SCHEDULE OF CHANGES OF FOOD IN A HOME CABINET
Capacity—12 cubic feet (equal to 2 standard lockers).

| Month. | Food put in. | Food taken out. | Food remaining. |
|--------|--|--|---|
| Jan. | | 20 pt. fruit; 20 pt. vegetables; 30 lb. beef; 25 lb. pork; 10 lb. veal; 5 lb. lamb; 4 friers; 2 roasters;* 5 game birds; 5 lb. butter. | 25 pt. fruit; 50 pt. vegetables; 40 lb. pork; 45 lb. veal; 8 friers; 8 roasters; 20 lb. butter. |
| Feb. | 325 lb. beef | 10 pt. fruit; 20 pt. vegetables; 25 lb. pork; 15 lb. veal; 4 friers; 4 roasters; 5 lb. butter. | 15 pt. fruit; 30 pt. vegetables; 325 lb. beef; 15 lb. pork; 30 lb. veal; 4 friers; 4 roasters; 15 lb. butter. |
| Mar. | 180 lb. pork | 10 pt. fruit; 15 pt. vegetables; 30 lb. beef; 15 lb. pork; 15 lb. veal; 4 friers; 4 roasters; 10 lb. butter. | 5 pt. fruit; 15 pt. vegetables; 295 lb. beef; 180 lb. pork; 15 lb. veal; 5 lb. butter. |
| Apr. | | 5 pt. fruit; 15 pt. vegetables; 30 lb. beef; 20 lb. pork; 15 lb. veal; 5 lb. butter. | 265 lb. beef; 110 lb. pork. |
| May | 60 pt. vegetables | 40 lb. beef; 20 lb. pork. | 60 pt. vegetables; 225 lb. beef; 90 lb. pork. |
| Jun. | 80 pt. fruit; 35 lb. lamb; 50 lb. butter | 40 lb. beef; 25 lb. pork. | 80 pt. fruit; 60 pt. vegetables; 185 lb. beef; 65 lb. pork; 35 lb. lamb; 50 lb. butter. |
| Jul. | 50 pt. fruit, rasp-berries, etc. | 30 lb. beef; 25 lb. pork. | 130 pt. fruit; 60 pt. vegetables; 155 lb. beef; 40 lb. pork; 35 lb. lamb; 80 lb. veal; 50 lb. butter. |
| Aug. | 20 pt. fruit, peaches; 60 pt. vegetables, corn, beans, etc.; 12 friers; 25 lb. fish. | 30 lb. beef; 20 lb. pork; 10 lb. lamb; 5 lb. butter. | 150 pt. fruit; 120 pt. vegetables; 125 lb. beef; 20 lb. pork; 25 lb. lamb; 12 friers; 25 lb. fish; 45 lb. butter. |
| Sept. | 40 pt. vegetables, beans, etc.; 90 lb. veal. | 20 pt. fruit; 20 lb. beef; 20 lb. pork; 10 lb. lamb; 15 lb. fish; 5 lb. butter. | 130 pt. fruit; 160 pt. vegetables; 105 lb. beef; 15 lb. lamb; 90 lb. veal; 10 lb. fish; 12 friers; 40 lb. butter. |
| Oct. | 180 lb. pork; 6 roasters.* | 25 pt. fruit; 30 pt. vegetables; 25 lb. beef; 20 lb. pork; 15 lb. veal; 10 lb. fish; 5 lb. butter. | 95 pt. fruit; 130 pt. vegetables; 80 lb. beef; 110 lb. pork; 75 lb. veal; 15 lb. lamb; 12 friers;* 6 roasters; 35 lb. butter. |
| Nov. | 6 roasters; 10 game birds. | 30 pt. fruit; 30 pt. vegetables; 20 lb. beef; 20 lb. pork; 10 lb. veal; 5 lb. lamb; 5 lb. butter. | 65 pt. fruit; 100 pt. vegetables; 60 lb. beef; 90 lb. pork; 65 lb. veal; 10 lb. lamb; 12 friers; 12 roasters; 10 game birds; 30 lb. butter. |
| Dec. | | 20 pt. fruit; 30 pt. vegetables; 30 lb. beef; 25 lb. pork; 10 lb. veal; 5 lb. lamb; 2 roasters; 6 game birds; 5 lb. butter. | 45 pt. fruit; 70 pt. vegetables; 30 lb. beef; 65 lb. pork; 55 lb. veal; 5 lb. lamb; 10 roasters; 12 friers; 5 game birds; 25 lb. butter. |

* Turkey, chicken, duck, etc.

