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AN EVALUATION OF DRIED,
CANNED AND FROZEN PEACHES
FOR INSTITUTION PIE MAKING

Thesis for the Degree of M. S.
MICHIGAN STATE COLLEGE
Dorothy Elizabeth Ann Ramsland
1947

THESIS

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This is to certify that the

thesis entitled

An Evaluation of Dried, Canned and Frozen
Peaches for Institution Pie Making.

presented by

Dorothy Elizabeth Ann Ramsland

has been accepted towards fulfillment
of the requirements for

M.S. degree in Institution Administration

Mabelle S. Ehlers
Major professor

Date Sept. 18, 1947

**AN EVALUATION OF DRIED, CANNED AND FROZEN PEACHES FOR
INSTITUTION PIE MAKING**

by

DOROTHY ELIZABETH ANN HANGLAND

A THESIS

**Submitted to the School of Graduate Studies of Michigan
State College of Agriculture and Applied Science
in partial fulfillment of the requirements
for the degree of**

MASTER OF SCIENCE

Department of Institution Administration

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ACKNOWLEDGMENT

The writer wishes to express her appreciation and thanks to all who assisted in making this study possible: particularly to Professor Mabelle S. Ehlers, under whose supervision the work was directed; to Dean Marie Dye who rendered valuable assistance by her suggestive criticism; to Dr. Pauline Paul who assisted in the statistical interpretation and the use of the score sheet; to Miss Katherine Hart, food supervisor of the Union Cafeteria, under whose direction the peach pies were made and to Mr. Jackson Towne of the library for his assistance in the compilation of the bibliography.

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I. INTRODUCTION

A. History of Peaches. The peach has been grown for so many centuries and over so wide an area that its origin is a trifle obscure. It has been said that the history of the peach follows the history of agriculture. Since the records of agriculture are not complete we do not know how long the peach has been cultivated. For many centuries people believed that the peach had come from Persia. Theophrastus referred to the peach as a Persian Fruit. Others called it the Persian apple. The ancient authors, Theophrastus, Columella and Pliny, agreed that the home of the peach was Persia.¹ They were the authorities in their day and their opinions have carried weight even down to the nineteenth century. The early historians believed Persia to be the home of the peach because it came from that country to the Greeks and Romans.² They assumed that because the fruit came from a region, that that was the fruit's original habitat. By examining the regions where the fruit grows wild, not just an escape from cultivation, one can establish the origin. In the case of the peach this is very difficult for it seemingly grows wild in Persia, in China, in Mexico and in many other parts of

1 Hedrick, U. P. The Peaches of New York. Albany: J. B. Lyon Company, 1917, p. 2.

2 Ibid., p. 3.

the world. De Cantolle, one of the most painstaking workers in the field of botany, after searching and weighing all evidence, concluded that the peach had never been really wild in Persia.³ Botanists since De Cantolle's time have never been able to find absolute proof that the peach was originally wild in Persia. The peach was late in reaching Greece and Rome. It arrived in these countries after the beginning of the Christian Era. The Greeks and the Romans had been in Persia before this era and it seems strange that some of the fruit or the seeds had not been brought to them earlier, if its original home was Persia. Neither Hebrew nor Sanskrit writers tell of the peach.

The fact that the peach was thought to have originated in Persia is indeed indicated by its name in some languages. In German, for example, the name "Pfirsich" indicates such an origin. There is much evidence that seems to indicate that China is the ancestral home. Confucius referred to the peach in the fifth and tenth centuries before the Christian Era.⁴ Both the sacred and profane writings of the Chinese mention the peach. Peaches are found commonly cultivated in China from river-level to an altitude of 9000 feet.

3 Hedrick, U. P. The Peaches of New York. Albany: J. B. Lyon Company, 1917, p. 2.

4 Gould, H. P. Peach-Growing. New York: The Macmillan Company, 1918, p. 2.

They are in a more feral state in China than anywhere else in the world except in the United States. We know that the peach has been an introduced plant in this country. Through the explorations of men like Frank Meyers of the United States Department of Agriculture there is conclusive proof that there are species of the peach growing wild now in China.⁵

There are many Chinese traditions referring to the peach.⁶ In all of the early Chinese writings and folklore, the peach and symbols of the peach have had a prominent place. From these writings have come the conceptions that the peach tree is the tree of life or the tree of death. Peaches which are lengthened to a point, large in size, and red colored on one side are regarded by the Chinese as the symbol of long life. Because of these superstitions, peaches are a part of the painting and sculpture of China. Peaches are saved as a salute to the new year. If one has been able to eat them enough times, the body is believed to be saved from corruption until the end of the world. Taoism from early days has taken the peach as its particular fruit, signifying longevity.

The peach has a prominent place among the fruits

⁵ Gould, H. P. Peach-Growing. New York: The Macmillan Company, 1918, p. 3.

⁶ Hedrick, U. P. The Peaches of New York. Albany: J. B. Lyon Company, 1917, pp. 7-10.

of the world. Since the propagation of the peach from the pit is relatively simple, it spread easily to all countries. It is cultivated extensively in the countries of Europe and Asia. The peach seems to be quite as much at home, as highly prized and as commonly grown in the countries of western Asia as in eastern Asia. Frank Meyer of the United States Department of Agriculture found a variety of peach at Kirin in Mongolia which was the most northern growth of the fruit.⁷ In Japan the number of varieties of the peach is only outnumbered by the number of varieties of the persimmon.

Italy and France were early peach growing countries in Europe. The monks, being skilled horticulturists, had peaches in their gardens. In Montreuil, a village near Paris, the whole population has been employed for many years in this cultivation. The best peaches of France are said to be from this village.⁸ From France, the other countries, Belgium, Holland, Germany and England, received their first peach trees. The English, as a people, are fond of gardens and orchards and even though the peach is not acclimatized in England, it is cultivated by growing on the south side of white limed walls. Many English fruit books give the

7 Hedrick, U. P. The Peaches of New York. Albany: J. B. Lyon Company, 1917, p. 21.

8 Downing, A. J. The Fruit and Fruit-Trees of America. New York: John Wiley & Sons, 1899, p. 180.

credit for its introduction to the gardener of Henry VIII, but literature shows its existence in England before this date.

