



Choosing and using

**YOUR**

**FOOD**

**FREEZER**



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## A FOOD FREEZER IS A CONVENIENCE

Nearly every wired home in the United States has a refrigerator, while only one in four has a separate food freezer. Many families find that a refrigerator gives them enough cold storage space for foods. Others prefer the newer combination refrigerator-freezers that provide space for a limited amount of actual food freezing.

Families with freezers can take advantage of seasonal buys and off-season sales. Whether or not they eat better and have more variety depends upon the food they freeze and their use of the freezer.

A separate food freezer is a convenience with advantages not offered by a refrigerator. If you're in the market for a freezer, it will pay you to study the different models available.

### HOW DOES A FREEZER WORK?

We're all familiar with refrigerators and have at least a general idea of what makes them tick. A freezer works in much the same way.

#### COOLING PROCESS

Heat is brought into a freezer when warm food is placed in it, when the door or lid is opened, or through leaks in the walls and around the door gasket. As in a refrigerator, the freezer must remove this heat from the compartment. A liquid refrigerant, Freon 12 or 22, absorbs the heat as it travels through the evaporator coils. Later the heat is expelled, as the refrigerant (now a gas) changes back into a liquid in the freezer condenser.

#### LOCATION OF THE EVAPORATOR

Placement of the evaporator (cooling) coils varies with different models. In chest freezers coils often are in the walls and/or some coils may be shaped into large plates which serve as space dividers. If there is a separate section for flash-freezing, it will have extra coils.

In upright models with contact freezing, the coils may be in the walls but are more likely to be mainly in the shelves at the top of the liner. For flash-

freezing, more coils are directly under some shelves. Generally speaking, the larger the evaporator surface, the more efficiently the freezer will operate.

"No-frost" freezers generally have their evaporator coils outside the freezing compartment proper. Zero or subzero air is moved through the compartment by a fan or fans located near the cooling coils.

#### FREEZER TEMPERATURES

Even though frozen solid, a package of food can deteriorate.<sup>2</sup> As temperatures rise, changes occur in color, texture, flavor, and nutritive value. These changes occur several times faster at 15° F. than they do at 0° F. Again at 25° F., the changes occur several times faster than at 15° F.

It is important, then, that you store frozen food at an adequately low temperature. Also, you will be interested in operating your freezer at a reasonable cost. Since the purpose of a freezer is not to store food indefinitely, an average temperature of 0° F. is adequate. Keeping the temperature lower than this is unnecessary and adds to the cost. Air temperature in the quick-freeze section, however, may go down as low as -30° F.

<sup>1 2</sup> See references on page 7

## SELECTING YOUR FREEZER

The style you choose will depend in part on where you plan to put your freezer. A convenient location is less important than it seems, since you open a freezer infrequently. If you transfer frozen packages into your refrigerator, there may be several days between trips to your freezer.

### UPRIGHT OR CHEST TYPE?

Sales of uprights have surged ahead of chest models in recent years for several reasons. For one thing, you stoop less with an upright, and it's often easier to find packages placed on shelves or in drawers. An upright occupies only about half of the floor space required by a chest model. Many people prefer the appearance of an upright, especially if it is in the kitchen.

There are points on the plus side for chest models, too. When dealing with refrigeration, we should remember that cold air is heavier than warm. Consequently, when the lid of a chest freezer is raised, there is little exchange of hot and cold air. This is why frozen food cabinets in supermarkets are often left uncovered. By contrast, when the door of an upright model is opened, warm air from the room rushes in, pushing out the heavier, cold air. This makes frost collect faster in uprights, and adds to the operating cost. A chest model provides a good-sized counter top, an upright doesn't. Some chest models provide baskets for food packages, but these are usually heavy to lift when loaded. Probably more food can be frozen and stored in a chest-type freezer than in an upright, since little space is

taken by dividers. Too, it's easier to fit irregularly shaped packages and bulky items, such as a turkey, so that little space is lost between them.

### SIZE AND CAPACITY

You can buy a separate food freezer as small as 3 cubic feet (referred to as a compact) or as large as 32 cubic feet, depending upon your need. Almost 50% of upright freezers sold in the first 9 months of 1962 were in the range of 11-14 cubic feet capacity; about 35% of the chest freezers were in the 20 cubic feet - and - over size.<sup>3</sup> One cubic foot will hold 35 pounds of frozen food, if the packages are regular in size, square cornered, and stored in contact with each other. Irregular shaped items, such as frozen juice cans, poultry, or meat, require much more space.

