

S105
E55
no. 257
cop. 2

Annotated Bibliography on the Economics of Food Dehydration

*Special Report 257
June 1968*

**COOPERATIVE EXTENSION SERVICE
OREGON STATE UNIVERSITY, CORVALLIS**



ANNOTATED BIBLIOGRAPHY ON THE ECONOMICS OF
FOOD DEHYDRATION

Walter Armbruster
Food Technology Economist
Cooperative Extension Service—Oregon State University

A project to develop information useful in determining the potential for food dehydration enterprises in Oregon and in other states is in progress at Oregon State University. The project, administered by the Cooperative Extension Service of Oregon State University, was funded by a grant from the State Technical Services Program under the Technical Services Act of 1965.

The project embraces the assembly and evaluation of information regarding: (1) The market potential for dehydrated food products, and (2) the comparative costs of different dehydration technologies. This information will be valuable for allocating educational efforts regarding adaptability of various dehydration technologies to Oregon's and other states' agricultural commodities. The basic information also will be useful to present and potential food processors in assessing profit potential for expanding and developing food dehydration operations.

The early phase of the project involved extensive review of literature. Selected economic references of immediate practical interest are listed below. The United States Department of Agriculture and University research publications are available from the publishing agency. Numerous articles dealing with technical aspects of dehydration are published in trade journals such as Food Technology and Food Engineering. Reports also are available from the U.S. Department of Agriculture Regional Research Laboratories relating results of research on technical aspects of the various dehydration technologies. These published articles and reports occasionally contain cost estimates.

Publications Concerned with Market Potential
for Dehydrated Foods

- Bird, Kermit, The Food Dehydration Industry's Prospective Changes,
Speech to annual meeting of the Dehydrated Foods Industry Council,
Philadelphia, September 15, 1967, Economic Research Service, USDA.

Size of dehydrated foods industry, reprocessors' use of dehydrated foods, and problems in use of dehydrated foods are analyzed based on unpublished results from a nation-wide USDA survey. Data are presented on military demand, and the future of food dehydration is discussed briefly.

- Bird, Kermit, Selected Writings on Freeze-Drying of Foods, ERS-147,
Economic Research Service, USDA, January 1964.

Papers dealing with freeze-drying progress, problems and expectations; relationship of freeze-dried foods to the frozen food industry; implications of freeze-drying for commodities produced in the western United States; and the future of freeze-drying.

- Brunk, Max E., et al., Profile and Prospects in Apple Products, 1967-75,
American Can Company, New York, June 1967.

A statistical profile of the apple industry and prospects for its future is presented. The markets for apples for various uses are examined, as is the regional production of apples in the United States. Major forces bearing on the apple industry's prospects are discussed.

- Dunham, D. F., Trial Use of Foam Spray-Dried Whole Milk in Selected Types of Institutions, ERS-348, Economic Research Service, USDA, June 1967.

Foam spray-dried whole milk was rated acceptable for beverage use by food managers of eight nonprofit or charitable institutions. These institutions used the product on a trial basis, serving about 600 people. Indications are that dry whole milk may have a price advantage over fresh milk, which might promote increased institutional consumption.

- Greig, W. S. and C. L. Marine, Onions and their Processing Potentials, Research Report 14, Michigan State University Agricultural Experiment Station, East Lansing, Michigan, 1965.

Onions are used almost universally, but are disagreeable to handle and peel, indicating possibilities for increased onion processing. Potentials for dehydrated onion products are large; chief markets appear to be remanufacturing, institutions, and export (because of transportation savings).

- Hall, C. W. and T. I. Hedrick, Drying Milk and Milk Products, Avi Publishing Company, Westport, Connecticut, 1966, pp. 256-284.

Chapter 11, dealing with markets and uses, indicates that principle commercial outlets for nonfat dry milk currently are for bakery, home (retail), and dairy use. Volume data are presented for utilization of nonfat dry milk and for dry whole milk.

- Harp, H. H. and D. F. Dunham, Market Potential for Processed Potato Products, Marketing Research Report No. 505, Economic Research Service, USDA, October 1961.

The retail market offers the largest potential for expanding sales of dehydrated mashed potatoes and frozen french fries. Dehydrated mashed and frozen french fried potatoes constitute a sizable share of total potato use by institutions, but a potentially large market remains.

- List of Planned Procurements - Dehydrated Subsistence Items, Headquarters Notice Nr. 14(68), Headquarters, Defense Personnel Support Center, 2800 South 20th Street, Philadelphia, Pa. 19101, February 9, 1968.

List of dehydrated foods expected to be purchased by Defense Personnel Support Center during 1968. Specifications for the items to be purchased are obtainable by writing to the listed address or visiting the Military Specifications Depository, Science and Technology Department, Oregon State University Library. The list is tentative and subject to revision based upon many contingencies.

- Marine, C. L. and W. S. Greig, Estimating Institutional Sales Potential for New Food Products: A Case Study on New Onion Products, Research Report No. 55, Michigan State University Agricultural Experiment Station, East Lansing, Michigan, 1966.

Although the institutional market accounts for only one-fourth of the total dollar sales of food, often it is the largest initial market for new processed-food products. An institutional sales test is described and evaluated. Market potential for dehydrated onions in the U.S. is presented.