From early historical readings it is known that peach trees were growing in the colonies. The Pilgrim Fathers may have brought the seeds with them from England and planted them in the new land. Sea captains on their visits to the colonies tell of seeing peach trees in bloom in the areas which are now New England, Maryland, Virginia, New York, New Jersey and Georgia.⁹

Mexico as a source of the stock of America's peach orchards cannot be discounted. The Spaniards in their conquest of Mexico established the dissemination of the peach. A Spanish book published by Molina in 1571 described peaches. From Mexico to Florida, Arizona, New Mexico and California the transmission by missionaries made peach culture certain among many Indian tribes. All of the Indian languages of the South and Southwest tribes have distinct names for the peach, showing its existence in these regions.¹⁰

Of particular historical interest to us in this area is the beginning of peach culture in Michigan. An Indian trader named Burnett planted the first peach pits

9 Gould, H. P. Peach-Growing. New York: The Macmillan Company, 1918, pp. 4-12.

10 Hedrick, U. P. The Peaches of New York. Albany: J. B. Lyon Company, 1917, pp. 39-46.

near St. Joseph in 1775. Seedling peaches were grown all over Southern Michigan from the time of the earliest settlements. The first peaches ever sent from Michigan to the Chicago market were grown in 1839 in the garden of B. C. Hoyt in St. Joseph. The next year Capt. Boughton took peaches to Chicago for sale and made such a good profit that many people were induced to plant peaches.¹¹ The commercial production began in 1848 when Eleazur Morton, George Parmalee and Curtis Boughton planted 25 acres near St. Joseph. President A. S. Dyckman in an address before the State Horticultural Society in 1874 said that people at the time believed that these three men were lunatics because with so many peaches in production the market would surely be overstocked. Chicago was a good market for the peaches of Michigan. The industry continued to expand and grow until 1862. The ravaging disease known as "the yellows" made its appearance near St. Joseph in the most favored peach region of the State in 1862 and 1863. The disease spread more rapidly until by 1877 and 1878 it was prevalent in nearly every orchard in the country. The only cure was to pull up the trees and burn them. In spite of this set-back the growers continued to expand and by 1884 the industry

11 Prof. E. F. Smith's Report on Peach Yellows and Several Other Important Papers Including President Lyon on Russian Apples, Professor Budd on Cherries. Mich. Hort. Soc. 18 (1888), pp. 271-299.

was recovering. The period of 1884-1906 saw many areas in the state expanding in peach production, without regard for suitable growing qualifications. The peak of expansion was reached in 1898. An unusually severe winter in 1906 killed many peach trees. With this blow the peach industry in Michigan never again reached the large proportions of the preceeding years as diversification to other fruits began. With increased transportation facilities and refrigerated cars the monopoly of the Chicago market was lost too. Michigan does have some good peach growing locations which escape the freezing temperatures of the adjacent states. These areas are within close proximity to good markets. These factors justify the present peach production of Michigan.¹²

B. Classification of Peaches. There has been need for a classification of groups and varieties of peaches in America. At first the logical system was to classify them according to whether they were freestone, clingstone, or semi-clingstone peaches. This classification was inadequate so Onderdonk, a pomologist of the United States Department of Agriculture in Texas, and Price, a worker in the Texas Agricultural Experiment Station, classified them according to race, which pro-

¹² Johnston, Stanley. Peach Culture in Michigan. Mich. Ag. Exp. Sta. B. 177 (1941), pp. 3-7.

vides a better basis. Hybridization has meant that many of the newer varieties are mixtures of two or more races. There is considerable overlapping but this still does not preclude the desirability of classifying them according to race. The races represent the type of peaches which have been introduced in North America.

The Spanish Race: The Spanish peach was introduced into Mexico and Florida by Catholic missionaries. The Indians aided in the distribution so that it is also sometimes called the Indian Race. In the United States this race is grown in Florida and in Texas. The Gulf States are the best areas for its growth.¹³ The Spanish race is characterized by small round fruits streaked and mottled with red, with yellow, red or white flesh. It is late appearing but is of good quality. The varieties attributed to the group are Casler, Estella, Galveston, Gibbon October, Victoria, Columbia, La Reine, Indian, Texas and Florida.¹⁴

The Peento Race: An importation of seed from Australia in 1869 began this race in the United States. This is a small but well-defined group of peach varieties which have all originated in Florida. Florida is the best growing place for this race but the other Gulf

¹³ Gould, H. P. Peach-Growing. New York: The MacMillan Company, 1918, p. 386.

¹⁴ Hedrick, U. P. Systematic Pomology. New York: The MacMillan Company, 1925, p. 128.

States may also grow it successfully.¹⁵ The fruit is small and flattened on one end. However, a peculiar characteristic of this race is the fact that the fruit produced by seedlings is oblong rather than compressed and does not show this flattening. Thus the group is rapidly losing its identification. The fruit is creamy white in color, mottled with red. The flesh is white. The flavor is rich and sweet. The varieties in this group are Angel, Jewel, Walio, Dorothy, Hall, Early Bidwell and Suber.¹⁶

The Persian Race: As its name indicates this race includes the varieties which came to us from Persia by way of Italy and Great Britain. The early colonists brought these peaches to the United States along about 1680. This race is composed of late varieties, particularly adaptable to northern orchards.¹⁷ There are many varieties in this group, Crawford, Chair, Alexander, Heath Cling, Oldmixon, Champion, Salway, Crosby, Wager, Early Hale and Gold Drop being a few of the better known.¹⁸

15 Gould, H. P. Peach-Growing. New York: The MacMillan Company, 1918, pp. 384-385.

16 Hedrick, U. P. Systematic Pomology. New York: The MacMillan Company, 1925, pp. 129-130.

17 Gould, H. P. Peach-Growing. New York: The MacMillan Company, 1918, p. 389.

18 Hedrick, U. P. Systematic Pomology. New York: The MacMillan Company, 1925, p. 128.

The North China Race: This race consists of the Chinese Cling or Shanghai varieties. Its introduction to the United States occurred in 1850 when Charles Downing imported the peach from the Orient. Mr. Downing sent some trees to a friend, Henry Lyon in South Carolina, where they grew and bore fruit. A United States Navy surgeon, Dr. William Spottswood, sent peach stones of the Chinese variety from Japan in 1860 to Florida. This race became propagated through these importations of Downing and Spottswood.¹⁹ The fruit of the original trees was creamy white blushed with red. It has predominantly white flesh, is early and has excellent eating qualities. Some of the most important varieties today belong to this group. Chinese Cling, Belle, Greenboro, Waddell, Riley, Carman, Elberta and Family Favorite are the chief varieties. These varieties may be crosses with varieties from other races because with increased hybridization, this is a less well-defined group.²⁰

The South China Race: This race is also called the Honey Race. Charles Downing of New York, previously mentioned, started this race with importations from China before 1850. The original trees never fruited in a northern climate. It was not until they were grown in

¹⁹ Gould, H. P. Peach-Growing. New York: The Macmillan Company, 1918, pp. 387-389.

²⁰ Hedrick, U. P. Systematic Pomology. New York: The Macmillan Company, 1925, p. 129.