A general figure of 6 cubic feet of freezer space per family member is often used. However, if your freezer will be used mainly as a holding box, and seldom for freezing peak loads, as little as 3 cubic feet per person may do. If you depend upon a freezer for much of your food supply, you may need as much as 10 cubic feet per person. When you compare models for size, be sure you compare the usable net food storage volume, which is likely to be less than the overall gross capacity ratings for various models.

### FROSTLESS TYPE OR REGULAR DEFROSTING?

No-frost models are a recent development in freezers. Most of these are uprights, at present. The term frostless (no-frost, frost-free) is a little misleading. Actually there is frost. Frost forms or crystallizes when the moist warm air comes into contact with the evaporator coils or refrigerated plate. This process is called "sublimation".

However, when the coils are outside of the freezer compartment, frost no longer forms inside. In "frostless" models, the coils are placed between the freezer liner and the insulation. A fan is provided to blow the cold air from the coils back into the freezer. Because of this constant sub-zero cold air, freezing of foods is likely to be faster in this type of freezer than in standard types with cold shelves and/or cold walls.<sup>4</sup> The forced air circulation adds to operating costs and will cause more drying of food that is not properly wrapped. Due to the very low temperatures maintained by freezers, careful attention to proper wrapping materials and methods is a "must" for high quality products.



Upright freezer.

Frost that collects on the evaporator of a frostless freezer is removed regularly. This usually is done by a clock device that shuts off the current once every 24 hours, such as 2 a.m. One brand defrosts automatically after every 20th door opening. Since the period of defrosting must be short to avoid thawing, most models have means of introducing heat to melt the frost. One means is to use a heating element. Some manufacturers reverse the refrigeration cycle temporarily so that the hot Freon passes through the evaporator coils.

Standard-type freezers (chest and upright) collect frost on shelves, wall linings, and dividers, or wherever the cooling coils are located. Some of this frost may be scraped off, but once it turns to ice other methods will be needed to remove it. You'll find instructions for this in the booklet for use and care provided by the manufacturer. Under normal use, manual defrosting is necessary only once or twice a year.

## INSULATION

Adequate insulation is of key importance in freezer construction. It is a well-known fact that the greater the difference in temperature between hot and cold objects, the more rapid will be the heat transfer. So it is with a freezer. The force of vapor trying to get into the sealed shell of the freezer cabinet is equal to a 70-mile per hour wind.

Traditional insulating materials have been primarily fiberglass and mineral or rock wool. Due to the 0° temperature inside, this insulation must be from 3-6 inches thick. The extra thickness gives better protection but means less storage space inside.

Manufacturers have tried in many ways to reduce the problem of freezer "sweating." This moisture is a natural result of warm, moist air contacting the cold freezer surface. (This is what happens when your windows steam up on a cold day.) One of the latest methods of preventing this moisture from collecting is to bring heat to the outer cabinet walls, as with a heating wire. Since this makes the outside walls nearer to room temperature, there is less flow of air around the freezer and less sweating.

Newer, thinner insulating materials are finding their way into some freezers that are constructed to check the penetration of moisture vapor. In some

instances, spun glass sheets, from 1-1/2 to 3 inches thick, are sealed in plastic laminate bags. This fiberglass serves as the insulation, and the sealing process protects the insulation from getting wet.

New foam plastics also serve as very good insulators for freezers. These rigid sheets are formed into permanent shapes by pouring a liquid polyurethane resin into a mold. As the liquid is processed, it foams up to entrap dead air. The outside layer forms a tight skinlike membrane that resists the entrance of vapor. At present, these new types of insulation cost about 25 per cent more than the others, hence they are available mostly on top-of-the-line models.

## SPECIAL FEATURES

As with any appliance, added features mean added cost. Some of these are highly desirable, others less so.

Hardware should be sturdy and rust resistant to withstand the heavy demands and the sweating normally found on freezers. Some models are available with locks.

A freezer alarm is desirable. Look for one that can be heard readily, not just a light that flashes on. The alarm should signal you before the warmest package in a partly loaded freezer reaches 15° F.,<sup>5</sup> also when the circuit is broken.

An interior light, available on some models, is a convenience for locating packages if room lighting isn't too handy.

Baskets and drawers are good but also have drawbacks. You may have to give up as much as a cubic foot of storage space to accommodate them.



Freezer drawer.

<sup>5</sup> See references on page 7.

