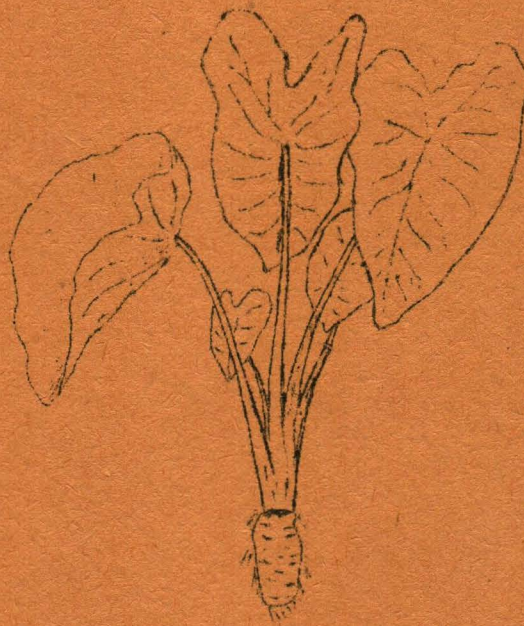


A Preliminary Study

MAINLAND MARKET
FOR TARO PRODUCTS



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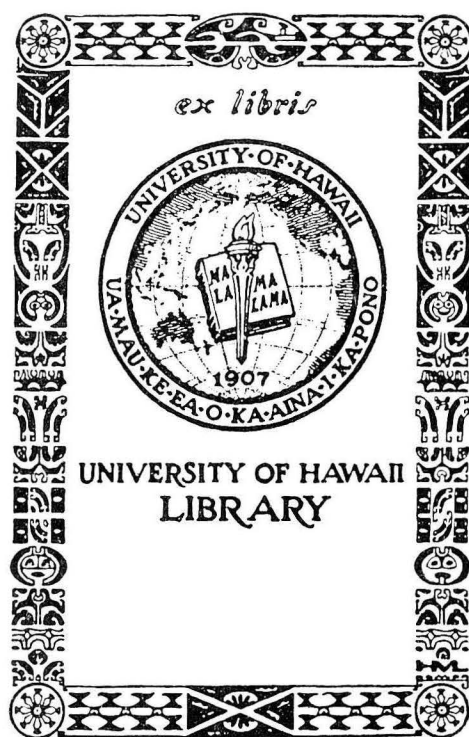


TABLE OF CONTENTS

	Page
Summary	1
Introduction	1
Export History	2
Taro Products for Specialty Food Stores	3
Taro Products as Baby or Cereal Foods	4
Taro Products as Dietary Foods	5
Poi for Allergies	6
Poi for Gastro-Intestinal Disorders	6
Poi in Low-Sodium Diets	7
Problems of Marketing Poi on the Mainland	7
Promotional and Educational Problems	7
Precautions in Selling Poi as a Dietary Food	8
Containers and Storage Life	9
Type of Product	10
Marketing Channels	10
Supply	11
Production in Hawaii	11
Price and Acreage	13
Poi Milling Capacity	13
Bibliography	15

This study was conducted with funds allotted to project 7x by the Industrial Research Advisory Council, authorized by the Territorial Legislature Act 122, 1949, and Act 217, 1951, and with Research and Marketing funds allotted to Hawaii Agricultural Experiment Station project 355 under the Research and Marketing Act of 1946.

SUMMARY

At present, the largest mainland demand for poi is from former residents of Hawaii and tourists who have been to Hawaii. This volume could be increased to some extent by improving and standardizing the quality of the delivered product.

Canned, ready-to-serve poi as a baby food has limited possibilities. It would add variety to the carbohydrate foods now being packed by the baby-food industry but, on the whole, would have severe competition. The market is already supplied by a large number of established products; prices and profit margins in the baby-food industry are low, and no significant expansion in sales volume is expected for this decade.

The best opportunity for expanding the market for taro products is in the field of dietary foods. If the total of hypertension, allergy, and gastrointestinal uses could be developed together, they would provide a substantial sales volume for poi or taro flour in any of the large metropolitan areas.

Several conditions must be fulfilled before the dietary market can be developed:

- (1) There must be a series of clinical tests in mainland clinics to provide the medical profession with authentic information on the value of poi in various diets.
- (2) Processing, packaging, and storage difficulties must be solved so that a standard quality in easily usable form will reach mainland users.
- (3) The labels and descriptive material that accompany the product must be improved and also must conform to regulations of the Federal Food and Drug Administration. Clearance with the American Medical Association would accelerate acceptance by the medical profession.
- (4) The supply situation requires careful organization, not only in the production phase in the Territory but in making the product available in mainland markets at all times. In recent years, the frequent maritime freight interruptions have discouraged mainland stores who have attempted to handle taro products. Physicians are reluctant to start patients on a diet unless they are sure it can be continued.

INTRODUCTION

Poi is a product of the taro root. Taro (*Colocasia esculenta*) has long been a staple in the diet of Polynesians. The taro tuber is usually cooked and ground into a viscous paste (poi) that ferments with the addition of water. High heat or freezing will halt the fermentation process. The consistency and viscosity of poi depend on the amount of liquid that is added. It is most frequently eaten as "ready-mixed" poi containing about 18 percent solids; the balance is usually water. Poi can be dehydrated and converted to flour which is referred to in this report as taro flour, although it has been marketed under many commercial names. Also, poi can be frozen solid and later reconverted by placing it in hot water.

