

Buy Your
Automatic Refrigerator
with
Dollars and Sense

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Extension Bulletin 166

Revised September, 1937

THE OHIO STATE UNIVERSITY, COOPERATING WITH UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL EXTENSION SERVICE—H. C. RAMSOWER, *Director*, Columbus
Free—Cooperative Agricultural Extension Work—Acts of May 8 and June 30, 1914

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Buy Your Automatic Refrigerator with Dollars and Sense

The following points should be considered in the selection of an automatic refrigerator:

What's to be Learned First of All?

Reliability of Manufacturer and Dealer.—It is best to choose an automatic refrigerator manufactured and sold by firms which are known to be reliable and which have been in business long enough to have established a reputation for quality merchandise and continued service. The retail dealer should be one who is able to give service and replace parts without delay.

Guarantee and Service.—Upon the reliability of the dealer and the manufacturer depends the real worth of any guarantee. It is advisable to determine what service is really available in accordance with this guarantee.

Most manufacturers have a 5-year performance guarantee plan for which the owner of the refrigerator is charged approximately \$1.00 per year. The guarantee too often is thought to be a warranty against interruption of service of whatever character over the guarantee period. This is not the case, however. The manufacturer guarantees his product (usually the refrigeration system) against defects for which he alone is responsible. Any replacement or service needed is usually taken care of by the dealer. For this and other reasons it is best to choose the dealer with great care, and to make the final selection a refrigerator which has been known to be reliable through a period of years.

What Assurance of Safety?

It is advisable that the automatic refrigerator selected be listed as having been approved by the National Board of Fire Underwriters. Products so listed are not necessarily the same in quality; such listing, however, indicates compliance with the Underwriters' Laboratories' requirements for safety. The American Gas Association places its Laboratory Approval Seal on gas refrigerators which have met their requirements for satisfactory and safe performance.

The motor on the electric refrigerator should be equipped with an overload fuse or other device which will automatically cut off the electric current in case of overload. In any automatic refrigerator in which the refrigerant is under pressure, the whole system should be protected with an automatic pressure relief device. This device should release a sufficient amount of refrigerant to re-store safety in case the pressure should increase above that normal for operation. In a gas refrigerator there should be some device which will automatically cut off the fuel supply if the flame is accidentally extinguished. In the kerosene refrigerator there should be some method by which the fuel supply will be stopped automatically in case of an excess flow of kerosene.

All tubing or piping which connects the various parts of the mechanism should be hermetically sealed and rigidly secured in position, so that neither

mechanical contacts nor vibrations can cause any loosening, rubbing, or cracking which may lead to leaks of the refrigerant.

What Kind of Fuel Does it Use?

The force which moves the refrigerant through the system of any refrigerator may be developed by the application of heat, as in the case of the gas and kerosene refrigerator, or by the use of a motor operated by an electric current, as in an electric refrigerator.

If so-called bottled gases are to be used a special burner constructed for compressed gas should be installed. This type of burner usually may be had without additional cost, if specified at the time the refrigerator is ordered. Refrigerators equipped with burners for manufactured or natural gases may be adapted to the use of compressed gas by replacing the burner with a compressed gas burner. If compressed gas is used, care should be exercised by the service man in the adjustment for maximum and minimum flames.

How Much Will it Cost?

Initial Cost.—The initial cost of automatic refrigerators for average household use varies from \$99 to approximately \$300. Prices vary according to size of box in cubic feet of storage space, type of fuel used to produce refrigeration, construction and workmanship of box, type of materials used as lining, insulation, exterior finish, trimmings, and hardware, and the number and type of special features.

*The Financing of the Purchase.*¹—The lead pencil is an important tool in household operation; the purchase of equipment is one of the places to use it. Equipment may be purchased in any one of several ways. The simplest and in many ways the most satisfactory method is to pay cash—if possible without borrowing. If one does pay cash, try to get “discount for cash.” If one does not have the cash:

1. The dealer may furnish the credit.
 - a. On open account. He may charge interest or may not. Oddly enough, some dealers let one pay for the goods 3 months or 6 months later at no higher charge than if the deal were for cash.
 - b. On installments. One pays part in cash, the balance at so much a month. If paid in only three monthly installments, sometimes no interest charge is made.