Florida and southern Texas that they were successful.²¹ The characteristics of the fruits are that they are small to medium in size, oblong oval in shape, creamy white in color with touches of red. This peach requires a long growing season. The flavor is distinctly honey-like. The common varieties are Honey, Climax, Pallas, Triana, Florida Gem, Taber, Hastings, Imperial, and Oviedo.²²

G. Peach Production. A new record in peach production was established with the estimates of the 1946 crop. There were 86,483,000 bushels of peaches, 6½ more than the 1945 crop and 44½ above the ten year average of 1935-1944.²³ In Chart I the leading states in peach production during the five year period of 1942-1946 are shown. California leads this production by a large margin but Georgia, Michigan, South Carolina and Washington also produce peach crops of commercial value. The Michigan crop for 1946 was the largest on record, slightly larger than the 1945 crop and 74½ above the ten year average from 1935-1944.²⁴ Chart II shows how

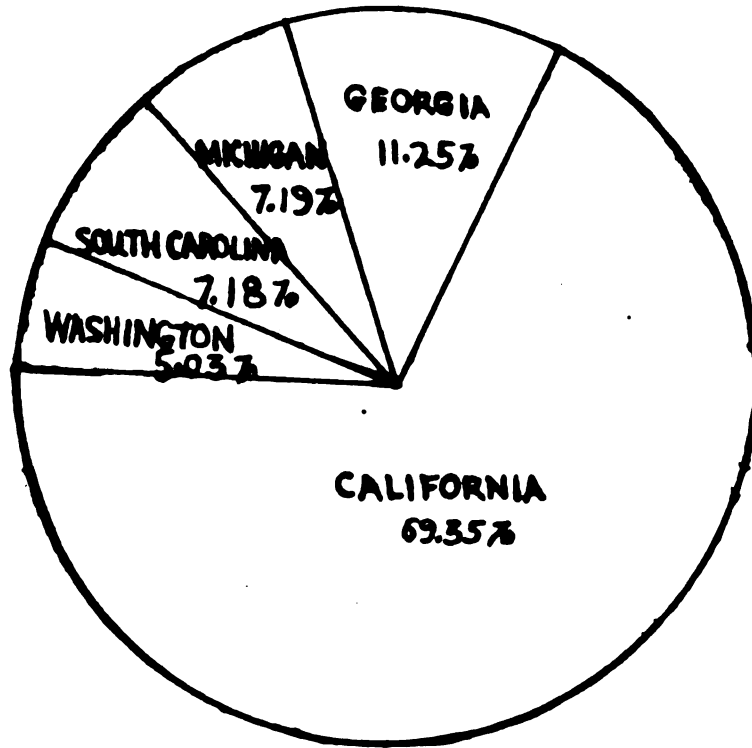
21 Gould, H. P. Peach-Growing. New York: The Macmillan Company, 1913, pp. 335-366.

22 Hedrick, U. P. Systematic Pomology. New York: The Macmillan Company, 1925, p. 129.

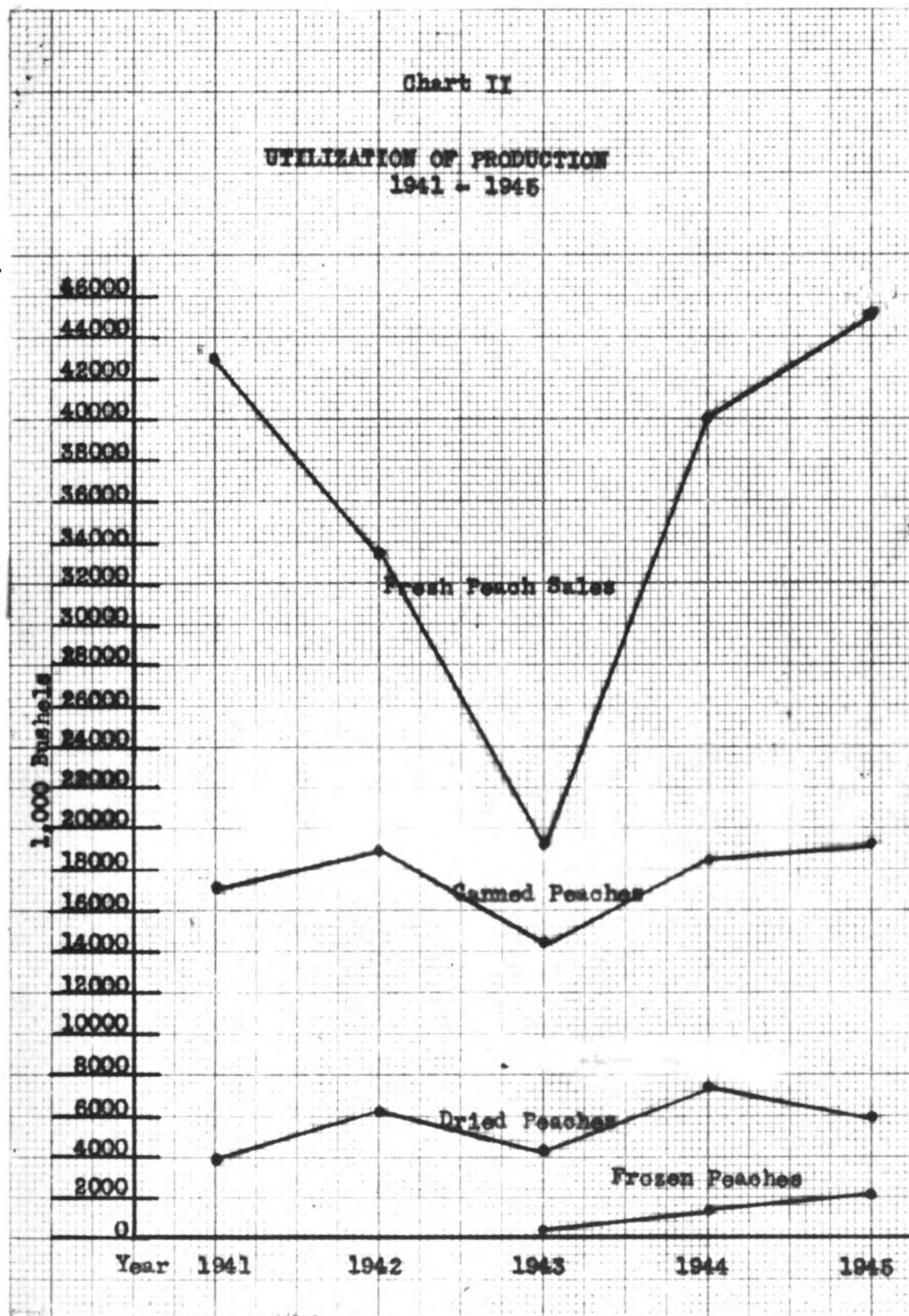
23 Miller, C. B. Marketing the Michigan Peach Crop. Market News Service on Fruits and Vegetables. U. S. Dept. of Ag. Production and Marketing Admin., F & V Branch. Mich. Dept. of Ag., Bureau of Foods & Standards, Coop. (1947), p. 1.