A recent survey of Hawaii's physicians and dietitians in hospitals and allied institutions indicated that poi is recommended and used by them for many therapeutic and dietary purposes (5).¹ Local physicians almost unanimously recommend poi for children and healthy infants. Poi is also recommended by physicians for infants exhibiting allergies to cereals and for malnutrition. Infants and adults with certain digestive disturbances and convalescents requiring an easily digestible food are frequently given poi. Poi is especially recommended because of its high calcium-

¹Numbers in parentheses refer to bibliographical references found on page 15.

phosphorus content and the beneficial effect of these minerals on teeth and bone formation. The dietary usage of poi by physicians and dietitians in Hawaii has developed over the years from observing the responses of selected patients to poi and from laboratory studies, rather than from exhaustive clinical tests. Nutritional studies have established the fact that poi is a good, healthful carbohydrate food and is superior to the grains and potatoes in vitamin and mineral content.

Because of its known nutritional values and dietary usage made of poi in Hawaii, a reconnaissance survey of the possible mainland market for the product was conducted in January and February of 1952. The investigation followed up the leads uncovered in the Territorial physicians' survey and in the scanty literature on the subject. The discussion and conclusions on the market potential for poi are limited, by necessity, to broad observations and opinions of mainland doctors, "health food" distributors, nutritionists, and other interested individuals.

EXPORT HISTORY

Taro flour was promoted and marketed on the Mainland as a baby and allergy food prior to World War II. Frozen and chilled poi has been shipped to the Mainland for more than 20 years. Canned, ready-mixed poi (18 percent solids) has been exported to the states only since World War II. Standard poi (30 percent solids) cannot be canned satisfactorily at present.

Early records show that taro flour was manufactured in Hawaii as early as 1874, and that King Kalakaua signed a legislative bill in 1886 authorizing the payment of a subsidy for the manufacture and export of taro flour (16). The flour was marketed under the trade names of Taroena and Taro Mano.

In the mid-1930's, Hawaiian Taro Products, Ltd., was formed. It manufactured for export a taro flour and also such products as Taro-Lactin, a taro flour with milk solids added for infant feeding, and Taroco, a taro powder to which other ingredients were added to make it palatable in liquid form. This firm spent considerable time and money promoting its products on the local and mainland markets as "health" foods, for infant feeding, and for making bread and pastries (10). The f.o.b. Honolulu prices for taro flour were \$6.30 per 5-pound tin and 16 cents per pound in 100-pound bags.² The

Hawaiian Taro Products could not make its operations pay and sold its equipment to another firm that occasionally manufactures Taro-Lactin and Taroco on a limited scale for the local market.

In 1939, the Galen Company of Berkeley, California (not now in business under this original name) imported Hawaiian taro flour and marketed it as Poy-o-Meal for allergy purposes, and Poy-o-Lin, a taro flour base with solids added, as an infant food. It also made a product called Poy-o-Malt which was sold to dairies. The company contracted for about 100,000 pounds of flour a month. The Galen Company spent 3 years in developing these products and about \$25,000 in promoting them chiefly among the physicians throughout the United States. (A market for the products was also developed in Venezuela.) Poy-o-Lin retailed for \$1.00 a pound in 1939-40 and Poy-o-Meal for \$1.25 per 1½ pounds. At that time Hawaiian growers were receiving \$1.00 to \$1.50 per hundredweight for taro. World War II cut off the taro flour supplies, and the business was not revived after the war.

The Galen Company sold all the poi products it manufactured. Poy-o-Lin sold better at first, but Poy-o-Meal outlasted it in preference. Even today inquiries for Poy-o-Meal are being received by the successor company

²Information from Hawaiian Taro Products, Ltd., given to the Lowe Corporation, Chicago, Illinois, April 8, 1938.

from medical men throughout the country.³ The promotional efforts of these companies have left their imprints on the mainland markets. A number of doctors interviewed on the Mainland had used the taro flour prior to World War II, principally in allergy work, and still enthusiastically endorse it.⁴

In 1951, exports of fresh poi from Hawaii to the Mainland amounted to 16,000 pounds and of canned, ready-mixed poi, 9,000 pounds. Little, if any, taro flour is being exported at present. Some taro is shipped to the Mainland for use as a vegetable.

TARO PRODUCTS FOR SPECIALTY FOOD STORES

Poi has little chance of becoming a staple food on the Mainland. Rice and potatoes are well-established staple foods; furthermore, most adults dislike the viscosity and flat taste of poi. On the Pacific Coast, where most of Hawaii's tourists originate, poi has an unsavory reputation that extends substantially beyond those who have actually tasted it. This unfavorable public reaction creates a formidable barrier to the sale of poi as a staple, whether fresh, sour, or artificially flavored.

At present there is a specialty market for fresh, standard poi,⁵ mostly frozen, in a few fish and meat markets and restaurants in California's coastal cities where the Portuguese, Hawaiians, and other migrants from Hawaii have settled. The migrants still like their poi to the extent of paying 49 to 50 cents a pound for the frozen poi that, when thawed and reconverted, bears little resemblance to the fresh product in taste or appearance.

Most of the fresh poi is shipped in the 2- and 4-pound plioilm bags in which it is marketed locally. Some of the poi is merely chilled in transit while some shippers have it frozen en route. The chilled poi continues to ferment slowly so that it is more sour on arrival than poi that is frozen. A shrinkage of about 12 percent in weight occurs during the 6-day trip from Honolulu to the Pacific Coast. Poi shippers have found that they must pack more poi in the

bags if the 2- and 4-pound net weights, as stated on the label, are to be maintained on arrival. Many of the Hawaii people on the Mainland would prefer to buy the canned, ready-mixed form in place of the frozen poi, which requires considerable time and labor to reconvert to a usable form. Some poi eaters object to the frozen poi because it is impossible to tell the degree of sourness when they buy it. Sales could be stimulated if shippers indicated the age of poi on the label at the time of freezing.