Fruits and vegetables should be processed and placed in the cabinet the same day they are harvested, preferably within two or three hours after picking.

Labeling.—All containers and packages should be carefully labeled stating the kind and varieties of fruit or vegetable, the treatment if any, and the date. Packages of meat should indicate the kind of meat and the cut. The containers and packages should be of the proper size for the family. Waxed cartons and paper can be marked with such pencils as Dixon's Phano for Glazed Surfaces No. 77, Eberhard Faber Weather-proof Lead Pencil No. 6639, or Blaisdell No. T173 for china marking.

Inventory.—An inventory card of some sort is very helpful in keeping track of the contents in the cabinet. The various items are entered on the card when placed in the cabinet and then checked off as they are taken out. On page 13 is a schedule indicating the foods and the amounts of each that can be stored in a cabinet of 12 cubic feet giving the amounts to be put in at the various times, the amounts taken out, and the amounts remaining throughout the year.

Cleansing agents.—A solvent prepared by dissolving two ounces of calcium chloride in one-half pint of water to which is added one-half pint of denatured alcohol is useful in removing food juices which may have been spilled in the cabinet or have oozed out of containers and packages. Pour the solvent over the spilled juices, allow it to stand for a few minutes, and then mop up with a dry cloth.

PRESERVING FOOD BY FREEZING

Food preserved by freezing retains more of its fresh flavor, color, and nutritional value than that preserved by any other known method. For best results the food products must be of the best quality, in the peak of condition, handled rapidly and frozen quickly. A good way with fruits and vegetables is to harvest, process, pack, seal, and freeze all in the same day. The products should be frozen solid within eight to twelve hours. Whether to freeze the products at home or take them to a frozen food locker plant for freezing will depend upon the type of cabinet owned and the amount of food to be frozen at a time. It should be remembered that no matter who freezes the products, a certain amount of heat must be taken out of the food to freeze it and it takes energy to do that. A commercial plant equipped to quick-freeze food on a "mass production" scale can do it more economically than it can be done in a small home unit. This is especially true with meat because of the "bulk" to be frozen at one time and the need for processing in a chill room before freezing.

CONTAINERS

Containers for frozen fruits and vegetables should be reasonably airtight, moisture-vapor proof, and have such shape that they can be economically stowed in the cabinet and will not interfere with the easy removal of products. (Fig. 6.) Heavily paraffined or waxed cartons, either cylindrical or tub-shaped, are satisfactory, if the lids fit tightly. Cartons with cellophane linings or waxed tops may be sealed readily with a hair-curling iron or with a flatiron. (Fig. 7.) Metal containers either hermetically sealed or with tight snap-on covers are satisfactory. Although very little corrosion occurs at low temperatures in a cabinet, a lacquer or enamel lining of metal con-

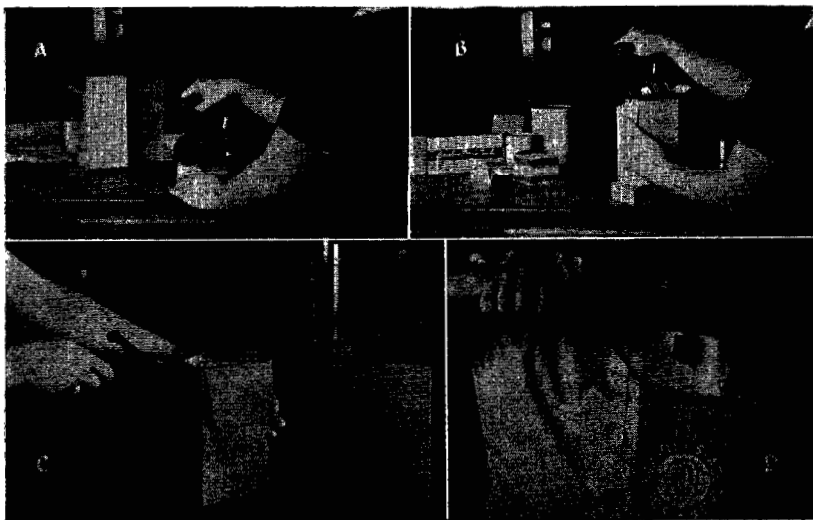


FIG. 7.—Methods of sealing frozen food containers. (a) Paraffined carton being sealed with hot flatiron. (b) Cellophane-lined carton being sealed with hot flatiron. (c) Cellophane bag being sealed with curling iron. (d) Waxed paper bag being sealed with a homemade sealer. The sealer consists of two brass rollers that are heated.

tainers prevents discoloring of fruits and vegetables. Glass containers such as the common fruit jar may be used. Wide mouth jars are preferred. Sufficient room for expansion of liquids always should be allowed in glass containers.