24 Ibid., p. 1.

CHART I



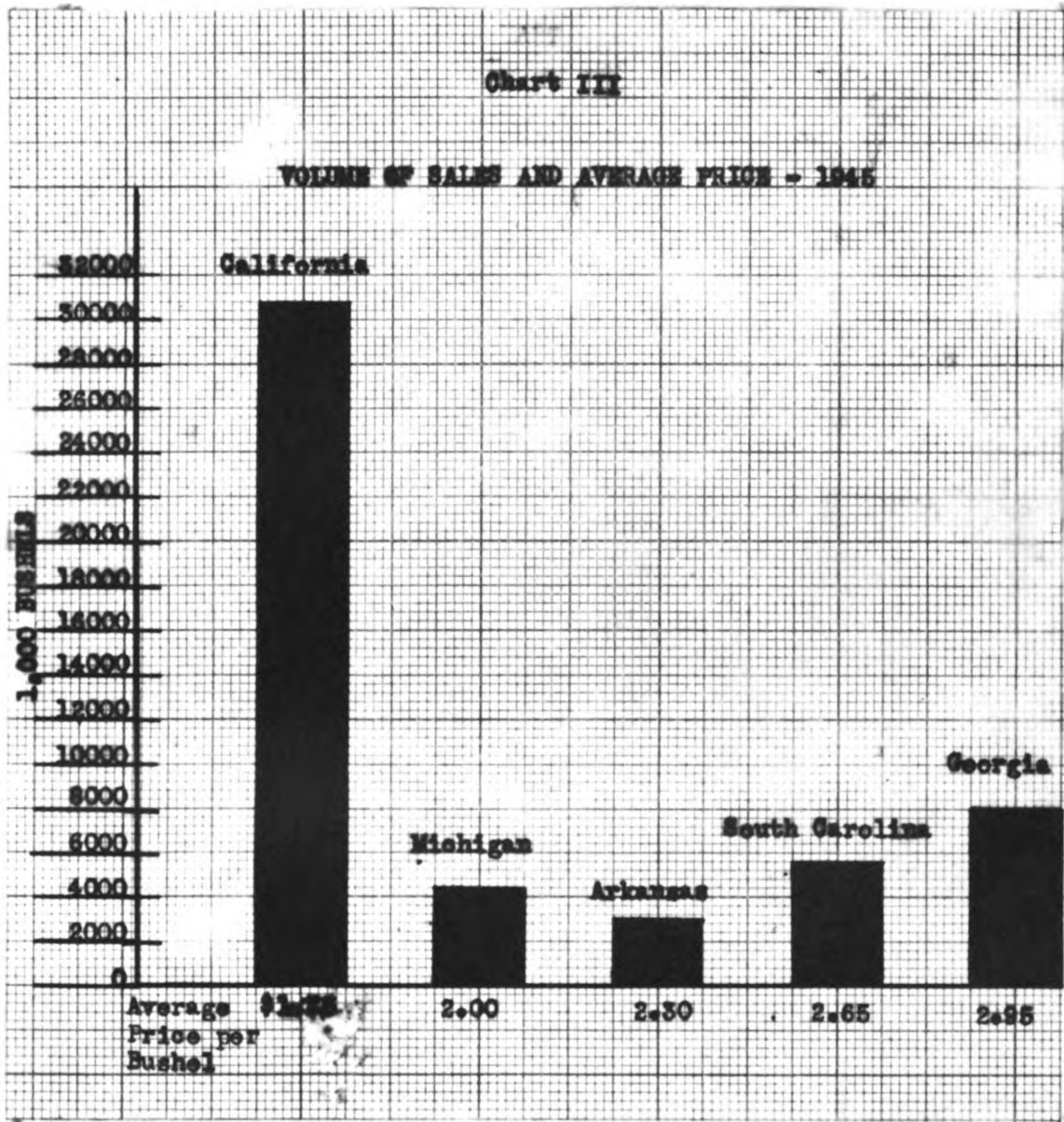
LEADING STATES IN
PRODUCTION OF PEACHES
DURING 5 YEAR PERIOD
1942-1946



this peach crop has been utilized from 1941-1945. The statistics of the United States Department of Agriculture have been used. Fresh peach sales are by far the largest, but canned and dried peaches are also important. Before 1943 the statistics were not given for frozen peaches because such a small amount was frozen. Frozen peaches are just beginning to be a satisfactory product and the present trend is for an increase in frozen peaches. Most of the California crop is processed either as canned, dried or frozen. Georgia, South Carolina and Michigan produce the largest volume of peaches for the fresh trade.

From the statistics available in 1945 from the United States Department of Agriculture, Chart III shows the five leading producers of peaches with their production for that season and the average price received per bushel.

In Michigan the season for peaches extends from August 4 to October 1. Chart IV shows each season for the principal marketed Michigan varieties. The Golden Jubilee variety is available from August 4-August 30, Red Haven variety from August 6-August 19, while Hale Havens ripen during August 13-August 30 and South Haven variety from August 16-August 30. The J. H. Hale variety is ready August 25-September 15. The longest season for any variety in Michigan is for Elberta peaches which