Some canned, ready-mixed poi is sold along the Pacific Coast in fancy food stores and delicatessens for cocktail, snack, hors d'oeuvre, and luau purposes. These markets are the principal sources of supply for tourists and others who have been to the Islands and who wish to serve Hawaiian foods on special occasions (see table 1 for number of delicatessens on the Pacific Coast). Fancy food stores provide a limited market for canned, ready-mixed poi, but of the 2,000 meat markets and 300 fish markets on the Pacific Coast, not more than a dozen stores now carry the product. Not all of these stores would have customers for fresh or frozen poi, but with a little promotional work, canned, ready-mixed poi in small containers could be sold to this trade.

Several inquiries were received from fancy-food distributors during the survey for taro chips as a cocktail item and canned taro as a fancy food delicacy. These are not being processed in the Islands at present but were packed on a limited scale prior to World War II. The "taro investigations," conducted by the Hawaii Agricultural Experiment Station from 1936 through 1941, explored the methods of processing these and many bakery products from taro (8).

³Information from W. Worswick, formerly sales manager of the Galen Company, Berkeley, California, February 26, 1952.

⁴Information from Dr. J. M. Frawley, Fresno, California, April 24, 1952, and from Dr. Jerome Glaser, Rochester, New York, May 3, 1952.

⁵Standard poi, by Territorial law, must contain at least 30 percent solids.

Table 1. Type, number, and value of sales of retail food stores
in selected Pacific Coast metropolitan markets, 1950.

Metropolitan area	Grocery stores without fresh meat market	Grocery stores with fresh meat market	Meat markets	Fish markets	Delicatessens	Other food stores
Los Angeles						
Number of stores	1,335	4,280	587	75	171	2,003
Value of sales (\$1,000)	84,910	827,684	49,380	2,258	7,741	122,733
San Diego						
Number of stores	197	605	58	8	12	205
Value of sales (\$1,000)	13,566	95,479	3,954	224	323	8,470
San Francisco						
Number of stores	2,270	1,518	623	69	195	1,125
Value of sales (\$1,000)	149,774	306,926	50,985	4,533	11,331	66,026
San Jose						
Number of stores	165	255	31	8	10	111
Value of sales (\$1,000)	9,296	46,402	3,162	594	450	5,997
Portland						
Number of stores	372	877	112	20	8	306
Value of sales (\$1,000)	16,648	125,021	11,002	1,356	370	17,917
Seattle						
Number of stores	832	511	157	27	48	333
Value of sales (\$1,000)	34,033	101,988	13,365	1,074	1,677	15,468
Pacific Coast States ¹						
Number of stores	8,928	16,157	2,309	306	491	5,809
Value of sales (\$1,000)	471,720	2,511,796	186,892	13,696	23,297	306,982

¹Oregon, Washington, and California.

Source: 1948 United States Census of Business, Vol. III, Retail Trade Area Statistics, United States Department of Commerce, Bureau of the Census.

TARO PRODUCTS AS BABY OR CEREAL FOODS

The 1950 United States output of canned baby food (both chopped and strained) was 123 million dozen cans as compared with 22 million dozens in 1940 and less than 4 million dozens in 1934 (19). Originally, baby foods were sold through drug stores, with emphasis on their medical value; by 1929 they were being distributed in large volumes through food stores (13). The pack of baby foods since 1948 appears to have leveled off at about the 1950 level. The retail sales volume of the industry was

about \$170 million in 1949, and the average retail price was 9.7 cents per 4 3/4-ounce jar or can. The profit margin of baby-food manufacturers in 1949 was down to about 1/2 cent per jar or can (6).

Fruits, meats, and vegetables ranked in that order of importance as baby foods in 1950, followed by custards and other desserts. Strained baby foods amounted to 78 percent of the pack, with chopped or junior foods accounting for the other 22 percent (22).

Competition among manufacturers and a decreasing baby population are believed to be the factors accounting for the sluggishness of the present baby-food market. On the other hand, it is estimated that less than 40 percent of the potential baby market is using canned baby foods. The number of babies 2 years and under reached a peak of 7.4 million in 1948. It has been forecast that the baby population will decrease gradually for a number of years to come. Production of baby foods, however, is not expected to decline with the decreasing baby population (19).

Few of the baby-food processors are interested in adding new products to their lines at present. They are more interested in devising new uses for the products they now package. Many processors feel that the present baby-food prices are too low and the

profit margins too narrow for them to undertake the costly promotional process of developing and introducing an unknown food such as poi. An anticipated development in the industry is that baby-food canners will branch out into the special dietary field to obtain a wider use of their products by ill and elderly persons (19). Should they expand into this field, baby-food canners are more likely to become interested in poi as a dietary food rather than in adding it to their present list of baby foods. Most of the baby-food manufacturers are interested enough, however, to want samples of poi for experimental purposes.

The same competition would prevail for poi if it were to be marketed in dry or flaked form as a breakfast or baby cereal. Prepared cereals had an f.o.b. plant value of more than two hundred million dollars in 1947 (table 2).

Table 2. Shipments and interplant transfers of breakfast food cereals in the United States, 1947.

Kind	Quantity	Value f.o.b. plant
	1,000 pounds	1,000 dollars
Ready to serve	713,147	148,134
To be cooked before serving	773,054	69,693
Cereal coffee substitute	(1)	3,772
Cereal preparation, kind not specified	(1)	159
Total cereal preparation	(1)	221,758

¹Data not available.

Source: 1947 Census of Manufactures, Statistics by Industry, Vol. II, United States Department of Commerce, Bureau of the Census.

TARO PRODUCTS AS DIETARY FOODS

The use of foods for therapeutic and dietary purposes is on the increase in the United States largely because of the advanced knowledge of the nutritional values of foods and the emphasis on the importance of diets in maintaining good health. In a recent article, two prominent mainland physicians

stated that "in present day America, nutrition is the single most important environmental factor affecting health." (17) Food faddists are rapidly spreading the "health" food gospel, although nutritionists, physicians, and dietitians frequently rebuke them for their occasional distortions

of fact and intrusions into professional practice. Nevertheless, the food faddists have made Americans 'health' food conscious.