Pint and quart size containers are preferred for ordinary quick freezing. The use of containers holding over five pounds is not recommended because too long a period is required for the products to freeze. A larger amount is too much for quick consumption when it is removed from the cabinet. In order to use a portion of the contents, the whole container must be thawed out, and products preserved by freezing should not be refrozen, for best results. Fruit

and vegetable juices can be stored in the same type of containers as are fruits and vegetables. Containers that taper towards the top should be avoided. Breakage of glass containers due to freezing will be lessened if the containers are laid on their sides until the contents freeze.

Some type of funnel or carton filler is helpful in filling cellophane bags. (Fig. 8c.) The top of the bag will not seal properly if wet.

TABLE 2.—AMOUNTS OF WATER AND SUGAR TO USE IN PREPARING SYRUPS

| Syrup desired (Percent). | Sugar (Parts). | Water (Parts). | Pints of syrup from one pound of sugar. |
|--------------------------|----------------|----------------|---|
| 20..... | 1 | 4 | 4.5 |
| 30..... | 1 | 2½ | 2.7 |
| 40..... | 1 | 2 | 2.2 |
| 50..... | 1 | 1 | 1.7 |
| 60..... | 1½ | 1 | 1.3 |

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

SUGAR SUBSTITUTES

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

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

Saccharin may be substitute for sugar for people who cannot use granulated sugar. Thirty-six, one-fourth-grain saccharin tables are equivalent to a cup of sugar for sweetening. Saccharin tablets must be dissolved in water to insure uniform distribution. To make a solution approximately equivalent in sweetness to a 40-percent syrup, dissolve 18 one-fourth-grain saccharin tablets in one cup of water. Fruit preserved in saccharine solution freezes into a solid hard lump which thaws slowly and is more likely to crack containers unless sufficient expansion space is allowed.

FRUITS

Only the best quality fruits should be stored in freezer cabinets. Over ripe, immature or blemished fruit will be even worse when removed from the cabinet. There is considerable difference among the different varieties but the degree of maturity, the condition of the fruit, and the method of handling are more important than the variety.

BLACKBERRY

Varieties.—Eldorado, Brewer, and Alfred were tested and found desirable.

Preparation.—Pick when fully ripe. Select well shaped berries, wash, and drain thoroughly. Soft and poorly formed berries may be sliced or crushed. Handle carefully and quickly.

Packing.—Pack four parts of berries to one part of sugar or in 40-percent syrup. (Table 2.) Place in a cool room for several hours before storing in cabinet.