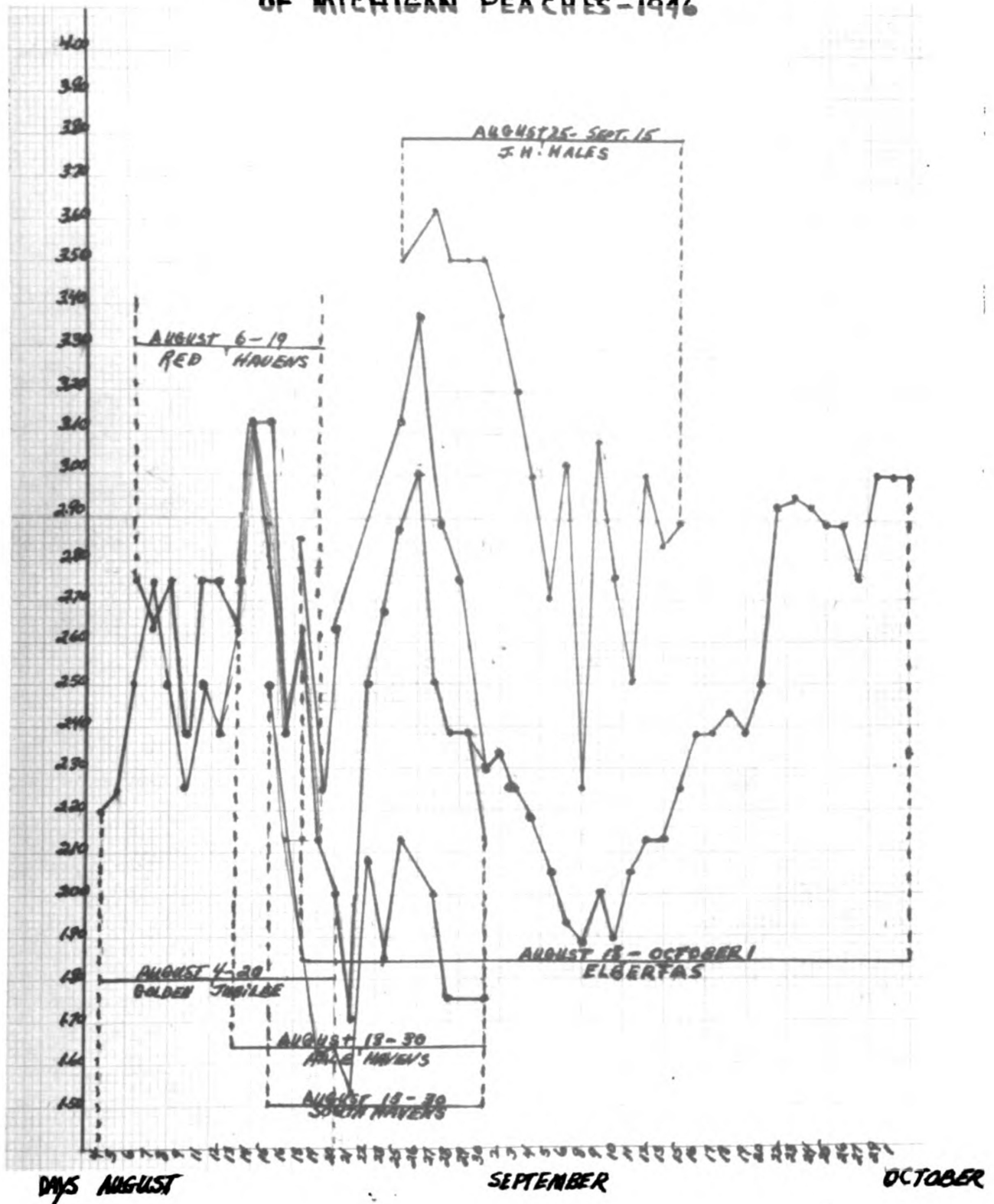


ripen from August 18-October 1. This season may vary due to weather each year but as shown in Chart IV this is for the 1946 season. The price received per bushel for each day of the season at the Benton Harbor market is noted. The price fluctuates per day and per variety.

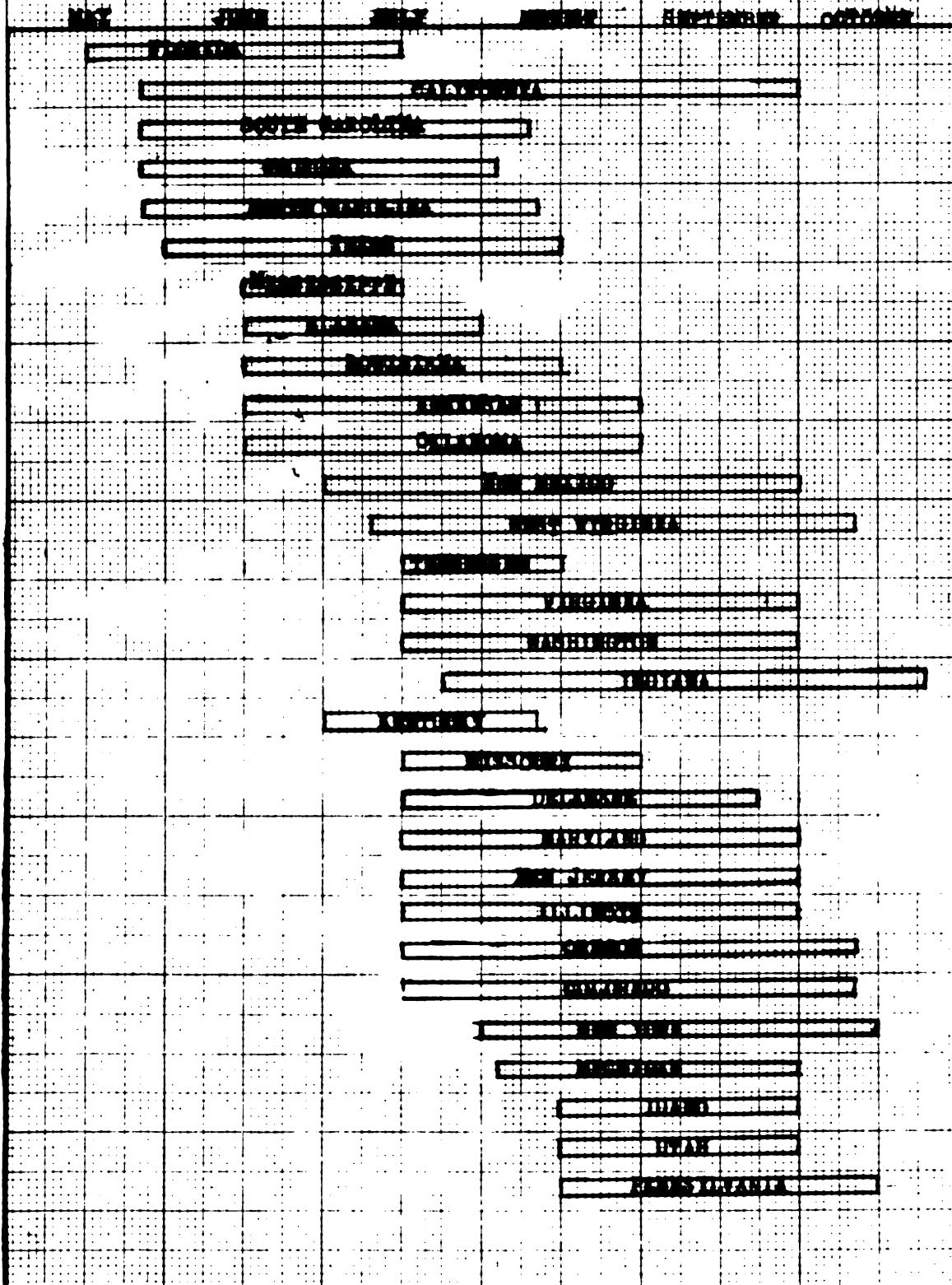
There are 32 states in the United States which produce peaches of commercial marketing value. The length of the season varies with each state. Chart V shows the ripening period and seasonal availability of all varieties of peaches for each state.