Even though foods and diets are receiving greater attention, a recent analysis of the number and kinds of treatments given new patients in medical clinics in the United States shows that only 7.3 percent are given a dietary treatment while 57.4 percent of the new patients are treated with drugs. The dietary treatments are principally for digestive disorders (27.9 percent) and cardiovascular ailments (13.4 percent) (12).

The increasing importance of the dietetic uses of food is evidenced by the growth of the dietetic canned food business. In 1949, the National Canners Association surveyed the field and found 17 packers processing 33 products. In 1951, a repeat survey registered 85 canners and 53 products (3).

Poi for Allergies

Many diseases and disorders formerly attributed to other causes are now traceable to allergies, and the study of the causes and cures of food allergies is one of the rapidly developing phases of medical research. Poi and taro flour have been used from time to time in treating allergies, principally as a cereal substitute, and, if clinical tests of poi are favorable, there may be a large potential market for poi. The actual size of this market cannot be determined from the many different medical estimates and opinions on the incidence of allergies.

A handicap to the development of this market is the strong objection most adults have to the taste of ready-mixed poi and the inconvenience of preparation. A few mainland physicians have attempted to place adults on a poi diet by masking the objectionable taste with flavoring. Physicians who know about the nutritional and allergenic value of taro flour and poi feel that perhaps the flour is the better product for adult use. Taro flour can be made into gruel or used as the principal ingredient for specialty bakery products such as cookies, breads, and crackers. Bakery products made from

taro or poi are more acceptable and palatable than is ready-mixed poi.

The greatest mainland market for poi would result from the physicians' recommendations for its use in diets for babies with allergies. Most babies take to poi readily, and poi is not likely to cause an allergy.

Poi for Gastrointestinal Disorders

Some 15 million people in the United States suffer from ulcers at one time or another during their lifetime. More than a half million ulcer patients receive medical treatment or are hospitalized for at least 1 month during the year. Practitioners of internal medicine in Hawaii indicate that poi has great value in alleviating gastrointestinal difficulties (9).

One mainland physician reports good results with poi in a limited number of ulcer and other gastrointestinal cases.⁶ The following is a quotation from the physician's letter:

"I feel that it [poi] is a very valuable carbohydrate supplement for infant diets and I also have used it extensively for adults who have gastrointestinal dysfunction. We have found it very valuable in the treatment of peptic ulcers, during convalescence, following acute illness, in the postoperative state, and also in the aged individual who so frequently has digestive disturbances."

The physician stated that one major advantage of using poi was that it left no secondary effects such as constipation, occasionally encountered when using pharmaceutical treatments. In addition, poi has a food value that is lacking in most medical treatments. The trial feedings, however, were on too limited a scale to be considered conclusive. The digestibility of poi, its "softness" on the gastrointestinal linings, and its alkaline residual effects seem to be the properties that make poi valuable for alleviating many gastrointestinal disturbances.

⁶Information from Dr. Rachael Jenkins, Lomita, California, given to Thomas T. Tateishi Company, Honolulu, Hawaii, October 18, 1951.

The ease of digestibility gives it promise in other fields, too. Elderly people, people with no teeth, and postoperatives are prospective clients for soft foods. Being a carbohydrate food and relatively high in caloric content, poi provides an easily obtainable source of energy for convalescents and a nutritious food for those who might be suffering from malnutrition. Also, the ready utilization of the calcium and phosphorus in poi is of importance to the nutritional and physical well-being of elderly people as well as of youngsters. The number of aged in the population of the United States is steadily increasing. Today, some 12 million people are 65 years old or older, and by 1980 the number is expected to rise to 24 million (11).

Poi in Low-Sodium Diets

Another possible but unexplored use of poi in diet therapy is in the field of feeding hypertension patients. A diet low in salt, fluid, and protein but relatively high in carbohydrates is prescribed for persons suffering from a chronic heart disease with edema. The rice diet, low in sodium, is

perhaps the most widely used hypertension diet, but it has been observed that the rice diet is generally unpopular among patients (especially ambulatory patients), and many medical researchers believe that a more palatable substitute diet is needed. Future investigations are planned to test diets that are more palatable and that would provide a higher carbohydrate content than does the rice diet (14).

Poi has a low-sodium content. Chemical analyses show a sodium range of from .0020 to .0076 percent in air-dried, cooked taro (16). This sodium content is low enough for taro and poi to be used in low-sodium diets. Patients already on a salt-free or "severely restricted" diet are generally accustomed to eating bland foods so poi should be acceptable to most adults on this type of diet. The greatest drawback to those persons on a "moderately restricted" salt diet would be its lack of palatability.

A prominent mainland nutritionist reports that the potential market for low-sodium foods is thought to be about as large as the present baby-food market of some 123 million dozen cans annually (2).

PROBLEMS OF MARKETING POI ON THE MAINLAND

Promotional and Educational Problems

If the mainland market for poi as a dietary food is to be developed and firmly established, considerable promotional effort will have to be expended to accomplish the task.

It is difficult at best to acquire new consumers when selling an unknown product. Food habits change slowly, and usually there must be a strong motive for a person to change his eating habits or to buy an unknown food. The two principal motives for changing dietary habits are fashion and health (18). The "health" aspects are important when selling poi as a special dietary food, while the "fashion" aspects are more important for selling poi through fancy food stores and delicatessens.

