Use Your Refrigerator Economically

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WHAT IT COSTS to run a refrigerator in your home depends as much on you as on the refrigerator you select. The way the refrigerator is used will influence greatly its cost of operation.

Today, both ice and mechanical refrigerators look very much alike so far as the construction of the box is concerned. And whether they're cooled with ice, electricity, gas or kerosene, all of them do a good job. The type to choose will depend on where you live, whether you have natural gas or electricity in your home, whether ice is easily available, or whether kerosene's the solution.

Initial cost will influence you, too—in recent years electric refrigerators have been greatly reduced in price. The less expensive models are as well constructed as the more costly, but they don't have all the special features. Appearing on the market are large refrigerators with flexible shelf arrangement for the storage of large containers in the rural homes. An 8-cubic-foot refrigerator uses very little more gas or electricity than a 6-cubic-foot.

The newer refrigerators are less expensive to operate. The electric refrigerator ordinarily uses from 18 to 22 kilowatt hours a month; the older ones use 40 kilowatt hours or more. Gas refrigerators of 6-6½-cubic-foot capacity average 1,400 cubic feet of natural gas of 1,000 Btu content when running full flame and only about one-third this amount at minimum flame. It probably would pay to buy a new mechanical refrigerator if your present one is fairly old.

The national defense emergency doubtless will affect refrigerator production. Not only may fewer refrigerators be available to the consumer, but models doubtless will not change much during the emergency.

There just isn't any comparison between the old and new ice refrigerators. The new ice refrigerators ice from the top. The air simply circulates across the bottom surface of the ice. An almost constant temperature is maintained so long as a sheet of
Most refrigerators are made of wood or steel with an external surface of enamel baked on. Some of the more expensive models may be finished in porcelain enamel but the “organic” enamels are very satisfactory. They are chip and scratch-proof and will retain their original white color. The floor of the food chamber is porcelain enamel and frequently the entire lining is of the same material. Steel frames are more rigid than wood and allow joints to be welded securely to prevent moisture from penetrating the insulation. Before the finish is applied, the steel is treated to make it rust resistant.

Different makes of refrigerators feature certain specialties which add to the convenience or attractiveness of the machine, but are not always essential. An interior light may be automatically switched on as the door is opened. The door may be opened by hand or simply by pushing the arm against it—certainly convenient if one’s hands are full. Sliding shelves which do not tip when pulled out permit easy access to foods. Adjustable shelves accommodate containers of varying sizes, allow the storage of a turkey or, in summer, a watermelon.

Some models have a bin or cellar compartment at the bottom in front of the motor and condensing coils, made possible because the coils are smaller and more compact in the newer models. In the bin, root vegetables and fruits may be stored, and even beverages not needing constant refrigeration. In at least one model this lower compartment is refrigerated, which gives extra storage space and may be used for milk, jars of fruit and other food in tall bottles.

Most of the new refrigerators have their own freezing locker which will hold 50 pounds of food at a temperature of 10°F.

Food compartments are wider and shallower than they used to be. That fact, along with the sliding shelves, makes it a lot easier to reach the bowl or dish at the back of the shelf. The doors are of better design and frequently are lined with Bakelite which, as you know from its use as handles on pots and frying pans, is an excellent insulating material. Some ice cube trays have shelf releases and a type of ejector for freeing the cubes from the sections, one at a time or by the trayful. Most of the units are sealed in, too—that is, the motor and condensing coils are under one housing.

Tests were made in the household equipment laboratories at Iowa State College to determine what affected the temperature in the food compartment. It was found that the refrigerator door should be opened for as short a time and as infrequently as possible to prevent the temperature from rising excessively.

The food chamber should not be overloaded. If the food containers are placed too closely together the cool air cannot circulate between them. Anything which hinders efficient circulation retards refrigeration. Ice, for example, should not be covered. It is the melting of the ice which cools the food chamber.

Heat always flows from a warm to a cool body. When food at room temperature is placed inside the refrigerator the warmth it contains diffuses into the surrounding air which circulates toward the ice or mechanical unit. As the air passes over the ice or unit, the heat is absorbed.

In the ice refrigerator the coldest place is the down drop of air from the ice chamber. In the top-icer ice refrigerators this place may be on the top shelf of the food compartment directly under the opening through which the cold air falls. In some models, however, it is the center of the chamber floor. The warmest sections are those through which the air circulates just before passing over the ice or unit.