(The Federal Housing Administration in the spring of 1937 discontinued its loans on household equipment. In some cities, the buyer can still make a similar arrangement with the dealer, but usually at 6 per cent or 7 per cent. The borrower of \$100 at 6 per cent on this plan is paying \$6 per year of interest on each \$100 in spite of the fact that each month he is cutting off one-twelfth of the debt.)

¹ Prepared by B. A. Wallace, Extension Economist in Marketing, the Ohio State University.

2. To get the cash, one may have to borrow.
 - a. He may borrow from a commercial bank at 6 per cent or 7 per cent; the bank generally does not require monthly payments. Most banks follow the practice of subtracting each payment as made, thus reducing the amount on which the borrower is paying interest. An 8 per cent rate on this plan is lower than 6 per cent or even 5 per cent on the usual finance plan. Ask your dealer or banker which plan of figuring interest is offered.
 - b. The farmer may borrow of his Production Credit Association at 5 per cent per year, plus costs of placing the loan, on the security of a mortgage on livestock and machinery. This mortgage does not touch auto or household goods.
 - c. The private finance or chattel loan company lends on chattel mortgage security, often including household goods and auto, at rates from 12 per cent to 36 per cent per year. These loans are generally payable in monthly installments utterly unsuited to most farm incomes. Some companies lend without chattel mortgage security, but require two co-signers on the note.

Cost of Operation.—The cost of operating refrigerators varies with the type of refrigeration used, the size, type, thickness, and installation of the insulation of the box, the temperature of the room in which the refrigerator is located, the location of the refrigerator in the room, the amount and temperature of the food placed in the food storage compartment, the frequency of opening the door, the length of time the door is left open, the amount of ice and the quantity of dessert frozen, the care given to the refrigerator and refrigerating system during use, and the age of the refrigerator.

The average kilowatt hour consumption of electric refrigerators for average household use is approximately 40 per month. At a rate of 5 cents per kilowatt hour the operating cost in this case would be \$2.00 per month.

The typical monthly consumption of gas refrigerators is approximately 1000 cubic feet of 1000-B.T.U. gas (B.T.U. refers to heat units). If a gas has more heat units per cubic foot, the consumption of gas would be less in terms of cubic feet. If, however, the particular gas used has fewer heat units per cubic foot the consumption of gas must necessarily be greater. If 1000 cubic feet of gas, sold at a rate of 75 cents per thousand, were used per month for operating a gas refrigerator, the cost for that month would be 75 cents.

The average size kerosene refrigerator consumes approximately 15 gallons of high grade kerosene per month. At this rate of consumption, with kerosene at 13 cents per gallon, the operating cost for the average size box would be \$1.95 per month.

Refrigerators when new may operate economically. But as they become older, in some cases the insulation may break down and allow too much heat

from the outside to enter the food compartment, thereby placing a too heavy heat load upon the refrigerating system. This increases the cost of operation of some refrigerators as much as 20 to 30 per cent.

If the refrigerator is installed in a cramped place operating costs are usually higher. The size of the space in the kitchen allotted to the refrigerator should be such that complete ventilation about the condensing unit is made possible. The action of the automatic refrigerator is to convey the heat which is inside the cabinet to a condensing unit outside the box. Whether the condensing unit is below, above, or back of the food compartment free circulation of air must be permitted to insure efficient and economical operation. If the condensing unit is below or back of the food compartment the box should be located at least 6 inches from the wall. If the condensing unit is placed on the top of the refrigerator at least 6 inches of air space should be allowed above the unit if efficient operation is to be secured and maintained.

If there is not sufficient ventilation about the refrigerator the refrigerating unit will have to operate longer to give adequate box temperatures, thus increasing operating costs. The same is true if dust and dirt are allowed to accumulate on the condenser or if too much frost is allowed to collect on the freezing coils.

Cost of Installation.—At the present time most electric refrigerators are installed in the home at no additional cost to the consumer. Usually they are connected to convenience outlets already in the house wiring circuits. It would be desirable, however, to have all electric refrigerators connected to power circuits separate from the house lighting circuits, so that overloads on the lighting circuits would be eliminated and that the operation of the refrigerator would not interfere with other household devices. If the refrigerator is installed on a new power circuit the cost for installation is usually between \$5 and \$15, the difference depending on existing house wiring and desired location for the refrigerator.

