

# ***Appliances and Their Effect on Food Buying***

*By Fern E. Hunt*

**A**sk any cook, "What effect do your kitchen appliances have on your food-buying decisions?" The answer you get will likely be, "well, none." If you asked further, "Without a refrigerator, how would you manage?" the answer would show that availability of at least one common appliance greatly affects food buying practices. Virtually all U.S. households (99.9 percent) have and use a refrigerator. Ninety percent of refrigerators sold in 1981 were combination refrigerator-freezers. About 45 percent of households in the Nation have a separate food freezer. And commercial processing and freezing of foods has burgeoned into a thriving segment of the food industry within the past 25 years.

Perishable foods may be purchased almost the year round — strawberries, lettuce, oysters, and eggs, to name a few — because refrigerated equipment is available to transport the food over long distances, store it in warehouses and display it in retail stores. Further, after purchase the food may be held safely in the home refrigerator or freezer for a reasonable time with little if any spoilage and with little or no fear of foodborne illnesses. So shoppers in the United States may buy supplies for a week or more at a time and take advantage of special sales to stock up on foods. In many

other countries chilled storage space for foods is not available in the marketplace or home, and food shopping is a daily chore.

Affordable refrigerators and freezers for homes have had more to do with changes in quality, availability of out-of-season items, forms of food eaten, and shopping practices than with total amounts of foods consumed. However, with availability of food freezers and commercially frozen foods, civilian consumption of commercially frozen fruit — exclusive of citrus juices — doubled from 1940 to 1979 (from 1.28 to 2.57 lb. per person). The increase was due primarily to increased consumption of commercially frozen strawberries. In the same period, use of citrus juices on a single strength basis increased from 5.12 to 33.37 lb. per person per year — an increase of 650 percent.

Consumption of commercially frozen vegetables increased from 2.2 lb. per person in 1940 to 23.4 lb. in 1979. At the same time total consumption of commercially produced vegetables (fresh, canned and frozen) increased from 186.9 to 233.6 lb. per person. There was a gradual change from home-produced to commercially produced items rather than consumption of greater quantities of

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vegetables per person. With modern specialized agriculture, even many farm households buy commercially produced foods for much of their food needs.

A further change in food choices coming with availability of frozen food storage space in households is the whole array of frozen desserts and of ready-to-cook or heat-and-eat specialty items and dinners. Such foods are a boon particularly to people who must prepare meals in a hurry, people who do not like to cook or who lack cooking skills, and to elderly and handicapped people living independently.

Capacity of household refrigerators and refrigerator-freezer combinations on today's market varies from 10.0 to 27.8 cubic feet. Freezer space is as small as 1.2 cubic feet in the smaller refrigerators and as large as 10.8 cubic feet in the largest refrigerator-freezer combinations.

### **Refrigerator, Freezer Needs**

Recommendations for refrigerator sizes are based on number of people in the household. A minimum of 6 (and preferably 8) cubic feet has been suggested for 2 people plus one cubic foot for each additional person in the household. Thus for a household of 2 adults and 2 children, minimum recommended capacity would be 8 cubic feet; the preferred space would be at least 10 cubic feet. If a separate food freezer is not available, 2 cubic feet of freezer space in the refrigerator has been suggested per person. Separate freezers can be purchased with capacities from 5.2 to 28.0 cubic feet. Some experts suggest that where very large amounts of freezer space may be required, a household would be wise to have two smaller freezers and dis-

nect one as frozen food stocks dwindle during the year.

Determinants of needs for refrigerator-freezer and separate freezer space include marketing habits of the household, age and health of family members, amount of entertaining, and home food storage practices. Families that freeze much of their own fruit, vegetables, and meat may need 5 to 6 cubic feet of freezer space per person in separate food freezers, while 3 to 4 cubic feet per person will provide ample storage space for most families.

**Cooking Appliances** — Currently available cooking appliances might be classified into two groups: 1) Those that promise to affect use of time and/or energy — permitting quick meal preparation either by rapid cooking or by long, slow, unattended cooking with conservation of energy, and 2) Those that satisfy special interests such as gourmet, outdoors, nostalgia, and natural food enthusiasts. Such appliances as microwave ovens, convection ovens, pressure saucepans, and slow cookers might be listed in the first group. Food smokers and dehydrators might fall into the second.