Some basic work was done more than a decade ago with taro flour products among the medical profession, but the effects of the initial promotional efforts have been largely dissipated. The least expensive and most effective means of establishing a dietary market would be clinical research work conducted by reputable medical men. Most new dietary products are introduced to the medical profession and then to the public in this manner. The clinical work should be done on the Mainland to establish the special dietary usefulness of poi under mainland conditions. If the results were favorable, as anticipated, their dissemination through medical journals would be highly effective in introducing the product nationally. Physicians must be sold on a new product before the consumer market can be developed. A little support from the doctors, and the market for poi could be expanded.

The market for poi as a dietary food will develop at a slow pace until the manufacturers or distributors provide instructions and information on the preparation and use of the product on labels or in leaflet forms. The lack of this basic information is one of the major complaints of mainland distributors. Dealers complain that the labels, as used by local canners and distributors, are practically useless from the standpoint of informing the consumer as to what the product is, how it can be prepared and used, and how it should be stored. As an example of the need for informing the trade and public about poi, many complaints are received by mainland dealers that the poi is spoiling. Canned poi is usually slightly acid with a tangy taste, and many persons first tasting it assume that the product is spoiling. Distributors, retailers, and consumers need to be informed about this characteristic of poi.

One of the basic problems in the marketing of poi is that consumers (over a year old) dislike the taste of the product. In a recently conducted consumer survey it was found that "habit" and "like the taste" accounted for nearly 60 percent of the reasons for the choice of foods. "Dislike the taste" was foremost (23 percent) among the reasons of the "don't eat"-ers for not eating certain cereals. Significantly, less than 10 percent of the reasons given by consumers for eating certain cereals were attributed to food values (4). This may be true for basic or staple foods, but food values play a more important part in selling special dietary foods. Nevertheless, physicians generally agree that, unless the food is palatable, patients cannot be retained on a strict diet. Patients either break the diet or are constantly requesting the doctors for substitute foods. In extreme cases, if there is hope for relief, patients will endure almost any unpleasantness.

Artificial flavoring of poi to overcome the taste objections of children and adults has been frequently advocated. The purpose of flavoring would be to increase the acceptance of poi by giving the bland product a pleasant flavor. This might prove a diffi-

cult problem, and some physicians, particularly allergists, are opposed to adding any flavoring ingredients for the simple reason that the patient might be allergic to the ingredients added. If ingredients need to be added, the allergists themselves prefer to prescribe the kinds and quantities to be mixed with the poi.

Precautions in Preparing and Selling Poi as a Dietary Food

Although there are many opportunities for marketing poi for various dietary uses, there are many responsibilities and possible liabilities involved in preparing and distributing the product for this market. The processor would have to be extremely careful in the sanitary preparation of the product, in maintaining strict controls over quality, and in abiding by all the regulations pertaining to the production and labeling of foods for special dietary uses. If poi is to be advocated for special dietary uses, the claims and statements on the label or accompanying literature should be approved in advance by the Federal Food and Drug Administration.

The Federal Food, Drug, and Cosmetic Act prescribes certain regulations for the manufacture, labeling, and advertising of the items listed in the title of the Act (21) and shipped in interstate commerce. Strict definitions of a food and regulations for its labeling are provided in the Act. The definition of a food for special dietary uses is as follows:

Regulation. 1.11 (a) The term "special dietary uses," as applied to food for man, means particular (as distinguished from general) uses of food, as follows:

- (1) *Uses for supplying particular dietary needs which exist by reason of a physical, physiological, pathological, or other condition, including but not limited to the conditions of disease, convalescence, pregnancy, lactation, allergic hypersensitivity to food, under weight, and overweight;*

(2) *Uses for supplying particular dietary needs which exist by reason of age, including but not limited to the ages of infancy and childhood;*

(3) *Uses for supplementing or fortifying the ordinary or usual diet with any vitamin, mineral, or other dietary property. Any such particular use of a food is a special dietary use, regardless of whether such food also purports to be or is represented for general use.*

If a food purports to be or is represented for any special dietary use by man, its label must bear a statement of the dietary properties upon which such use is based. Also, if a food is represented or purports to be a treatment for a disease resulting from a dietary deficiency in man, its label must contain adequate directions for such use. In addition, if a food is represented or purported to have special dietary use for man by reason of its vitamin content, mineral properties, hypoallergenic properties, or is recommended for infants, or in the control of body weight, or in dietary management with respect to disease, the label must bear certain specific information on each claim made. In brief, these are the principal precautions a manufacturer must observe if he intends to comply with the Federal Food, Drug, and Cosmetic Act (20).

As yet the Act has not been extended to cover the label requirements for low-sodium foods inasmuch as this field is in the exploratory state of development. Neither does the Act prescribe the percentage of solids that special dietary foods must contain. This is left to the individual manufacturer to determine on the basis of his estimation of consumer preferences. The Act does apply, however, if the solids content, on analysis, is below that stated on the label.

The Federal Trade Commission is responsible for the policing of advertising claims in the food and drug field. The Federal Food and Drug Administration, however, has jurisdiction over pamphlets, leaflets, or other

types of advertising literature that make claims for a certain product and accompany it in the distribution process. This type of advertising is considered to be a part of the label.

The American Medical Association, through its Council of Foods and Nutrition, is also interested in the advertising claims of food manufacturers and distributors. It is concerned only with the labeling and advertising of special dietary foods of manufacturers who apply for the Council's seal of acceptance. The seal is generally imprinted on the label. To obtain the privilege of using the seal, the manufacturer or distributor must meet and abide by certain basic rules the Council has established. The seal has a tangible goodwill and advertising value, and many manufacturers allow the Council to rule on their advertising claims and program for the privilege of using it (23).