## USING YOUR FREEZER

Your satisfaction with a freezer will depend in part on how closely you follow the manufacturer's suggestions for use and care. Before you buy, compare various types and brands and study the manufacturers' booklets. For information on freezing foods and purchased frozen foods, see the U. S. Department of Agriculture publications Home Freezing of Fruits and Vegetables and Home Care of Purchased Frozen Foods.<sup>6</sup>

### FREEZING CAPACITY

There's a sound reason behind the caution that you shouldn't try to freeze at one time more than 1/15 the capacity of your freezer. Presumably, there will be other food in the freezer. Too much warm food added to the compartment will raise the temperature of both the air and the already frozen food. Within 24 hours of adding food to the freezer, it should be frozen and down to the normal temperature, along with all of the other food in the freezer.

You can figure the safe amount of food to freeze as follows:

Capacity of your freezer  
(example 20 cu. ft.)  
Pounds per cubic foot 35

20x35 = 700 pounds total capacity  
1/15 of 700 = 46.6 pounds (the amount  
it is safe to freeze in any  
24-hour period)

Some authorities say it is safe to freeze as much as 1/10 the capacity of your freezer within a 24-hour period, but 1/15 should give better results. You may wish to have extra-large quantities frozen at a nearby locker plant.

Placing food — For best results and fastest freezing, place new packages of unfrozen food in the coldest spots in your freezer, preferably in direct contact with evaporator coils or plates. Already frozen food deteriorates somewhat if packages of warm food are placed in direct contact with them. Use a

quick-freeze compartment or shelf if you have one. If not, place packages as close to the walls as possible, allowing a little air space between packages only while freezing them. In an upright, the top part is usually colder because there are more coils. Some manufacturers suggest preparing a freezer when a new load is to be frozen. This can be done by setting the cold control at its coldest position several hours ahead of time, thus preventing the warmer food from raising the temperature of the whole compartment much above normal. In frostless models, place unfrozen packages where the air is coldest.

### QUALITY

You'll never take better food out of a freezer than you put in. Use only top quality food products. Avoid opening the door often or leaving it open long, since this causes the temperature inside packages to fluctuate. Proper airtight wrapping helps to keep topnotch quality, too.

Freezer wrappings — Packaging materials vary in thickness, cost, and efficiency. Find a good quality that suits you and learn how to use it properly. Whatever you use for wrapping food or as a container, be sure it will keep the air out and the natural moisture in.<sup>6 7</sup>

Storage record — You will profit by having some system of keeping track of the food stored in your freezer. Otherwise, some of the more popular items will disappear quickly, and others may stay around too long. Labels on packages should give you the needed information regarding contents and date put into the freezer. For example,

chuck roast, 4-1/2 lbs. — 6/20/64

A record that gives a running account of the contents of your freezer is good. Keep it posted nearby, along with a pencil tied to it for easy recording. You may wish to work out your own system, but the following may be a helpful guide.

ITEM	Pkg. size	No. pkgs.	Date put in	Date to be used	Pkgs. used
Com niblets	10 oz.	16	8/20/63	6/20/64	THI III
Salmon steaks	2 lbs.	4	5/11/64	7/11/65	I

<sup>6 7</sup> See references on page 7.

**Refreezing** — If conditions are right, refreezing can be done safely, according to the U.S. Department of Agriculture.<sup>6</sup> Foods that are only partially thawed and still have ice crystals in them can be refrozen. There will be some loss of quality, of course. Use refrozen packages as soon as possible.

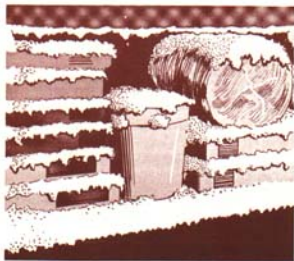
Conditions may not be right for refreezing. If there has been a gradual warm-up to 40° F. over a period of several days, do not try to refreeze. This is most apt to happen after the current has been off for some time. Hence the value of an alarm signal that will warn you if your freezer has stopped.

## CARE OF YOUR FREEZER

### DEFROSTING

A thick layer of frost not only lowers freezer efficiency and increased operating costs, but it reduces the space available for food packages. Follow the manufacturer's recommended method of defrosting for each model. Most suggest that this be done before frost is one-half inch thick on the freezer surfaces. Once or twice a year is generally often enough to defrost, unless the freezer is opened frequently. Plan to defrost when the supply of frozen food is low. You can lengthen intervals between defrosting by occasional scraping of frost. Be sure to use a plastic or wooden scraper—a sharp tool might puncture the coils.

Owners of "frostless" models do not have to defrost them. Water from the regular defrosting cycle collects in a small container, from which it evaporates.



Excessive frosting is undesirable.

### CLEANING

A freezer requires little cleaning, since it is not used in the same way as a refrigerator. However, after defrosting it is wise to clean the interior of your freezer. Wipe with a cloth or sponge wrung out of warm detergent water. Rinse with a cloth wrung out of clear water, then dry.