**Portables** — Some small or portable cooking appliances have the potential to be a factor in consumer decisions in the food marketplace. For example, appliances that cook foods by moist heat methods — such as a pressure saucepan or a slow cooker — cook less tender cuts of meat satisfactorily with minimum energy inputs compared to cooking them in a covered pan in the range oven. But intended use, consumer knowledge of meats, financial resources, and tastes will be the major determinants of the choice of type or cut of meat rather than avail-

ability of a particular cooking appliance.

One of the least energy intensive and quickest ways of cooking food by moist heat is in a pressure saucepan. The heat penetrates food quickly at the high temperature and pressure, and the cooker is effective for foods that ordinarily require a long time to tenderize. It works well in softening tough connective tissue found in less tender cuts of meat. With the pressure saucepan, some foods cook in as little as a fourth of the time required in a regular saucepan and as quickly as in a microwave oven. A microwave oven will do more kinds of cooking than the pressure saucepan, but the pressure cooker currently has the advantage in both purchase price and cost of operation. Pressure saucepans come in 2½-, 4-, and 6-quart capacities.

### **Types of Ovens on Market**

Changes in recent years in oven design and types of ovens available on the appliance market have largely reflected changes in uses of time by family members (particularly women), convenience and desired lifestyle factors, energy concerns, and advances in the food industry. Table model (or counter-top) ovens have flourished in the 1970's because of needs to heat or cook small quantities of food and concern about amounts of energy used in small ovens versus full-size range ovens. Development of frozen pre-cooked, brown-and-serve and heat-and-serve food items has gone hand-in-glove with innovations in cooking appliances and vice versa. Many of these foods are purposely marketed with containers in which the food may be cooked or heated and which fit well into small ovens.

Use of conventional types of ovens — range and table model or portable

types — is an inefficient way to cook food. Only 6 to 14 percent of the energy used in a range oven goes into the food. Microwave ovens offer a more energy efficient way to cook foods normally cooked in an oven, and with skill excellent meals can be produced in the appliance. Generally about 50 percent of the energy used goes into the food. In presently available appliances, cakes, pies, and other baked products are generally less acceptable in a microwave oven than in a conventional oven, even with combinations of microwave and conventional oven cooking. Microwave ovens are now owned by about one-fourth of U.S. households. According to a recent nationwide *Merchandising* study (1982), microwave oven owners surveyed used the appliance 44 percent of the time for cooking regular meals; 39 percent of the usage was for reheating foods; and 16 percent, for simple defrosting.

**Convection Ovens** — Forced convection ovens are theoretically more efficient than traditional types of ovens. Foods should heat faster in forced movement of hot air than with the natural convection in ovens. Countertop convection ovens have not achieved the market success of microwave ovens, but they do offer an alternative to heating up a full-size range oven for oven-cooking jobs. Sales in one year have never surpassed the half-million mark. Price differences depend primarily on types of controls and automatic features.

Recommended temperature settings for baking in a forced convection oven are 25° to 50° F lower and cooking times are shorter than for an oven with natural heat distribution; therefore energy usage should be lower with the convection oven. In a study of four different brands

and styles of countertop forced convection ovens, a countertop regular oven of a corresponding size, and a 30-inch range oven, the average energy use in countertop forced convection ovens was significantly less than in the electric range oven. But the table model regular oven (without forced convection) required the least energy of all for cooking jobs. Further, one of the table model forced convection ovens used as much energy as the large oven in the electric range for baking jobs. Baked products from all ovens were similar in eating quality characteristics, but top browning was more uneven in the forced convection ovens than in ovens with natural circulation of heat.

### ***Dehydrators and Smokers***

Sales of commercially manufactured food dehydrators and smokers for home use have not reached levels high enough to be noted in 1982 annual statistical marketing reports for the appliance industry. Impact on the food market caused by use of such equipment is likely to be minor, if perceptible. People who must buy the foods they dehydrate or preserve by smoking will not usually find it cost effective. Further, relatively few people will want to take the time and trouble necessary to cure meat before smoking or to sulfur fruits and blanch vegetables before drying in order to preserve them.