D. Object of Study. The purpose of this study was twofold: first to determine the value of dried, canned and frozen peaches for institution pie baking and, second, to evaluate the varieties used. The principal varieties available on this market were tested. The color, consistency, odor, flavor and texture of the various forms were evaluated. To the institution buyer and user not only the quality of the peach is important but the cost as well. Therefore, the cost of the peaches as such, as well as the labor cost involved in pie making with the various forms of the fruit were studied. Peaches are an especially adaptable fruit for pies and are popular with the customer. Dried, canned, frozen or fresh peaches make acceptable products and various varieties are available in each form. Since we were particularly concerned with Michigan varieties, they were compared with California varieties. Peaches are an

CHART IV SEASONAL AVAILABILITY AND DAILY PRICES OF MICHIGAN PEACHES-1946



**Chart V
SEASONAL AVAILABILITY OF PEACHES**



important fruit crop in Michigan. Michigan ranks fourth in the nation's production of peaches while California produced the largest volume of peaches in the United States for the past five years. Buyers believe that as the flavor of Michigan peaches become better known they will gain in favor, but their general quality should be more consistent. Other buyers have noted that peaches are the least satisfactory of the frozen fruits, therefore it seemed important to compare them with dried and canned products. Since there is little information available on the subject of peach pies for institution use a study of this type was needed.

II. Review of Literature

There is a vast quantity of literature available on the subject of peaches. Since much of this literature does not apply directly to the problem of this thesis, the subject has been limited to a discussion of the use of peaches in institutions and the nutritional value of peaches. Publications of recent date have been used as source material. The history, classification and production of peaches have already been reviewed in the introduction.

Use of Peaches: In various quantity cook books recipes are given for the use of peaches. Peach pie recipes include the use of dried, canned and fresh peaches. Recipes for salads, cobblers, whips, crumble desserts, custard pies, waffles, shortcakes, sauces and ice creams are to be found in quantity cookery books by Treat and Richards (1), Fowler and West (2), Wood (3), and Hart (4). Berry (5) in a specialized cook book of fruit recipes lists puddings, cakes, brandies, wines, jams, jellies, relishes, sherbets, tarts and cookies which may be made from peaches. Frozen fruit has received little attention in these cook books. Monroe Boston Strause (6), writing for the restaurant trade, lauds the use of frozen peaches for pies. Frozen peaches give the restaurants, hotels and other institutions, the advantages of fresh peaches without the dis-

advantages of labor and preparation time. It is possible to offer the customers a fresh peach pie during the months of the year when peaches are not in season. With the correct selection of variety, proper thawing and handling, peaches may be used that will have a uniform flavor and wide appeal. No references are available in the literature on the institution use of various varieties of peaches for pie making.

Nutritive Value: Fruits are a valuable addition to the diet both from the standpoint of pleasure in eating them and for their nutritional value. The volatile flavors and odors, the attractive color, the smooth clean taste, the texture, all these factors appeal to us and promote the use of fruit in the menu. The nutritive value of peaches is summed up in Tables I, II, III and IV (see pages 24, 25, 26 and 27). The vitamin and mineral content and the composition of the fruit is shown in these tables.

The ascorbic acid content of fruits has been shown to vary tremendously with variety, climate, soil and maturity. Such knowledge is leading to the selection of varieties and conditions best suited to produce an improved food supply. Schroder, Satterfield and Holmes (18) studied eight varieties of peaches. Peaches at the edible stage of ripeness contribute more ascorbic acid to the diet than if they are eaten before they are fully ripe. According to the data there was a

-20-

varietal difference in ascorbic acid content. The ranges were from 3.84 mg. per 100 gm. for Augbert to 12.86 mg. per 100 gm. for Hiley Belle. The size of the peaches varied but there was no consistent correlation between size and degree of ripeness. The maximum amount of ascorbic acid which can be supplied to the diet according to this study is 13 mg. per 100 gm. of the fruit. Peaches cannot be used as the sole source of ascorbic acid but due to their attractiveness and appeal they can contribute materially during their season. The highest concentration of ascorbic acid was found to be in the skin, lower in the flesh directly under the skin and lowest in the flesh surrounding the pit. Kirk and Tressler (19) also found that fruits have a daily variation in ascorbic acid amount. These differences were attributed to season, ripeness, amount of sun and quantity of rain. There was a pronounced varietal difference and different portions of a peach had different ascorbic acid contents, i. e. peach skins contain two to four times as much ascorbic acid per gram as the pulp.

The effect of drying on the nutritive value of peaches was determined in a study by Eheart and Sholes (20). The results showed that sulphured peaches retained all of their vitamin C content whether they were sun dried or dehydrated while unsulphured peaches lost all of their vitamin C content during drying.

Processing of frozen peaches seems to have little

effect upon their ascorbic acid content as reported by De Felice (21). Frozen sliced peaches of the Rochester, J. H. Hale, Crawford, South Haven and Elberta varieties were shown to contain 75 per cent of the ascorbic acid potentially available in the whole fresh peach.

Yellow peaches are considered an excellent source of vitamin A and provitamin A, a good source of vitamin C and riboflavin or vitamin G, although they are not considered a significant source of B₁ or thiamine according to Daniel (22).

Peaches contain small amounts of the various minerals as shown in Table II. Chatfield and Adams (23) have reported peaches are not a significant source of either calcium or phosphorus but dried peaches are an excellent source of iron. Peaches can add variety to the diet in flavor, texture and color; they can contribute in a supplementary way in nutritive value.