Containers and Storage Life

Canned, ready-mixed poi is sold on the Mainland in various types and sizes of containers. Two canners pack 13 ounces of poi (net weight) in a glass jar having a screw lid. Another packer puts up a 16-ounce glass jar of poi and also a 9-ounce tin. Another canner packs poi in a 1-pound 12-ounce can. Frozen fresh poi is sold in pliofilm bags (some in cotton bags) containing 2 or 4 pounds.

Consumer preference for glass containers is increasing rapidly; more and more baby foods are being packed in glass. Tin reportedly imparts an unsavory taste to the poi. The relative merits of the two types of containers for poi should be thoroughly tested. Vacuum-type lids are preferred to the screw-type on glass containers to permit easier opening.

To meet the needs of the infant trade and delicatessen markets, a 4 1/2- to 5-ounce container is needed in addition to the larger sizes. The larger sizes are satisfactory when a considerable amount of poi is to be consumed in a short period of time, such as at a *luau*, or if a person eats poi frequently.

Another sales drawback is that little is known about the storage characteristics of canned poi. It should retain its quality and composition for a year or more. Baby food manufacturers require that their products have at least a 1-year shelf life, preferably 2 years.

It was learned during the mainland survey, and later substantiated by local distributors, that canned, ready-mixed poi (18 percent solids) is too thick for convenient consumer use. The poi becomes caked within a couple of months after being canned, especially in the colder mainland climates, making it difficult to use and destroying its convenience of serving. Processors claim that 16 percent solids poi would be easier to can and would hold its consistency much longer than the 18 percent poi.

Type of Product

Most physicians familiar with the special dietary value of taro and poi are more familiar with taro flour than with the canned, ready-mixed poi. The taro flour was marketed in the States prior to World War II under various trade names whereas canned, ready-mixed poi has never been promoted on the mainland markets.

Taro flour has many advantages over canned, ready-mixed poi: (a) It is easily stored and retains its qualities in storage for a longer time; (b) it is less costly to transport and store; (c) much of the objectionable taste of poi is destroyed when taro is dehydrated and ground into flour; and (d) its alternate uses are greater (it can be made into cookies and other bakery products or diluted to a baby bottle mixture).

On the other hand, canned, ready-mixed poi has several advantages over taro flour: (a) Ready-mixed poi can be served without further preparation (when not chilled and caked) and can also be diluted for baby use. This is its greatest selling point since consumers are willing to pay extra for convenience of serving. (b) The retail package is small, and the cost per unit is relatively low--35 to 45 cents retail for a 13-ounce jar on the Pacific Coast as compared

with \$1.27 or more per pound wholesale for taro flour f.o.b. Honolulu.⁷ A 13-ounce jar of ready-mixed poi contains an equivalent of about 2 1/2 ounces of taro flour; the balance is water. A pound of dry material in ready-mixed poi costs consumers from \$2.50 to \$3.00. Consumers, however, are willing to pay more for a pound of dry material in ready-mixed poi than for a pound of taro flour because the ready-mixed poi is sold in small units and in a more convenient form.

Marketing Channels

At present, canned poi is marketed principally through fancy-food and "health" food stores. The markup in these outlets is high--usually 50 to 75 percent of cost--and the turnover is slow. Many physicians and related technicians were found to be antagonistic toward "health" food stores because of their alleged encroachment on certain functions of the medical profession. This animosity tends to make "health" food stores a questionable channel of distribution, particularly if reliance is placed upon the medical profession to endorse and promote the sale of poi. At present, however, these stores are the logical outlets for the small volume of poi sold on the Mainland. Regardless of their reputation among the medical profession, "health" food stores are increasing in number and in caliber of service.

Drug stores also handle certain special dietary foods. For example, the Borden Company markets a number of milk substitutes--Mull-Soy, a substitute for cow's milk, and Bremil, a substitute for human milk--through drug stores only. In 1951, drug stores sold 23 percent of all infant cereals and 80 percent of all milk modifiers and formulas sold at retail to civilians (15). Drug stores are much more convenient outlets for consumers than either "health" food stores or delicatessens, but they prefer to handle merchandise having a rapid turnover.

More and more supermarkets are adding special dietary food sections. These out-

⁷Information from Pacific Farms, Honolulu, Hawaii, given to Organon Inc., Orange, New Jersey, January 23, 1951.

lets would be the logical marketing channels for Hawaiian poi if it were better known and adequate supplies were available. Supermarkets are convenient shopping centers and account for much of the volume of the grocery trade. Supermarket markups are generally lower than those of specialty stores, hence the price to consumer might be lower than at present.

Selling prices of the canned, ready-mixed poi varied from store to store and city to city. The 13-ounce jars retailed from 35 to 45 cents each, whereas the 9-ounce can sold for as much as 60 cents each. The 1-pound 12-ounce can retailed for about 95 cents. Mainland distributors generally buy the poi outright at f.o.b. Honolulu prices.

Supply

The greatest problem in selling poi on the Mainland, even through the few "health"

food outlets, is inadequate supplies. Many stores have calls for the product but cannot obtain it even when supplies for export are available in Hawaii. This was found to be particularly true in Los Angeles, where only a small, scattered supply of poi was found in retail stores during the survey. The situation is most distressing when the supply is suddenly cut off from an active market. This usually happens during a shipping strike or when taro supplies are short in the Islands. When taro supplies are short, Hawaii distributors give preference to the local market. Mainland physicians who know of the dietary value of poi turn to it as a last resort when no other food seems to be satisfactory.⁸ One of the principal reasons is that the supply is so undependable that doctors try all other possibilities first. The mainland market cannot be developed and expanded unless a continuous and sufficient supply is guaranteed to mainland distributors.