The installation cost for the gas refrigerator usually is included as a part of the initial cost. If the owner moves from one house to another, the cost of re-installation will be approximately \$5.00 for the air-cooled box, and \$8.00 for the older water-cooled box.

Kerosene refrigerators which are air-cooled or water-cooled usually involve no cost for first installation other than that included in the initial cost. Those which are water-cooled will cost approximately \$5 for any installation after the first.

Cost of Upkeep.—Nothing definite can be said regarding the cost of servicing an automatic refrigerator. Any machine is likely to require service or repairs at some time during its normal life. Find out what service is covered by the guarantee. Some guarantees apply only to the compressor itself, omitting the motor, belts, shafts, cooling units, etc. Others include the replacement of the whole mechanism within the guarantee period. Some guarantees cover only replacement costs, leaving the labor and service charges payable by the owner.

Hermetically sealed units usually give less trouble than open units. Welded joints in the refrigeration system are likely to be more permanent than those which have been soldered.

It will cost on an average approximately \$3 to have the refrigerant gas cut off and then cut back on at the beginning and end of each period of non-use. Generally it is more economical to leave the refrigerator on during vacations and other like periods of non-use. Many refrigerators are equipped with a temperature control setting known as the "Vacation Setting," which maintains refrigeration temperatures at a minimum cost throughout the period without damaging the system.

If the refrigerant leaks out it may cost as high as \$10 to make the necessary repairs.

What About Over-all Construction?

The inside wall and the outside wall of the refrigerator cabinet are generally constructed of steel. Steel is strong, durable, and easily worked into almost any size and shape desired. There are different grades and gauges (thickness) of steel used by the various manufacturers. One refrigerator may be less costly than another due wholly to the type and/or gauge of steel used. Many grades rust easily and so should be protected on all surfaces with a finish which is rustproof and lasting. The thinner the sheet steel used the more "tinny" it will be and the more easily it will dent.

It is preferable that the cabinet be made in as few sections as possible. Overlapped seams which are welded will lessen the danger of moisture seeping into the insulation (unless the insulation is protected in hermetically sealed units) to a much greater degree than will seams protected with metal bands or rubber strips.

What Size Shall it Be?

Size of Box.—The size of the refrigerator is usually designated by the size of the food storage compartment, either by cubic feet of capacity or by the area of the shelf space as designated by square feet. In comparing different sizes of refrigerators be sure that such comparisons are done on the basis of cubic feet of useful space rather than by the total number of cubic feet. Specifications as to the amount of refrigerating space available for some refrigerators may be given to include the cooling unit, while other makes include only useful refrigerating space in designating the size of the box. The usual sizes for household automatic refrigerators are the 5, 6, 7, 9, and 12 cubic feet boxes. For the family of five persons the 6 or 7 cubic foot size is usually the most satisfactory. The rural household may need a larger-than-average size because certain food supplies are less readily available, and have to be stored for longer periods of time, especially during some seasons of the year.

If the family is a growing one a refrigerator larger than that required for present needs should be secured.

Another factor in determining size of the box is a consideration of the shelf arrangement and spacing. Shelf spacing should not be sacrificed for an increase in shelf area to a point where convenience in use will not be possible. Determine the number of square feet of shelf space necessary to take care of the various foodstuffs and their containers which will need refrigeration.

Right hand or Left hand Doors.—Refrigerators may be purchased with right hand or left hand hinged doors. It is important to get the one that fits most conveniently into the working scheme of the individual kitchen.

How About the Temperature?

Temperature Requirements and Maintenances.—“The milk compartment should maintain a temperature of 45°F. or below, and the average temperature of the food compartment should not exceed 50°F. at any time.”¹ The temperature within the box of an automatic refrigerator may be easily kept within the desired range of temperatures if the cooling unit is of the correct size for the food space, if the refrigerator is in correct temperature adjustment or if the refrigerating system is operating correctly.

The temperature within the food compartments of most automatic refrigerators may vary from 38°F. to 45°F. Usually the temperature never exceeds 45°F. in any part of the box if the box is well insulated and of good construction. The prospective purchaser should make sure that the firms manufacturing and selling the box will stand back of it within a fair period of time in regard to its ability to maintain guaranteed temperatures.

The refrigerating system should have a capacity that is capable of giving satisfactory performance under peak summer conditions.