In some of the new ice refrigerators tested the ice cake only covered the rack completely for the first day or two after icing. Then as the ice continued to melt the rack gradually became uncovered for several inches on each side of the cake, allowing the air to circulate over the entire surface of the ice. Under these conditions the temperature rose, sometimes to 50° or above. Chipping the ice which remained on the rack, to form a bed of crushed ice on which the new cake was placed, slowed up this process, and is therefore recommended.

We usually set the upper limit for temperatures in a refrigerator at 50°. There is nothing magic about the 50°, however. Yeasts and molds and the even more undesirable bacteria are not going to be vigorous and active above 50° and at 49° quietly abandon their bad behavior and die. It isn’t as simple as that. Most refrigerators

Oilied silk bags and covered containers prevent refrigerator dehydration.
maintain maximum temperatures below 50°. In the mechanical refrigerator the average temperature is usually about 42°. Lower temperatures than 42° are not essential unless we are storing foods easily susceptible to spoilage for 10 days or more.

We have talked a lot about temperature for food preservation, but only recently have we begun to consider the part which humidity plays, although commercial cold storage plants have realized its importance. Cold air will hold less moisture than warm air, but foods stored uncovered at any temperature will tend to dry out unless the relative humidity is approximately 100 percent—in other words, unless the air is saturated with water vapor.

Placing warm foods in a refrigerator and frequent or lengthy opening of the door will cause an increase in relative humidity of 10 to 25 percent. Since cold air can hold less moisture than warm air, the excess moisture in the ice refrigerator will be deposited with the film of ice meltage when the air circulates over the cake of ice and will be carried away through the drain pipe. In the mechanical refrigerator, however, the excess moisture is deposited as frost on the unit. This makes defrosting necessary much more frequently during the warm, humid summer months, and is further argument for opening the door as seldom as possible.

Refrigerator manufacturers have tried to solve the humidity problem in various ways. Those marketing ice refrigerators believe that the presence of the melting ice supplies sufficient moisture. For some years the manufacturers of mechanical refrigerators have provided containers to preserve the crispness of succulent vegetables.

More recently some refrigerators have been divided into two compartments—one containing the cooling unit as usual and storage space for milk, meats, frozen foods, and extra ice cubes; the other with additional coils between the walls permitting high humidity for preservation of fruits and vegetables without the necessity of covering any but the most succulent. A minimum of air circulates in this second section, because it is the circulating of air which removes the moisture.

Extensive tests in our laboratories at the College have shown that fresh succulent vegetables unless protected with a skin should be covered in all types of refrigerators—ice and mechanical. Vegetables containing a high percentage of water, such as lettuce and celery, keep best when stored tightly covered; others—beans, carrots, radishes, and so forth, are stored preferably in a ventilated container.

Containers are of various kinds. There are hydrators of porcelain enamel, with or without openings for ventilation. The openings may be round holes on the sides or slender slits in the cover, or the cover may simply fit loosely enough to allow a slight amount of air to circulate. Some hydrators even have humidity controls—a series of shutters on the sides of the pan, which are opened to different degrees by setting the pointer on the dial to the mark for one-fourth, one-half or full, according to the amount of food stored. If the pan has only a little food in it, the shutters must be nearly closed to prevent evaporation.

Glass covered dishes in a variety of shapes and sizes may be purchased in a hardware store or dime store. Bags are of oiled silk or pliofilm with zipper or slide fastenings. Covers of the same materials with elastic edges may be used over bottles and bowls.

Leafy vegetables often are more crisp at the end of 24 hours of circulation of air.

Some general suggestions for the economical use of a refrigerator are:

- Leave spaces on shelves between containers to allow free circulation of air.
- Store foods covered to prevent drying out and excess collection of moisture on unit.
- Defrost when frost is about one-fourth inch thick.
- Open door as infrequently as possible.
- Remove all waste parts, such as carrot tops, celery tops, pea pods before storing. There is no need to refrigerate what will later be thrown away.
- Cool most foods to room temperature before placing in food chamber.
- Remove water in drip pan at end of defrosting to prevent fresh deposit on unit.

A refrigerator is a worthwhile investment. It reduces spoilage, frequently improves flavor of foods, and saves the time and energy of the homemaker.