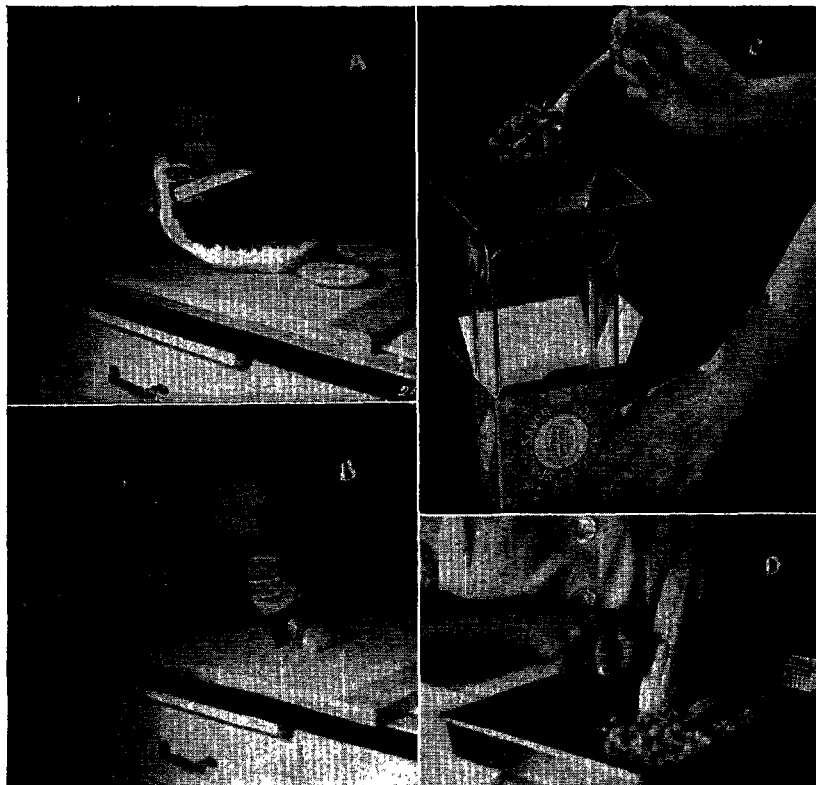


FIG. 8.—Packing food. (a and b). Preparing grapefruit for freezing. Sections of grapefruit are easily removed if properly peeled. (c) Metal frame and funnel helpful in packing cellophane bags. (d) Removing whole kernels of corn from cob, after blanching, with a fork.

BLACK RASPBERRY

Varieties.—Black Pearl, Cumberland, and Quillen were found to be good.

Preparation.—Pick at peak of ripeness, handle quickly and carefully to avoid crushing. Discard poorly colored and over ripe or seedy fruits. Wash thoroughly and drain.

Packing.—Pack whole, 4 parts of berries to 1 part of sugar or in 30-percent syrup. A heavier syrup tends to make the berries seedy. Black raspberries are excellent when crushed with sugar.

BUSH CHERRY

Varieties.—Keyapaha, Oahe, Teepee, and Wampum were tried and found to be fair.

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

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

DEWBERRY

Varieties.—Young and Boysen have been tried and found satisfactory.

Preparation and Packing.—Same as for blackberries.

GOOSEBERRY

Varieties.—Houghton, Glendale, and Pixwell are all satisfactory.

Preparation.—Gooseberries should be harvested when fully grown and when the ripest ones show some red color. Sort berries, stem, and wash.

Packing.—Pack whole with 50-percent syrup. If chopped or crushed they may be packed 4 parts of berries to 1 part of sugar.

GRAPEFRUIT

Grapefruit can be preserved in a frozen food cabinet.

Preparation.—Peel and remove sections. (See Figure 8 a and b.)

Packing.—Pack sections without sweetening or add 1 part sugar to 4 or 5 parts grapefruit sections.

GRAPE

Varieties.—Concord and others.

Preparation.—Harvest when fully ripe, wash, remove berries from cluster, and sort.

Packing.—Pack whole with 40-percent, syrup.

PINEAPPLE

Pineapple can be preserved by freezing.

Preparation.—Peel and cut into slices or into small cubes. Pineapple may be packed raw or simmered for a few minutes.

Packing.—Pack with sugar, 1 part to 4 or 5 parts pineapple.

PURPLE RASPBERRY

Varieties.—Columbian, Ruddy, and Sodus have been tried and although somewhat soft are very good.

Preparation.—Harvest when fully mature but before berries become soft or start shattering. Handle carefully and quickly. Wash thoroughly and place in containers.

Packing.—Pack 3 parts of berries to 1 part of sugar or in 40-percent syrup. Purple raspberries are excellent if crushed with sugar.

RED RASPBERRY

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

Preparation and Packing.—Same as for purple raspberries.

SOUR CHERRY

Varieties.—Early Richmond and Montmorency. No doubt other varieties of sour cherries are also desirable.

Preparation.—Pick when fully ripe. Avoid bruising as bruised fruits discolor. Sour cherries may be packed whole or pitted. For most uses pitted fruits are more desirable.

Packing.—The whole fruits can be packed in 50-percent syrup. Pitted cherries are packed 3 parts of fruit to 1 part of sugar or in 50-percent syrup.

STRAWBERRY

Varieties.—Howard (Premier), Blakemore, Dorsett, Progressive, Fairfax, Rockhill, Aroma, and Dunlap. Whole berries of Aroma and Dunlap are rather soft but if sliced or crushed with sugar are excellent.

Preparation.—Pick when fully ripe but before the berries get soft. Sort to remove deformed berries. The deformed fruits are sliced or crushed for storage. Wash berries thoroughly before packing.

Packing.—Pack whole berries without sweetening or 4 parts berries to 1 part sugar or in 50-percent syrup. The sugar pack seems most desirable as it does not dilute the flavor.

FLESHY TREE FRUITS

Tree fruits such as apple, apricot, peach, and plum have been satisfactorily preserved by freezing.