Refrigerant.—In automatic refrigerators the substance through the use of which freezing is accomplished is known as the refrigerant. Among the more common substances now in use as refrigerants are: sulfur dioxide, methyl chloride, ethyl chloride, ammonia, and carbon dioxide. If the company manufacturing the refrigerator is reliable and a satisfactory guarantee is placed on the refrigerating unit, the type of refrigerant used in the system is not as important as some dealers may suggest.

Any odorless toxic refrigerant should have with it a substance which will give a characteristic odor to the combination.

Temperature Control.—Every automatic refrigerator should have a thermostatic control which provides for the securing of different temperatures within the freezing unit. These controls should be quickly sensitive for fairly slight temperature changes, and clearly marked to indicate which adjustment will raise and which will lower the temperature. The temperature control should be conveniently located.

The control should be so regulated that when it is set for the lowest temperature a standard food load in the box will not freeze, but so that ice

¹ Standards for Home Refrigerators. United States Department of Agriculture, Bureau of Home Economics, Washington, D. C.

cubes and fairly satisfactory desserts may be frozen readily. A large number of temperature settings is unimportant.

Defrosting Mechanism.—An accumulation of frost on the freezing unit decreases its efficiency. It may be desirable to have some means of defrosting the unit without having to turn off the fuel supply. Minimum refrigeration is necessary at all times, and the provision of a separate defrosting control makes defrosting possible without raising the box temperature high enough to induce food spoilage.

Insulation.—A high percentage of the heat which gets into the food compartment of any refrigerator seeps in through the walls of the box. The total amount which gets in must be kept as low as possible by adequate and moisture proof insulation.

The insulation of any refrigerator should be at least 2 inches thick, as recommended by the Bureau of Standards. The insulating material varies with each refrigerator, but the primary requirements of any insulating material are that it will have a high resistance to the passage of heat and also to the absorption of moisture. There are three general types of insulating materials, namely: vegetable fibers, mineral substances, and metal foils.

The insulation used in the refrigerator should be of such construction that settling and shifting are reduced to a minimum. If the insulation settles or shifts its efficiency will be lowered and the operating cost of the refrigerator will be increased.

So-called dead air spaces of 1 inch or more in refrigerators are practically valueless as insulators, and the purchase of refrigerators with such construction should be avoided. Vegetable and mineral insulators must be waterproofed, while the insulating efficiency of metal foils is not affected by moisture unless the surfaces become corroded.

Cooling Unit.—The cooling unit is usually made of aluminum, or stainless steel and other alloys, or sheet steel finished with porcelain enamel. Cooling units finished with porcelain enamel may craze or chip off, permitting corrosion which may endanger the refrigerating system. The cooling unit should be of such size in relation to the food storage compartment as to insure correct box temperatures. The larger the food storage compartment of the refrigerator, the larger the cooling unit must be. Centrally located freezing units have a greater advantage in that they provide better and more even circulation of air and there is more cooling surface to which milk bottles and other tall containers may be exposed directly.

Is it Quiet?

Quietness of Operation.—Gas and kerosene refrigerators are practically silent in operation, since there are no moving parts. The compression type refrigerator operated by electricity uses a motor in its construction to develop refrigeration. Whenever a motor is in operation some noise is inevitable, but much has been done recently to make them approximately noiseless. The

modern electric refrigerator, if operating properly, should not make a noise which is objectionable in the kitchen. Many times excessive noise is attributed to the refrigerating mechanism, when it is really due to the fact that the refrigerator is not set level on the floor, or may be set against a wall, which causes the noise to be amplified and carried to other parts of the house.

What About the Box—Inside and Out?

Exterior Finish.—The outside finish of a refrigerator should be easy to clean, have few seams and joints, have smooth rather than paneled surfaces, and be made of a material which will not absorb moisture. The exterior surface should maintain its original finish and color, if proper care is given it. Lacquered or enameled metal sheeting deteriorates in climates where high temperatures and humidity prevail. Porcelain enamel is quite satisfactory, as it is rust-resistant, not affected by alkalies, easy to clean, and extremely durable.