- Miller, Earl B., Cooperative Marketing of Nonfat Dry Milk to Commercial Outlets, Report No. 129, Farmer Cooperative Service, USDA, September 1965.

Data was obtained from 11 cooperatives manufacturing one-third of the nonfat dry milk products in the U.S., and from 20 commercial firms representing the major types of users of nonfat dry milk. Information is presented on use of nonfat dry milk by commercial users and reasons for using it.

- Moede, H. H. and B. Burnside, Market Potential for Low-Fat Milk, Marketing Research Report No. 709, Economic Research Service, USDA, May 1965.

Prices paid for low-fat milk compared to other types of milk are presented for home-delivered and retail-store sales. A household consumer survey provided information regarding knowledge of low-fat milk, uses, and relationship to other forms of milk. An evaluation of the economic impact of low-fat milk and estimates of its market potential are presented.

- Sjogren, C. N., "Practical Facts of Foam-Mat," Food Engineering
Vol. 34, No. 11, November 1962, pp. 44-47.

Points up opportunities for foam-mat dried products for use as instant food drinks and as ingredients in dehydrated soups, cereals, and baking mixes. Gives production details, including how to make foams.

- "What's Coming in Freeze Drying," Food Engineering, Vol. 35, No. 2,
February 1963, pp. 64-67.

Breakthroughs to big gains are seen as potentials are analyzed, providing costs can be cut and quality improved. Promising prospects include institutional sales of portion-control fish, meats and vegetables; quality ingredients for food items such as soups, desserts, and bakery products; and specialty products such as seasonings.

Publications Dealing with Cost of Dehydration Technologies

- Bird, Kermit, Freeze-Drying of Foods: Cost Projections, Market
Research Report No. 639, Economic Research Service, USDA,
January 1964.

Various freeze-dry processing costs are examined by studying the operations of four hypothetical but representative processing plants as integrated departments within a company or firm. Analysis and implications of costs lead to conclusion that freeze-drying might add 4 to 8 cents per pound of product as compared to canning or freezing.

- Claffey, J. B., et al., Estimated Cost and Equipment for Commercial Production of Potato Flakelets, ARS 73-26, Agricultural Research Service, USDA, October 1961.

A process for using drum-dried mashed potatoes to make flakelets yields a product equal in quality to that obtainable from flakes. Flakelets are better adapted than flakes for institutional and military use due to greater density, which allows savings in packaging. The process is described and estimates developed comparing production costs for flakes and flakelets.

- "Cost Analysis of Foam-Spray Drying of Whole Milk," Transactions of the American Society of Agricultural Engineers, Vol. 9, Nov. 6, 1966, pp. 771-773.

Reports a study to determine cost of making whole milk powder, using the most modern techniques, which allows production of a top quality beverage grade milk at the lowest possible cost as compared to fresh milk. Costs and calculated selling price for foam-spray dried whole milk are presented.

- Greig, W. Smith, Locational Effects of New Technologies in Fruit and Vegetable Processing, Research Report 35, Michigan State University Agricultural Experiment Station, East Lansing, Michigan, 1965.

Acceptance of new distribution-cost-reducing technologies could have drastic effects on location of the fruit and vegetable processing industry. Effects of the adoption of dehydration were analyzed for tart cherries, apples, peas, corn, lima beans, spinach, snap beans, beets, and partially for tomatoes. The analyses were based on transportation costs. Specific commodities for which Oregon would be expected to increase or decrease production if dehydration were adopted are indicated.

- Potter, N., et al., "The AMF Microflake Food Dehydration Process," Activities Report, Vol. 16, Fall 1964, Research and Development Associates, Inc., pp. 194-200.

Because of mild time-temperature exposure, microflake food dehydration is a nondestructive process suitable for a wide variety of non-particulate food materials. It is more expensive than drum or spray drying but less costly than foam-mat or vacuum-belt drying.

- Turkot, V. A., Explosion-Puffed Dehydrated Carrots. Part III. Estimated Cost of Commercial Production Using Shortened Cycle, ARS 73-49, Agricultural Research Service, USDA, August 1965.

Cost calculations show that cost to make explosion-puffed carrot dice exceeds that for conventional air-dried dice by 10 to 15 percent. In view of the superior properties of the explosion-puffed product and the production costs, the authors conclude that manufacture of this product on a commercial scale offers an attractive potential.

- Turkot, V. A., et al., Explosion-Puffed Dehydrated Potatoes.

Part III. Estimated Cost of Commercial Production Using Shortened Cycle, ARS 73-55, Agricultural Research Service, USDA, April 1967.

A method for preparing quick-cooking dehydrated potato pieces employing superheated steam in the explosion-puffing process is described and costs are estimated. It is estimated that quick-cooking dice could be made for about 3 cents per pound more than the price of conventionally hot-air-dried dice of the same size.

- Van Arsdel, W. B., and M. J. Copley, Food Dehydration: Volume II - Products and Technology, Avi Publishing Company, Westport, Connecticut, 1964.

The best drying method for a given product is the least expensive one that will provide the needed quality and characteristics in the product. Chapter 11 contains cost data and references to cost-studies for various dehydration processes.