PRODUCTION IN HAWAII

With approximately 75 percent of the Territory's population on Oahu, most of the poi produced in the Islands is consumed in or around Honolulu. The quantity of poi milled from taro and consumed on Oahu from 1943 through 1951 is shown in table 3. In 1951, roughly 5 million pounds of poi were used on Oahu by a population of slightly more than 300,000. Consumption was about 16 pounds per capita. In 1932, slightly more than 6 million pounds of poi were consumed on Oahu (1). The population then was 207,800, hence consumption in that year was about 29 pounds per person. People of Hawaiian ancestry eat considerably more poi per person than do Caucasians or Orientals. For example, in 1936 it was estimated that 70 percent of the poi was consumed by Hawaiians (8).

Increasing population on the island of Oahu has caused a shift of good taro land to higher economic uses. Soil diseases, insects, and water problems impair the productivity of the remaining taro land. More and more of Oahu's taro and poi supplies are furnished by the neighbor islands (table 3). About half of the taro receipts from

the outer islands come from Kauai, about 30 percent from Hawaii, and the remainder from Maui and Molokai. In addition, large quantities of fresh poi are shipped from the outer islands to Oahu.

Taro production in the Islands since 1943 is shown in table 4. Acreage and production have gradually decreased in the Territory during the past 8 years. While acreage and production have dropped off materially on Oahu, acreage on Maui has increased and is substantially above the 1944-1945 level on Kauai.

All the taro produced in the Territory, except that in the Kona district, is produced under wetland culture. Wetland production requires the planting, growing, and harvesting of taro on land that is covered by water. Taro growers are finding it more and more difficult to obtain labor to work in the muddy taro patches. The Kona output of dryland taro accounts for only 5 percent of the Territory's production, but there are large acreages of idle land on the

⁸Information from Richard A. Klein, Chicago, Illinois, May 3, 1952.

Table 3. Oahu supplies of taro and poi, 1943-51.¹

Year	Taro			Poi		
	Production ²	Unloads	Total supply	Milled on Oahu ³	Unloads ⁴	Total market supply
	1,000 pounds			1,000 pounds		
1943	10,031	1,173	11,204	6,722.4	(5)	6,722.4 ⁶
1944	9,002	841	9,844	5,906.4	(5)	5,906.4 ⁶
1945	9,315	1,759	11,074	6,644.4	170.2	6,814.6
1946	6,135	1,594	7,729	4,637.4	(5)	4,637.4 ⁶
1947	5,800	2,402	8,202	4,921.2	(5)	4,921.2 ⁶
1948	6,400	3,167	9,567	5,740.2	279.7	6,019.9
1949	6,600	3,065	9,665	5,799.0	152.7	5,951.7
1950	5,290	2,866	8,156	4,893.6	152.8	5,046.4
1951	5,300	3,013	8,313	4,987.8	328.8	5,316.6

¹Unload data for 1943-45 include only steamer unloads; data for years 1946 through 1951 include steamer and plane unloads.

²Estimates based on millings except for 1943.

³Millings from total taro supply, assuming a 60 percent recovery of poi.

⁴Does not include poi in jars and cans for retail sales.

⁵Data not available.

⁶Data incomplete.

Source: Market Statistics (annual); Statistics of Diversified Agriculture in Hawaii (annual); Hawaii Univ. Agr. Ext. Serv.

Table 4. Taro production and acreage, Territory of Hawaii, by islands, 1943-51.¹

Year	Oahu		Hawaii		Maui		Kauai and Niihau		Molokai and Lanai		Territory	
	1,000 pounds	acres	1,000 pounds	acres	1,000 pounds	acres	1,000 pounds	acres	1,000 pounds	acres	1,000 pounds	acres
1943 ²	-	-	-	-	-	-	-	-	-	-	17,136	1,042
1944	9,002	488	4,025	235	995	74	1,350	88	63	25	15,435	910
1945 ³	9,315	446	3,615	223	1,080	60	1,975	94	165	34	16,150	857
1946	6,135	433	2,190	192	975	52	2,085	105	95	20	11,480	800
1947 ³	5,800	418	2,490	223	1,305	65	2,775	205	245	19	12,615	930
1948	6,400	462	2,650	238	1,575	82	3,340	210	230	23	14,195	1,015
1949	6,600	462	2,500	190	1,270	85	3,200	175	330	32	13,900	944
1950	5,290	426	2,500	158	1,400	91	2,250	169	300	30	11,740	874
1951	5,300	411	2,150	153	1,350	95	2,530	162	500	50	11,830	871

¹Acreage is average acreage during given year.

²Data not available by islands.

³Island acreages are estimates.

Source: Statistics of Diversified Agriculture in Hawaii (annual), Hawaii Univ. Agr. Ext. Serv.

island of Hawaii that might be suitable for mechanized production of dryland taro. However, field tests, extending over at least a 5-year period, need to be undertaken to determine the economic feasibility of such plantings.

Price and Acreages

Accompanying the decreasing demand and supply has been a rise in the price of poi due to rising costs in processing, packaging, and growing. The higher prices further retard demand for poi as consumers gradually shift to the less expensive rice and potatoes. The Honolulu retail price of standard poi rose from less than 10 cents a pound prior to World War II to 22 cents a pound in November 1951. Rice, on the other hand, was retailing for 10 and 11 cents a pound in November of 1951, and potato prices averaged 6 to 8 cents a pound.⁹ This difference in prices among these basic commodities is responsible for much of the substitution of rice and potatoes for poi, even by persons of Hawaiian ancestry.

During World War II, the Office of Price Administration controlled taro and poi prices on Oahu from August 1943 to October 1946. The price for Grade A taro was set at 3.1 cents a pound, pulled, sacked, and delivered at roadside. The maximum wholesale price allowed for standard poi was 11 cents a pound; at retail the ceiling price was set at 13 cents a pound. Ready-mixed poi was to be retailed at no more than 9 cents a pound. The Office of Price Stabilization, established after the outbreak of the Korean War in 1950, set ceiling prices for taro and poi on November 20, 1951 (9). The retail ceiling price of standard poi was set at 22 cents a pound; ready-mixed poi in bulk or in packages, at 17 cents per pound; ready-mixed poi in 13-ounce jars, at 33 cents; and ready-mixed poi in 28-ounce tins, at 66 cents. Wholesale ceiling prices were set at approximately 80 percent of the retail selling price. Taro ceiling prices were to be no more than 6 cents a pound.