There are several reasons for interest in home dehydration of foods — for example, convenience for hikers and other sports people in transporting and storing dried products, nutritious natural snacks, relatively low energy use in processing, and storage without use of energy resources. Dehydrating foods is less costly than some other means of food preservation, because intense heat is not required

in processing and refrigerated storage is unnecessary afterward. Also, storage space requirements and shipping weight are low.

Several models of dehydrators with temperature controls and forced air circulation to hasten drying have appeared on the market. In addition, some forced convection ovens are designed with controls to provide temperatures of 150° F or below (suitably low for satisfactory drying of food), and some manufacturers offer accessory kits and instructions for dehydrating foods in their ovens. Good dehydrators may be homemade as well. Construction of homemade dryers requires some carpentry skills and an investment for materials and parts. In commercially made drying equipment for home use, only relatively small quantities of food — usually less than 10 pounds — can be dehydrated at one time. That could be a disadvantage for a household wanting to preserve large quantities of food.

**Smoking** — As it is currently done, smoking is more a way of enhancing flavor of foods and a method of cooking than a method of food preservation. In smoker-cookers the material deposited on surfaces of food during smoking contains formaldehyde and phenols among many other chemical components. Formaldehyde and phenols are bacteriostatic, and creosols produce smoked flavor.

Foods smoked without a high salt cure generally will keep for only a short time unless refrigerated. How long they keep depends upon degree of curing, amount of dehydration and smoking, and the storage temperature. Signs of spoilage include development of surface molds, sour taste or smell of ammonia, and ran-

cid flavor. Commercially made smoke ovens may be designed to smoke only or to smoke-cook and roast, barbecue, steam and/or shish kebab. Various styles are available, some with gas heat and some with electric. An advantage of the commercial smoke oven is portability. A disadvantage is the small usable capacity.

### **Shelf Life of Foods**

Commercially canned food is sterilized during canning, so problems with microbial spoilage are extremely rare if the can remains undamaged. Metal containers for commercially canned foods are designed with inside coatings to resist chemical reactions between the can and its contents and to have an unlimited shelf life. Two years is considered the norm for storage. Some foods are more corrosive than others, and the rate of the reaction between can and food is affected by temperature — the higher the temperature, the faster the deterioration. Corrosiveness of the foods depends upon their acidity. Acidic foods such as fruits, juices, and pickles are the most corrosive and have the shortest shelf life. Low acid foods — such as vegetables, meats, and fish — generally keep well. Ideal storage conditions for canned foods include cool, but not freezing, temperatures and a dry environment to prevent rust from the outside.

A new type of package for processed food is the retortable pouch, a flexible package made of two layers of film with a layer of foil sandwiched between. The package is flatter than cans and the food is sterilized in a shorter time than is re-

quired for heat to reach the center of a cylindrical can. Shelf life of the food is 1 to 2 years at room temperature. A drawback to the use of pouches is the relatively high cost in comparison to cans.

**Dehydrated Foods** — Shelf life of dehydrated foods depends to a large extent upon storage conditions. Since moisture content is very low — 2 percent to 10 percent of the original product weight — the foods absorb moisture in a humid atmosphere. In a moisture-tight container which excludes light and at room temperature or cooler, many dehydrated foods have a shelf life of up to 2 years. The lower the moisture content, the longer will be the shelf life at any temperature. Oxidative deterioration can occur in dried foods. Since plastic bags may not completely exclude oxygen, glass or metal containers are better for dried food storage.

**Frozen Foods** — When temperatures in freezer storage space are maintained at 0° F or below and packaging materials are moisture-vapor proof, many foods could be stored indefinitely with little or no deterioration in eating quality. But storage of frozen fruits and vegetables beyond the next growing season is poor management of expensive storage space. Also, ground meats and foods containing fats tend to develop rancid flavors if stored longer than 3 to 6 months. The freezer manual and the local county home economics extension agent are good sources of information on recommended storage times for frozen foods.