Varieties.—The common varieties of these fruits that grow in Kansas yield a satisfactory product if frozen when fully mature and handled carefully.

Preparation.—Tree fruits should be fully mature but not ripe enough to bruise when handled. Customary sorting, washing, and halving are necessary. Peeling is not necessary unless the consumer objects to the skins. To peel easily, apricots and peaches may be scalded in boiling water for a minute or so until the skins are loosened. As the fruits are halved or cut into pieces they should be dropped into a heavy syrup to protect the fruits from the air. The

addition of a tablespoonful of lemon juice per quart of syrup helps in preserving the color of fleshy fruits. Other solutions that will prevent discoloring of fleshy fruits are:

1. One-percent citric acid solution (1 level teaspoon per pint.)
2. Thiocarbamide, 1 level teaspoon per gallon of water.
3. Sodium sulphite, 1 level teaspoon per gallon of water.

The sliced fruits are dipped for a few minutes in one of the above solutions and then thoroughly drained before packing.

Packing.—Pack the sectioned fruits in 40- or 50-percent syrup using sufficient syrup to cover the fruit thoroughly. Narrow strips of stiff white paper bent in the shape of a “U” placed on top of the fruit under the lid keeps the fruit submerged in the syrup and prevents discoloring. Dry sugar packs are not desirable for fleshy fruits because the tissues discolor when removed from storage.

FRUIT JUICES

Juices of apple, pear, cherry, grape, grapefruit, pineapple and rhubarb have been successfully preserved by freezing. Simmering the fruits for five minutes helps in removing juices and preserves the flavor. Juices may be sweetened to taste or packed without sugar. Since fruit juices expand considerably when frozen, they should be stored in paraffined containers or allowed 10- or 15-percent expansion room if packed in glass containers.

VEGETABLES

The different kinds of vegetables are not equally satisfactory for freezing. As a rule, those which are eaten raw and are prized for their crispness, such as lettuce, radishes, cucumbers, and tomatoes, are not satisfactory for freezing. Those vegetables which are usually cooked before being eaten yield an excellent product when preserved by freezing. Vegetable varieties also vary in their desirability for freezing but the degree of maturity, proper processing and storing are more important than the variety.

Blanching.—All vegetables must be blanched, or scalded, before freezing because they contain certain enzymes which, if not destroyed, would change the color and flavor of the products even when frozen. Blanching consists of a short cooking period or heating in boiling water followed by quick cooling in fresh, cool, running water or in a large volume of cool water. The vegetables are placed in a wire basket, perforated metal container, or cheese cloth bag and submerged in boiling water for a period long enough to heat the material through but not long enough to soften the products. (Fig. 9.) The volume of boiling water should be 10 or 12 times the volume of the products blanched so that the boiling temperature may be maintained during the blanching period. A quart, or two pounds is about the maximum amount of most vegetables that should be blanched at one time. Blanching time is given under the

individual vegetable headlgs. Steam blanching is not recommended for home use.

Vitamins are not destroyed by the blanching process but they break down rapidly if the products are not placed in the sharp freezing compartment promptly after blanching. Some vitamins and soluble minerals may be lost in the blanching process especially if the products are overblanched. Leaching of vitamins and minerals will continue in the cooling process so the vegetables should not be left in the cold water longer than is necessary to cool them.

There are two general methods of packing vegetables.

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

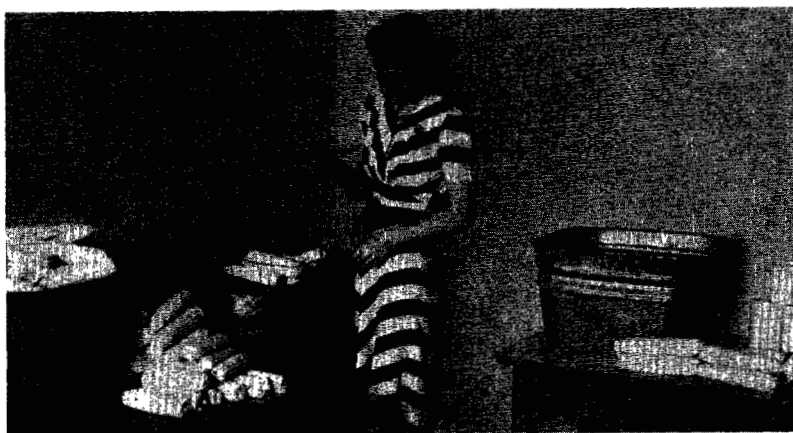


FIG. 9.—Corn being cooled after blanching or scalding. Note wire basket and large volume of cold water.

