

Freeze Drying Technique

A full-sized steak lying on a shelf at room temperature for months without spoiling? It doesn't seem possible but it is—if the steak is freeze-dried.

Since freeze drying has such a potential, what's holding it up? The answer is cost, says Dr. Richard A. Keppeler, associate professor of agricultural engineering at The Pennsylvania State University. He observed that vacuum freeze drying, for example, requires very costly equipment. Primarily astronauts and back-pack campers, to whom low weight is vital, are willing to pay the charge.

Dr. Keppeler described two methods of freeze drying in a recent issue of "Science in Agriculture," the research quarterly of the Agricultural Experiment Station at Penn. State. He said perhaps some price relief may be expected from a process now being developed called atmospheric freeze drying. The process, he indicated, shows excellent promise for preserving food quality at reasonable price. Vacuum

freeze drying is an older process.

Except for cost, freeze drying has several advantages over other forms of food preservation. Freeze-dried food retains its original size and shape except that the product has sponge-like empty cells where the water has been removed. Foods are easy to "rehydrate" for use. And as mentioned, the foods are light in weight.

Despite the somewhat limited work done so far with atmospheric freeze drying, costs on some foods have been lower with vacuum freeze drying. In addition, some foods have shown better quality with atmospheric freeze drying than with the vacuum method. Other foods have not fared as well under the atmospheric technique, where the drying time is even longer than vacuum freeze drying.

In comparing the two processes, Dr. Keppeler said vacuum freeze drying primarily removes water from the product after it is frozen. In the process, ice will sublime or move directly from solid ice to

water vapor without passing through the liquid state. The best known example of sublimation is dry ice, solid carbon dioxide, which evolves a vapor from a solid at atmospheric pressure without going through the liquid state.

In atmospheric freeze drying, the equipment is much more lightly constructed than for vacuum freeze drying since pressure is essentially the same inside and out. Thus construction costs are lower.

To transfer just enough heat to the drying front to sublime the ice in atmospheric freeze drying, but not too much so that the ice all melts, controls must be precise. Temperature of the air passing over the drying food must be increased gradually from about 16 degrees F to room temperature. This overcomes the heat transfer resistance of the constantly increasing dry layer through which the heat must pass.

The best solution to this problem so far has been to pass the frozen food through several chambers, each one successively warmer than its predecessor. The moving air in each chamber is held at a constant temperature with the moisture in the air being removed by a desiccant before it passes over the food.

For Art?

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Heavy Fact?

An adult opossum weighs about 28,000 times its birth weight. If a human grew as much, an 8-pound infant would grow up to weigh more than 100 tons.

Expensive Clothes Not Always Best

Higher priced clothing items don't always indicate higher quality. That's why it pays to spend the time to be a careful shopper, according to Mrs. Ruth Ann Wilson, Extension clothing and textiles specialist at The Pennsylvania State University.

For children's playclothes, look for strong seams, material that is tightly woven, and features that will help appearance such as durable press or stain and soil-resistant finish. And be sure that play clothes are machine washable. Read the label on the clothing for care instructions before buying.

You may want to spend just a little more money in certain cases, says Mrs. Wilson. For example, quality denim jeans with double knees probably cost more, but they'll last longer than those made of thin cloth with only one layer of fabric in the

knees. On the other hand, for a fast-growing youngster, who has no younger brother or sister to wear hand-me-downs, you don't want to buy such good quality clothes that he can't wear them out.

For "good"—clothes your child wears only on special occasions—it probably isn't a good idea to pay a lot of money. You can buy less expensive clothes and they'll look just as nice as higher priced outfits.

Let your child help you choose his or her clothes. Usually a youngster will be happier wearing something he's picked out. You may want to select two or three outfits that meet your standards for price and quality. Then let your child make the final decision.

Be a careful shopper. Spend time to inspect workmanship and read labels. And you'll get good buys and more for your money.



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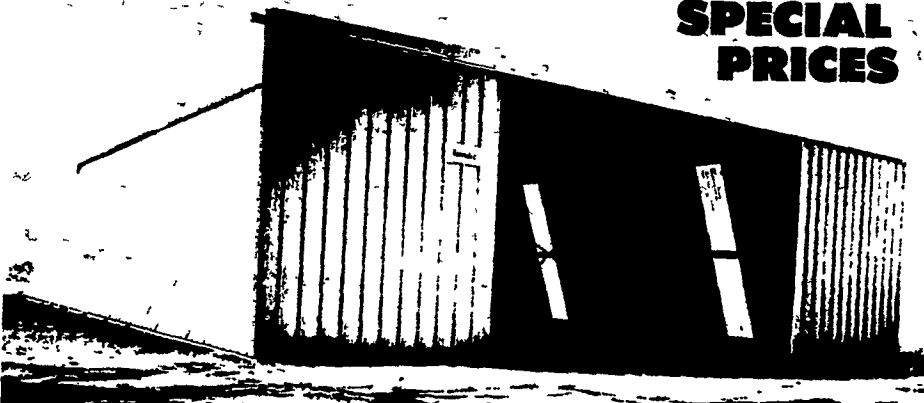
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