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IMPLICATIONS OF FREEZE-DRYING FOR COMMODITIES PRODUCED IN THE WESTERN UNITED STATES

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Sir Francis Bacon's, "Acorns were good till bread was found," bears some relation to changes presently occurring in our food processing industry. One newfledged processing method receiving attention is freeze-dehydration. Let's look at possible impacts of this industry on our Western agricultural economy.

Taste Tests

In our USDA taste panel tests we examined 33 freeze-dried foods now on the commercial market. Each was compared with a similar food that had been processed by freezing or canning.[1/] Most of these freeze-dried foods were rated by the panel as "fair" though some tasted "good," and others were "poor." None were "very poor."

Several freeze-dried items were superior to their counterpart products. Others were of about the same quality, but most were inferior to their comparison standards. Freeze-dried foods appeared most favorable where they were in mixtures, as for example, stews, chili, soups, and chicken dishes. The inclusion of other ingredients definitely masked a lack of flavor evident in some of these freeze-dried foods.

Processing Costs

To estimate unit production costs of this processing technique, we used the budget approach and developed synthetic models of four plants.[2/] The smallest plant, called the 1X model, had a water removal capacity of 4 tons per 24 hour day. The other 3 plants are multiples of this small one, and are designated as 2X, 4X, and 8X.

Investments for the four model plants range from about $350,000 for the small model upward to over $2 million for the large 8X model plant. In the small plant there are about 10 full-time employees and in the largest plant 22 workers perform the necessary drying operations.

1/ For a complete analysis of taste test results see Freeze-Dried Foods: Palatability Tests, Kermit Bird, July 1963. Available at Division of Information, ERS, USDA, Washington, D. C.

2/ For details of the cost study see Freeze-Drying Costs, Kermit Bird, estimated publication date September 1963.

In the small plant fixed costs are $75,000 per year, and the variable costs approximate $308 per day. Our largest model plant has total fixed costs of $422,000 per year and total variable costs of $900 per day. Because of the large investment in freeze-drying equipment and the high rate of depreciation, fixed costs are high in this new industry--about half of total costs. This ratio of fixed costs to total costs is unusual in a food processing industry, and indicates the necessity of a full capacity operation.

Average costs were 7½ cents per pound of water removed for the small plant. They are 6.3 cents for the 2X plant, 5 cents for the 4X plant, and 4 cents for the 8X model plant. Clearly there are economies of size in this industry. Unit costs would be much higher if the same plants operated less than 24 hours per day, or less than a full 250-day year. For example, the 1X plant would experience costs of 13 cents per pound if operated only 100 days per year.

What Freeze-Drying May Mean to the West

Western United States, with its wide diversification of agricultural commodities, produces the following foods that may be of future interest to the freeze-drying industry.

1. Beef products of various varieties.
2. Pork cuts including ham, chops, and sausage.
3. Chicken and turkey pieces.
4. Fish, especially shellfish.
5. Mushrooms.
6. Vegetables including asparagus, broccoli, brussell sprouts, some tomato products, but not peas, corn, potatoes, onions, or snapbeans.
7. Deciduous fruits including apples, peaches, plums, prunes, and cherries.
8. Other fruits including citrus, pineapple, dates, and figs.
9. Berries including blueberries, raspberries, strawberries, and cranberries.
10. Dairy products including cottage cheese, cream cheese, and cheese dips.
11. Seasonings, extracts, and spices.

Only a few of these will attain large volumes in freeze-dried forms. Processing costs are high when compared with frozen, canned, or conventionally dried foods. This cost aspect, plus the lack of complete retention of flavor by many items, may limit volume potential--especially for direct sales to consumers via grocery stores. However, freeze-dry foods do have outstanding characteristics that should assure them at least a limited market for many products.

I do not foresee freeze-drying seriously cutting into either the freezing or canning industries. Instead, I expect it will develop markets that are new, and may account for about 2 per cent of the processed food volume by 1970.