Porcelain enamel for the entire exterior surface and lining will represent about \$18 of the initial cost of the refrigerator. Porcelain enamel is durable if handled correctly, withstands any amount of cleaning, and makes cleaning problems easier. Synthetic materials (lacquers and enamels—baked on) are being developed, however, which have proved to be satisfactory and are less expensive than porcelain enamel finishes. These finishes do not chip or scratch easily, are resistant to moisture, and are fairly easy to clean. Repairs can be made simply and easily should any part of the finish become scratched or marred. A mild soap should be used for cleaning lacquer surfaces. For those who change residence occasionally an exterior finish of porcelain enamel may not be a wise choice. The porcelain enamel may become broken or chipped with careless handling in moving.

Doors.—The door should be as heavily insulated as the walls of the refrigerator, and be provided with gaskets to prevent admission of warm air. The door should be of sturdy construction, with hardware which will prevent sagging and readily make tight closing possible. There should be a perfect seal around the door frame where the lining and the exterior surface of the cabinet join. The door gasket should be made of odorless rubber which is resistant to grease, and which will give satisfactory service and not stick or become hard. The gasket should be removable and easy to replace.

Hardware.—The hardware should be of good quality, easy to clean, and sturdy in construction. It should not tarnish readily, scratch, nor become loose. Hardware which is welded in place rather than fastened by exposed bolts or screws is likely to be more permanent and will not present as many cleaning problems. Chromium and nickel plating are used most generally for hardware finishes on modern refrigerators. The door catch should be easy to manipulate without danger to the fingers, and should operate easily and readily with just a slight push. It should not be necessary to slam or to latch the door carefully.

Inside Lining.—It would be desirable to have the inside lining of the refrigerator seamless except for that place where the cooling unit is fastened. At such a place an airtight joint should be provided. The lining of the refrigerator food compartment should be finished with a surface which is smooth, rust and stain resistant, easy to clean, and non-absorbent. Round corners facilitate cleaning. Porcelain enamel has proved the most satisfactory and is usually worth its cost. If porcelain enamel is not used for the entire finish of the lining it is advisable that the bottom and half way up the sides of the interior of the refrigerator be finished with porcelain enamel.

Shelves.—Shelves should be of sturdy construction to hold necessary food weights without sagging, sufficient in number, and conveniently placed. The distance between shelves differs in the various refrigerators. In most cases it should be possible to place a standard pint jar on each shelf. Individual requirements should be taken into consideration so that the shelves are so spaced as to take care of particular needs. The shelves should be rust and stain resistant, easily cleaned, and flat surfaced so that containers put in the storage compartment will stand firmly without tipping. Shelves made from steel wire and heavily plated with tin give satisfactory service. Shelf arrangement should be provided for milk bottles allowing a minimum height of $9\frac{3}{4}$ inches. More than 12 inches is considered waste space.

The lowest food shelf should be sufficiently high from the floor to be reached easily and conveniently without much stooping.

Shelves which slide in and out are convenient when the box is exceptionally deep. Sliding shelves may add to convenience but may tend to decrease food storage capacity. Likewise shelves on the door may be convenient, but may in some cases be installed at a sacrifice of insulation. Refrigerators which have shelves on the doors should be of such construction that the doors will not warp or sag after foods have been stored in the racks for some time. Sliding shelves should have back supports which will prevent containers from falling or tipping when the shelf is being pulled out. The shelves should glide in and out easily and without a jerk.

Trays.—The freezing trays for automatic refrigerators should be rust and stain resistant, smooth in finish, durable in construction, and easy to clean. There should be some mechanical means for easy removal when frozen to the cooling unit. The trays should have rounded corners and should be made of strong material so that warping will not take place when water is frozen in them. Trays made of aluminum and those made of copper and heavily coated with tin are satisfactory and meet most recommendations. The use of rubber for trays is not as satisfactory as metal because of the poor conductivity of rubber. Freezing in rubber trays will take longer than in metal trays.

The number of trays should be sufficient to care for the needs of the family. The ice cube capacity should be determined by quantity of ice rather than the number of ice cubes. The sizes of cubes varies in accordance with divisions in the ice tray.

What About Special Features?

Before final selection is made, the prospective purchaser should weigh the special features of one automatic refrigerator against those of other refrigerators being considered. Some of the features found in present day automatic refrigerators include: special types of door opener, interior light, containers for vegetables and other types of food, cold indicators, sliding and revolving shelves, adjustable shelves, water coolers and ice cube and tray releases.

Does the Refrigerator Have This?

Instruction Book.—Suitable instructions should be furnished with the automatic refrigerator, fully explaining it and giving directions for its operation and care.



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