⁹Information from the Research and Statistics section of the Territorial Department of Labor and Industrial Relations.

Apparently, production of taro from 875 to 900 acres is adequate to supply the poi needs of the Territory's present population at the current rate of consumption. Nine hundred acres will produce roughly 12.5 million pounds of taro which in turn yield about 7.5 million pounds of standard poi.

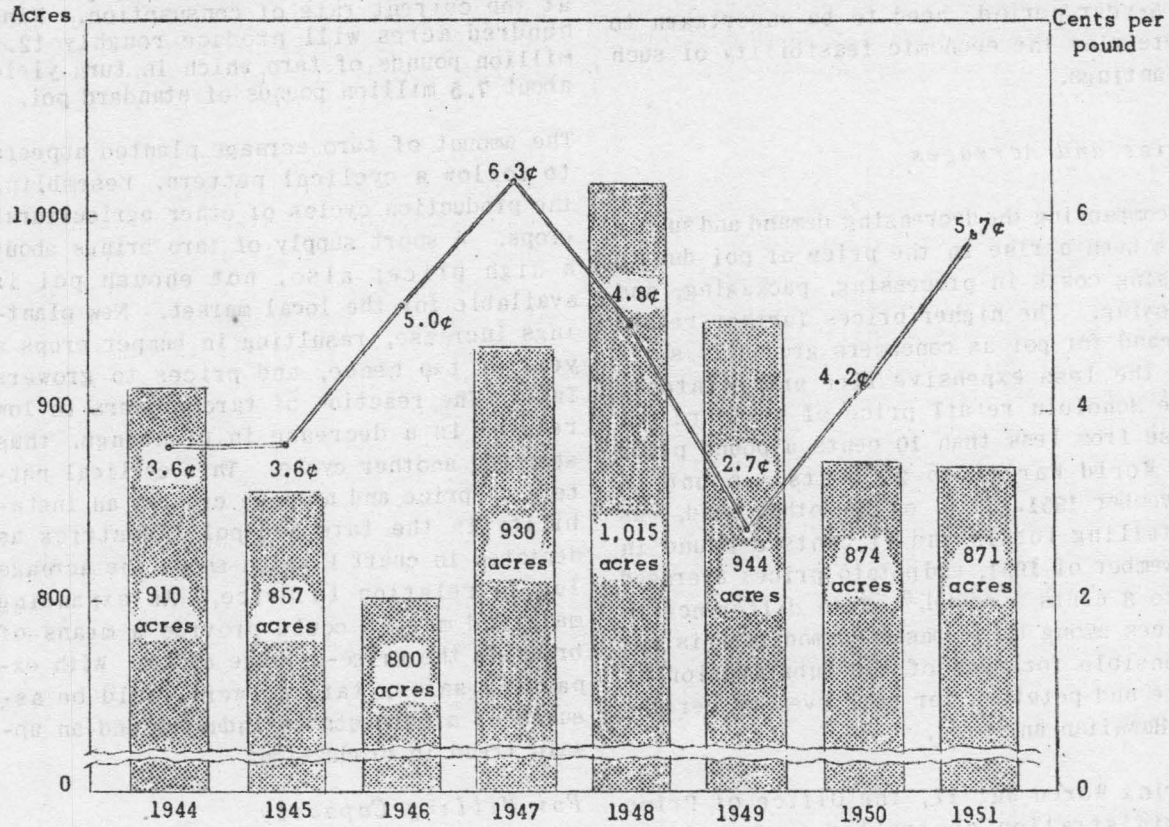
The amount of taro acreage planted appears to follow a cyclical pattern, resembling the production cycles of other agricultural crops. A short supply of taro brings about a high price; also, not enough poi is available for the local market. New plantings increase, resulting in bumper crops a year or two hence, and prices to growers fall. The reaction of taro growers to low returns is a decrease in plantings, thus starting another cycle. This cyclical pattern of price and acreage creates an instability in the taro and poi industries as depicted in chart 1, which shows the acreage lag in relation to price. An expanding mainland market could provide a means of breaking the price-acreage cycle. With expanding sales, taro growers could be assured of a more stable industry and an upward trend in production.

Poi Milling Capacity

A survey of the poi mills in the Territory in May 1951 revealed that there was adequate mill capacity for increasing poi production. Some 32 mills were in operation at that time, of which one third were on Oahu. The total weekly capacity¹⁰ of the mills was about 800,000 pounds of taro; almost half of the capacity was on Oahu. The mills were operating at less than 30 percent capacity at the time of the survey. In May 1951 taro was short and the millers indicated that they were operating about 5 percent below their normal grind. The largest poi mill has a capacity of 150 bags of taro a day and, at the time of the survey, was operating at about 70 percent capacity. Six of the largest poi mills (four are on Oahu) represent about 45 percent of the total territorial capacity. However, existing mills could more than double their poi output if a market were available and taro supplies were abundant.

¹⁰Capacity was considered to be the processing of one full cooker of taro a day. Cookers varied in capacity from 10 to 90 100-pound bags of taro.

Chart. Territorial taro acreage and annual average prices of taro, 1944-51¹



¹F.o.b. roadside price to millers. Prices are weighted for grade and seasonal volume.

Source: *Statistics of Diversified Agriculture* (annual), Hawaii Univ. Agr. Ext. Serv.

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