TABLE I
Vitamin Content of Peaches

	Vitamin A Per 100 gms. I. U.	Ascorbic Acid Per 100 gms.	Thiamine	Riboflavin	Niacin	Bibliog- raphy Source Number
Fresh						
	300-3000	8.4				7
	1700	8.0				8
	880	8.0	20	60		9
			.02 mgms.	.05 mgms.	.9	10
Canned						
Clingstone	0.19-0.51	2.0-5.7				12
Freestone	0.09-0.28	1.4-3.7				12
		3.0				9
	880	8.0	.02	.05	.9	10
Clingstone			.005-.011	.48-1.18		13
Freestone			.005-.011	.34-.90		13
Dried			0.01	0.17	6.3	14
	2500	40				9
	3400					
Sulphured	3250	19	.01	.20	5.4	10
Frozen						
	2900	3				9
	2000					8
	2000					15

TABLE II
Mineral Content of Peaches

	CA mg/100gm.	P mg/100gm.	FE mg/100gm.	Pyridoxine mg/100gm.	Biotin mg/100gm.	Bibliog- raphy
					S L	Source
					Lactis	Caseis
						Number
Fresh						
	8	22	.6			10
Canned						
				11-20	0.5	1.5
	5	14	.4			10
Dried	24	112	1.8			14
Sulphured	44	126	6.9			10

TABLE XII
Food Composition of Peaches

Per 100 gms. Food	% Water	Protein gms.	Fat gms.	Ash	Crude Fiber	Bibliography Source Number
Fresh						
	86.9	.5	.1			10
	86.9	.5	.1	.47	.6	16
Canned						
Water pack	92.3	.5	.1	.3	.3	16
Juice pack	89.6	.4	.2	.4	.2	16
Syrup pack	80.9	.4	.1	.4	.4	16
	80.9	.4	.1			10
Dried						
	24.0	3.0	.6	3.0	3.5	16
	24.0	3.0	.6			10
	24.0	3.0	.6	3.0	3.5	17
	12.56	3.67	.2	3.17	4.0	14

TABLE IV
Food Composition of Peaches

Per 100 gms. Food	Total Carbohydrates gms.	Total Sugars	Total Acid	Fuel Value in Calories	Bibliog- raphy Source Number
Fresh					
	12.0			51	10
	12.0	8.8	.64	51	16
Canned					
Water pack	6.8	4.6	.2	30	16
Juice pack	9.4	7.3		41	16
Syrup pack	18.2			75	16
	18.2			75	10
Dried					
	69.4	51.0	3.0	295	16
	69.4			295	10
	69.4	51.0	3.0		17
	76.16				14

III. METHOD OF PROCEDURE

Types of peaches: Canned, frozen and dried peaches all make acceptable peach pies but there are different varieties available in each type and, hence, some variation in the quality of the resulting pies. In this study, canned, frozen and dried peaches were compared with fresh peaches which were used as the standard product. Since the primary interest is in the Michigan varieties available on this market, these peaches were compared with the leading California varieties obtainable here.

A survey made by mail in 1945 indicated that about 46 per cent of the 1945 peach crop was of the Elberta variety and 25 per cent of the Hale Haven variety.²⁵ These being the principal Michigan varieties grown, both were included in the study. The canned peaches used were of both these varieties (the Elberta variety and Hale Haven variety). Frozen Michigan peaches available were of the Elberta variety. These frozen peaches had been treated with ascorbic acid to lessen the possibility of browning. There are no dried Michigan peaches available. The California canned

25 Crop Report for Michigan, United States Department of Agriculture Bureau of Agricultural Economics and Michigan Department of Agriculture, Bureau of Agricultural Industry, January-February, 1946.

peaches available on this market were of the Phillips variety, a late California Cling Peach. In correspondence with the canners of this peach we were informed that under the general classification of Phillips, there are many specific varieties including Corona, Dabbling, Giblin, Gomes, Peterson, Phillips, Sewell, Stuart, Sullivan #4 and Wiser. Gomes, Phillips, Stuart and Sullivan #4 are the ones generally used by this particular canner. The other canned California variety used was a peach entirely different in character and variety than the Phillips, the Midsummer. The canner of this peach stated, "The Midsummer variety consists of several very similar type peaches, in fact, we do not attempt to separate them. They are known generally as Hauss, Paloras, and Libby's." The frozen peaches used in the study were California Elberta and a yellow freestone variety called Rio Oso. To both of these varieties ascorbic acid had been added to retard discoloration. The largest percentage of peaches dried in California are of the Muir variety and that was the one used in this study. Other varieties are dried in California but in conversation with a food broker in Lansing it was learned that this area is not a great user of dried peaches and hence almost without exception, dried peaches available here are Muirs. The fresh peaches used for the standard pie were purchased on the daily market. South Carolina Elberta peaches were available during the pie

baking period so these were used.

All forms of peaches were thoroughly examined by the writer at the beginning of the study and before their use in pie making. The results of this examination are noted elsewhere.

METHOD: The standard recipe used by the Union Cafeteria for canned and frozen peach pies was used. This formula when reduced to small quantity consists of the following ingredients:

2 cups of peaches
1 cup of peach juice or syrup
1/4 cup sugar
1/2 oz. cornstarch

The fruit was strained and the juice collected. The peach juice was added to the sugar and cornstarch. This mixture was cooked on a gas plate over a medium flame for four minutes. This gave a syrup of medium consistency. All of the fruits except the Phillips variety were packed in a light syrup, hence to this variety it was necessary to add one-half cup sugar to make the sweetness of all pies as nearly alike as possible. The thickened syrup was poured over the drained fruit. Upon cooling the pie filling was stored in a glass jar in the refrigerator overnight. The next morning the pies were baked using this prepared filling. The peach pies were all baked in the Union Cafeteria by the pastry cook. The pie crust used was the standardized recipe developed by the Union Cafeteria for its daily use in pie making. Thus the work was done under insti-

tution conditions.

The pies were baked in an institution electric oven which was thermostatically controlled. They were baked at 400° for forty-five minutes.

The dried fruit and the frozen fruit because of their nature, needed additional preparation. The dried peaches were soaked for three hours before preparation time. They were then cooked for fifteen minutes in the water in which they were soaked. After draining and cooling the dried peaches were sliced for use in the pies. The procedure for the filling was the same as reported previously. The frozen peaches were thawed according to directions given by the freezers. These directions were to thaw in the container for three hours before using. The syrup and juice obtained from the thawing was used for each frozen peach pie.

The fresh peaches were peeled and sliced immediately before using to minimize the browning. One and one-fourth cups of sugar were put on the peaches and one cup of water was poured over the sugared fruit to obtain juice for thickening. One-half ounce of cornstarch was used for thickening, the same proportion as used for the other peach pies.

After cooling, one half of the pie was used for testing. This pie was cut into seven pieces for the judges to score. All pies were judged within 3 hours after cutting at a time convenient for each judge but at

approximately the same time each day. Four judges were institution trained people, two judges were foods and nutrition trained personnel and one judge was home economics trained but not in the foods field. The judges were familiarized with the score sheet before the scoring was begun. The score card used was developed by the Foods and Nutrition Department, School of Home Economics, Michigan State College. This score sheet is included in the Appendix.