The outside of a freezer, like that of a refrigerator, can be wiped periodically with a damp cloth and with one of the special white waxes for this purpose.

### IF THE CURRENT GOES OFF

First of all, don't panic. Secondly, don't open the freezer door or lid. If your trouble is due to power failure, there's a good chance that this will be fixed within a safe time limit. If the difficulty is with the freezer itself, your next move depends on whether or not a serviceman is available.

During a power failure you're in luck if your freezer is full of frozen packages. The food will probably stay frozen for as long as 48 hours. If only half full, it should stay frozen about 24 hours.

It's good insurance to have a beforehand arrangement with someone to let you buy 50 pounds of dry ice if you ever need it. This should keep the food in a 20-cubic foot freezer around 15° F. for 3-4 days. Handle dry ice with respect—keep your gloves on and place chunks of it on top of a board or cardboards, not directly on the food packages. Be sure there is good ventilation in the room, and work quickly while the freezer door or lid is open.

## DOES IT PAY?

Purchase price — More than one million freezers were sold in 1962, averaging \$255 in cost.<sup>3</sup> Only 13 per cent of the buyers turned in used models. This percentage will increase, however, as more people continue to buy.

Life expectancy — Most people consider a freezer an investment. Estimating the useful life of a freezer at approximately 15 years, depreciation can

be computed on the basis of 1/15 of the purchase price each year. There is, of course, possibility of some trade-in allowance even after 15 years.

Operating costs — Many factors affect operating costs, including frequency and amount of freezing, number of door or lid openings, room temperature, local utility rates. It is estimated that about 0.1 kilowatt-hour of electricity is required to freeze a pound of food and reduce its temperature to the desirable 0° F.

The following table<sup>5</sup> compares the cost per pound of freezing and storing food in one year, under three different situations. The freezer used is a 12-cubic-foot model, 360-pound capacity. Electricity is figured at 2-1/2 cents per kwh.

	CAPACITY (360 lb. food)	1½ × CAPACITY (540 lb. food)	2½ × CAPACITY (900 lb. food)
Net depreciation (based on 15 years, 3% interest)	\$16.39	\$16.39	\$16.39
Return on investment foregone, at 3% interest	11.26	11.26	11.26
Repairs (2% of purchase price)	6.00	6.00	6.00
Electricity for freezing food	.90	1.35	2.25
Electricity for maintaining 0° F.	27.38	27.38	27.38
Packaging (at 2¢/lb.)	7.20	10.80	18.00
<b>Total cost</b>	<b>\$69.13</b>	<b>\$73.18</b>	<b>\$81.28</b>
<b>Cost per pound of food</b>	<b>.19</b>	<b>.13½</b>	<b>.09</b>

Note that the cost of the food itself was not included. The only two differences were: the additional cost of freezing more food when there was more turnover of the freezer contents, and the additional packaging materials. The figures show definitely that making good use of your freezer by frequent turnover of contents will help defray other costs of owning a freezer.

It doesn't cost any more to operate a full freezer than a half-empty one. Whether or not it will pay you to have a freezer will depend on how you use it. For most families it is a convenience but not a saving.

### FOOD FREEZER PLANS

We suggest that you investigate carefully before you enter any contract for a food freezer plan. The "package deal" that includes purchase of a freezer may be less to your advantage than buying a freezer separately. The food items that are included with the plan may or may not measure up to your usual purchases. In any event, be sure to read the contract carefully before you sign it, just as you do with any contract.



## IT'S UP TO YOU

If you have read all of this leaflet, then you know that buying a freezer is no simple matter. You also know that you will probably not save any money by owning a freezer. But it is a convenience, especially when both husband and wife are employed away from home, or when the family entertains frequently.

If you decide to buy, look for a reliable guarantee. Read it carefully so you'll know what it includes. Make sure there is a food spoilage warranty in case of a breakdown. These are usually good for 3-5 years. Look also for the Underwriters' Laboratory seal\* of approval, indicating that electrical connections and refrigerating system are safe. And remember that you should connect your freezer to an individual circuit. This will save an interruption of current flow to your freezer (which would happen if you had another appliance on the circuit).

Manufacturers have put some excellent food freezers on the market. Research has supplied us with necessary information about processing and using food. Proper use and care of the freezer will result in many satisfactions. From now on it's up to you.



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To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.



*Other Leaflets in this Series Include:*

*Choosing and Using Your Automatic Dishwasher, E-388*

*Choosing and Using Your Automatic Clothes Dryer, E-389*

*Choosing and Using Your Refrigerator, E-390*

*Choosing and Using Your Automatic Washer, E-392*

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