Packed with brine.—Vegetables like asparagus, cauliflower, and broccoli which tend to get too soft and lose their shape when blanched are often packed in a 2-percent brine. This keeps them somewhat firmer. A 2-percent brine solution is prepared by dissolving 1 level teaspoon of salt in 1 cup of cold water or 4 level teaspoons of salt per 1 quart of water. A stronger brine solution might make the product tough and would be more salty than is desired when the food is prepared for the table. The advantages of using brine are:

1. Vegetables in brine retain their shape better.
2. Brine prevents desiccation of products packed in containers that are not proof against moisture vapor.
2. Brine tends to keep the vegetables from thawing out rapidly in case the compressor is shut down for a period.

The disadvantages of using brine are:

1. There is always a possibility of leaks developing in cartons or around the lids of containers.
2. Brine adds weight to the products handled.
3. There is danger of using too much brine and the containers, especially glass jars, are subject to breakage when frozen.
4. Too strong a concentration of brine makes the products tough.

ASPARAGUS

Varieties. — Martha Washington and Mary Washington.

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

Packing. — Place tips carefully into the container to avoid breaking the tender tips. Cover with 2-percent brine but allow sufficient space for expansion. Packing the stalks with the tips down will assure the covering of tips with brine without filling the containers too full. Use containers from which contents can be removed without thawing.

BEANS, GREEN AND WAX

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

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

Packing. — Pack dry or in 2-percent brine but allow sufficient space for expansion. (Fig. 8c.) Brine over 2-percent tends to make beans tough. Pack the same day harvested.

LIMA BEANS

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

Preparation. — Harvest while seeds are in green stage. Wash pods and drain. Shell by hand or use hand pea sheller or tight clothes wringer. Pods blanched one minute in boiling water shell easier. (Fig. 10E.) Place in wringer stem first. Blanch small beans 2 minutes, medium, 2 to 3 inches, and large, 3 to 4 minutes; cool thoroughly.

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

EDIBLE SOYBEANS

Varieties. — Bansei.

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

BROCCOLI

Varieties. — Italian Green Sprouting.

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

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

CAULIFLOWER

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

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

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

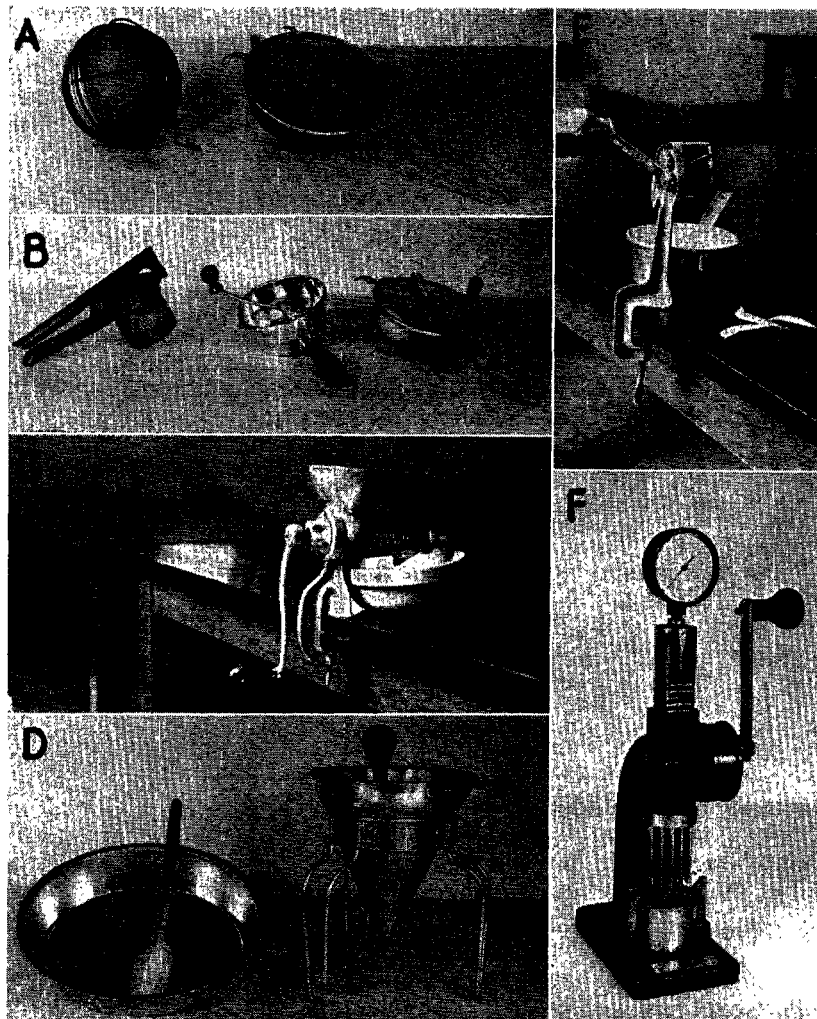


FIG. 10.—Equipment used in connection with preservation of frozen foods. (A) Screen baskets used in blanching vegetables. (B) Types of juice extractors that are slow and not very effective. (C) A desirable fruit and vegetable juice extractor. (D) Perforated "strainers" useful in draining fruit and vegetable juices. (E) Handy small pea huller. (F) Texturemeter, an apparatus for determining the toughness of vegetables.

SWEET CORN

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

Preparation. — Harvest before grains become starchy. Husk and trim ears. On the cob, blanch small ears 5 minutes, medium ears 8 minutes, large ears 10 minutes. Cool thoroughly. Corn cut from the cob saves about 60 percent space. Blanch on the cob 6 to 8 minutes. Cool and cut from cob. (Fig. 8d.)

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

FIELD CORN

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

DILL

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

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

Packing. — Pack dry.

MUSHROOMS

The edible mushrooms found in Kansas may be preserved safely by freezing.

Preparation. — Only specimens known to be edible and at their optimum stage of maturity should be used. Wash carefully, prepare as for immediate table use, cutting large mushrooms into small pieces. Blanch for 2 or 3 minutes in boiling water, drain and cool.

Packing. — Pack dry in moisture-proof containers.

OKRA

Varieties. — Dwarf Green.

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

Packing. — Pack dry in moisture-proof containers.

PEAS

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

Preparation. — Harvest peas when the pods are filled with young, tender peas but before they become starchy. Wash and drain. Shell by hand or use hand pea sheller or tight clothes wringer. Blanching pods 1 minute in boiling water facilitates shelling. Place in

wringer stem first. Blanch small peas 2 minutes, large 3 minutes. Cool thoroughly.

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

RHUBARB

Varieties.—Ruby, MacDonald, Canada Red.

Preparation.—Harvest early tender stalks. Wash and cut into pieces about 1 inch in length. Blanch small stalks $\frac{1}{2}$ minute, large 1 minute. Drain and cool. Do not over-blanch. Rhubarb may be packed without blanching.

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

SQUASH

Varieties.—Acorn, Butternut, Hubbard and others.

Preparation.—Select squash at prime degree of maturity for immediate table use. Wash and prepare as for table use, either diced or in large pieces. Cook until tender, cool thoroughly,

Packing.—Pack dry either in pieces or mashed into pulp in moisture-proof containers.

SPINACH

Varieties.—Long Standing Bloomsdale, New Zealand.

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

Packing.—Pack dry in moisture-proof containers,

SWISS CHARD

Varieties.—Lucullus.

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

CARROTS, KOHLRABI, PARSNIPS, AND TURNIPS

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

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

TOMATO JUICE

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

MEATS

Healthy, well finished animals provide the best quality meat for storage. Slaughtering may be done either on the farm or at a locker plant. (Table 3.) Since most locker plants have trained butchers in their employ, the products which they process are usually more satisfactory. Whether the slaughtering is done on the farm or at the locker plant, two precautions should be kept in mind: 1. Sanitary conditions. 2. Immediate and thorough chilling of the meat.

The approximate yields of edible meat and by-products from various farm animals are presented in Table 3. The time to slaughter the animals and place them in the cabinet is also given in the table.

All meat should be chilled for 24 to 28 hours at temperatures of 34° to 36° F. before cutting and wrapping. Pork and veal are usually packaged soon after chilling. Beef and lamb are improved by aging for a period of from 10 to 21 days in a chill room. The meat should be cut and packaged in desirable amounts according to family needs. Considerable space can be saved at the locker if the meat is boned. Only an experienced butcher should attempt to bone the meat for best results. The various cuts of meat should be wrapped in paper recommended for frozen food lockers. Some workers prefer wrapping the meat in moisture- and vapor-proof cellophane or similar cellulose material. In wrapping meat, the following directions should be noted:

1. Use sufficient paper to permit enveloping the meat completely. The ends must be carefully folded to make the package as nearly air-tight as possible.
2. Always use two wrappers. If cellulose wrapper is used, the outside wrapper need not be moisture or vapor proof.
3. Tie the packages securely with cord or gummed tape. Wire staples should be avoided as stapling punches holes in the wrapper.
4. Each package should be plainly marked giving the kind of meat, the cut, and the date.

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

| SLAUGHTER. | Live weight. | Dressed weight. | Packaged weight. | Lard. |
|---------------------|--------------|-----------------|------------------|-------|
| Hog..... October | 225 | 180 | 130 | 35 |
| Beef..... February | 750 | 410 | 325 | |
| Hog..... March | 225 | 180 | 130 | 35 |
| Lamb..... June | 90 | 45 | 35 | |
| Veal..... September | 200 | 110 | 90 | |
| Poultry..... Summer | | | | |

* Adapted from Kansas Agricultural Experiment Station Cir. 217.

Poultry, game, and fish should be handled according to the suggestions given for other meats. All classes of poultry are readily adapted to frozen food cabinets. Birds stored in this manner should be thoroughly bled, and plucked by either the dry or the scald method and eviscerated. Glazing of poultry, game, and fish is advisable. This is done by placing the products in a sharp freezer for

24 hours without wrapping and then dipping them into cold water two or three times. This will produce a thin film of ice over the entire surface of the product. Wrap securely after glazing.

The following suggestions are offered with reference to the length of time meat can be stored safely:

Fresh pork—Three to six months.
Beef—Six to twelve months.
Lamb—Six to nine months.
Veal—Six to nine months.
Ground beef—Three months.
Poultry and game—Six to twelve months.
Fish—Three to four months.

EGGS

Fresh, chilled eggs are prepared for cabinet storage by breaking them into a bowl and beating or churning them thoroughly, without whipping in air, until the yolks are broken and well mixed with the whites. Some authorities recommend the addition of one tablespoon of corn syrup or honey to each two cups of eggs or egg yolks. The whites may be separated from the yolks and packed without churning or other treatment but the yolks should be well beaten to prevent undesirable coagulation. Eggs are stored in containers similar to those used for fruits and vegetables.

BUTTER

Butter is worked thoroughly to remove all buttermilk. It is then molded in convenient forms and wrapped in waxpaper or put into lined cardboard cartons and placed in the cabinet to freeze. Butter will keep for six to twelve months if stored at 0° F.

MISCELLANEOUS FOODS

Not all the possibilities in preserving foods by freezing have been investigated. It is possible to preserve many precooked foods in quantities for the season of heavy demand, for unexpected company or for the housewife's vacation. Among the precooked foods which have been successfully preserved by freezing are soups and soup stocks, baked beans, stews (omit potatoes in stews as they lose texture and quality if frozen for a long period), hash, pastries, pies, cakes, bread and rolls. Leftovers from the table can be saved by freezing.

Ice cream can be kept three or four weeks in a cabinet. Cheese will keep for several months if packed in a moisture vapor proof wrapper. Heavy cream will keep for weeks in a home cabinet. Some housewives prefer to add about 10 percent by weight of sugar to the cream before freezing. Thin cream does not freeze well.

All of these miscellaneous foods should be packed in moisture proof paper or packages for safe storage. The housewives will realize that the space in their cabinets is expensive and will not overload them with precooked foods.

USE OF FROZEN FOODS

In general, frozen foods are used in the same manner as fresh products. They contain virtually the same vitamins as are found in fresh foods and retain much of the fresh flavor. Freezing food products does not sterilize them. It merely slows down the action of most types of enzymes and bacteria. When the foods are allowed to thaw, the enzymes and bacteria, which are always present, proceed to work at an increased rate. For this reason all frozen products should be used soon after being removed from the cabinet. Fruits may be eaten as soon as they are thawed out. Vegetables and meats must be cooked, though the cooking period is much shorter than for fresh products. Vegetables frozen in brine are thawed over a slow flame and cooked in the brine. Those packed-dry are placed in boiling water, seasoned, and cooked for a short time. Meats should be cooked at moderate temperatures allowing ample time for both thawing and cooking. In general the authorities agree on the following points to get the most out of frozen food:

1. Cook only long enough to make foods tender.
2. Cook in a covered vessel in a small quantity of water.
3. Serve immediately.