Only a small number of pies could be used at one time so five peach pies were baked each day. To obtain a good comparative study between varieties and between forms of peaches, the kinds baked at one time were interchanged. The baking schedule follows:

- Day 1 Michigan Elberta Canned Peaches
 Michigan Hale Haven Canned Peaches
 California Phillips Canned Peaches
 California Midsummer Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 2 California Muir Dried Peaches
 California Elberta Frozen Peaches
 California Phillips Canned Peaches
 California Midsummer Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 3 California Muir Dried Peaches
 California Elberta Frozen Peaches
 California Rio Oso Frozen Peaches
 California Phillips Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 4 Michigan Elberta Canned Peaches
 Michigan Hale Haven Canned Peaches
 California Phillips Canned Peaches
 California Midsummer Canned Peaches
 South Carolina Elberta Fresh Peaches

- Day 5 California Muir Dried Peaches
 California Rio Oso Frozen Peaches
 California Phillips Canned Peaches
 California Midsummer Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 6 California Muir Dried Peaches
 Michigan Elberta Canned Peaches
 Michigan Hale Haven Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 7 Michigan Elberta Frozen Peaches
 California Elberta Frozen Peaches
 California Rio Oso Frozen Peaches
 Michigan Hale Haven Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 8 Michigan Elberta Frozen Peaches
 California Elberta Frozen Peaches
 Michigan Elberta Canned Peaches
 Michigan Hale Haven Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 9 Michigan Elberta Frozen Peaches
 California Elberta Frozen Peaches
 California Rio Oso Frozen Peaches
 California Midsummer Canned Peaches
 South Carolina Elberta Fresh Peaches
- Day 10 California Muir Dried Peaches
 Michigan Elberta Canned Peaches
 Michigan Elberta Frozen Peaches
 California Rio Oso Frozen Peaches
 South Carolina Elberta Fresh Peaches

Each pie was repeated five times except the Michigan Elberta Frozen Peach Pies which were repeated four times, due to shipping difficulties in getting the peaches transported in time for the study. The fresh peach pie was baked each day as the standard pie.

The amount of time necessary for preparation of each type of peach was noted. Labor cost was calculated upon the preparation time basis. These factors are especially important in the institution and must be emphasized.

The statistical analysis of the data consisted of the calculation of the fiducial limits and the t values. The fiducial limits corresponding to $p = .05$ were used. The t value was calculated for the difference between groups of fresh, frozen, canned and dried peaches. The formula used was $\bar{x} - m = \pm t \frac{s}{\sqrt{n}}$ or $m = \bar{x} \pm s \frac{t}{\sqrt{n}}$.²⁶

²⁶ Snedecor, George W. Statistical Methods. Ames: Collegiate Press, Inc. 1937, p. 60.

IV. RESULTS AND DISCUSSION

Pre-preparation Examination of Peaches: All of the peaches used in this study were examined before making into pies. Table V is a synopsis of these observations. It can be generally concluded that with the exception of the samples of the Phillips canned and Muir dried varieties all peaches should have made satisfactory products. This probability was found to be correct and will be discussed in the following paragraphs.

Differences between Methods of Preserving: A comparison was made between the groups of peaches, canned, dried, frozen and fresh. The groups were paired in every possible combination. The mean difference and the t value of the difference was calculated for each scoring factor. The results are given in Table VI. The results indicate that the dried peaches used were decidedly inferior to canned, frozen and fresh peaches in color, consistency, flavor and texture, the difference being highly significant. There is a significant difference in color between frozen and fresh peaches, fresh peaches being superior. The flavor of canned peaches is inferior to the flavor of fresh peaches, the difference being highly significant. Canned peaches are also inferior to both fresh and frozen peaches in the factor of soaking of the crust, where a significant difference is shown to exist.

TABLE V
RESULTS OF EXAMINATION OF PEACHES BEFORE PIE MAKING

TYPE	COLOR	PACK CONSISTENCY	ODOR	FLAVOR	TEXTURE	YIELD
Canned 10	Ranged from green yellow in size and to bright yellow	Not uniform in size and shape	Good	Excellent	Varied from firm to soft	2 1/4 qt. solid. 1 qt. liquid from #10 can. Syrup pack
20	Ranged from green yellow in size and to bright yellow	Not uniform in size and shape	Good	Excellent	Varied from firm to soft	2 1/4 qt. solid. 1 qt. liquid from #10 size can. Syrup pack
30	Bright orange - undesirable	Very uniform in size and shape	Little Flat	Flat	Slightly mushy	2 3/4 qt. solid. 1/2 qt. liquid from #10 can. water pack.
40	Yellow ripe color - good in size and shape	Very uniform in size and shape	Good	Excellent	Good - uniform	2 1/8 qt. solid. 1 qt. liquid from #10 size can. Syrup pack
Frozen 1F	Varied but better than 10 and 20	Uniform in size	Good	Excellent	Good	
2F	Yellow ripe color - good	Uniform in size	Good	Excellent	Good	
3F	Yellow ripe color - good	Uniform in size	Fair	Good	Tended to soft	
Dried	Dark brown in color - unattractive	Uniform shape	Strong	Strong	Good	

TABLE VI
RESULTS OF GROUP COMPARISONS

Scoring Factor	Methods of Preserving	Mean Difference	t value for Mean Difference
Color	Canned vs. Frozen	0.5	0.124
	Canned vs. Dried	3.1	4.203**
	Canned vs. Fresh	0.7	1.125
	Frozen vs. Dried	2.6	5.963**
	Frozen vs. Fresh	1.2	2.892**
	Dried vs. Fresh	3.8	9.453**
Consistency	Canned vs. Frozen	0.1	0.297
	Canned vs. Dried	1.8	4.724**
	Canned vs. Fresh	0.2	0.351
	Frozen vs. Dried	1.7	3.846**
	Frozen vs. Fresh	0.3	0.477
	Dried vs. Fresh	2.0	3.273**
Odor	Canned vs. Frozen	0.0	
	Canned vs. Dried	1.1	3.047**
	Canned vs. Fresh	0.3	0.694
	Frozen vs. Dried	1.1	3.116**
	Frozen vs. Fresh	0.3	0.668
	Dried vs. Fresh	1.4	2.806*
Flavor	Canned vs. Frozen	0.8	0.325
	Canned vs. Dried	1.1	4.151**
	Canned vs. Fresh	1.3	3.385**
	Frozen vs. Dried	1.9	5.638**
	Frozen vs. Fresh	0.5	0.113
	Dried vs. Fresh	2.4	4.697**
Texture	Canned vs. Frozen	0.1	0.207
	Canned vs. Dried	3.1	3.503**
	Canned vs. Fresh	0.5	0.779
	Frozen vs. Dried	2.2	4.977**
	Frozen vs. Fresh	0.4	0.681
	Dried vs. Fresh	2.6	3.856**
Soaking	Canned vs. Frozen	0.5	2.083*
	Canned vs. Dried	0.6	1.694
	Canned vs. Fresh	0.6	2.439*
	Frozen vs. Dried	0.1	0.283
	Frozen vs. Fresh	0.1	0.413
	Dried vs. Fresh	0.0	

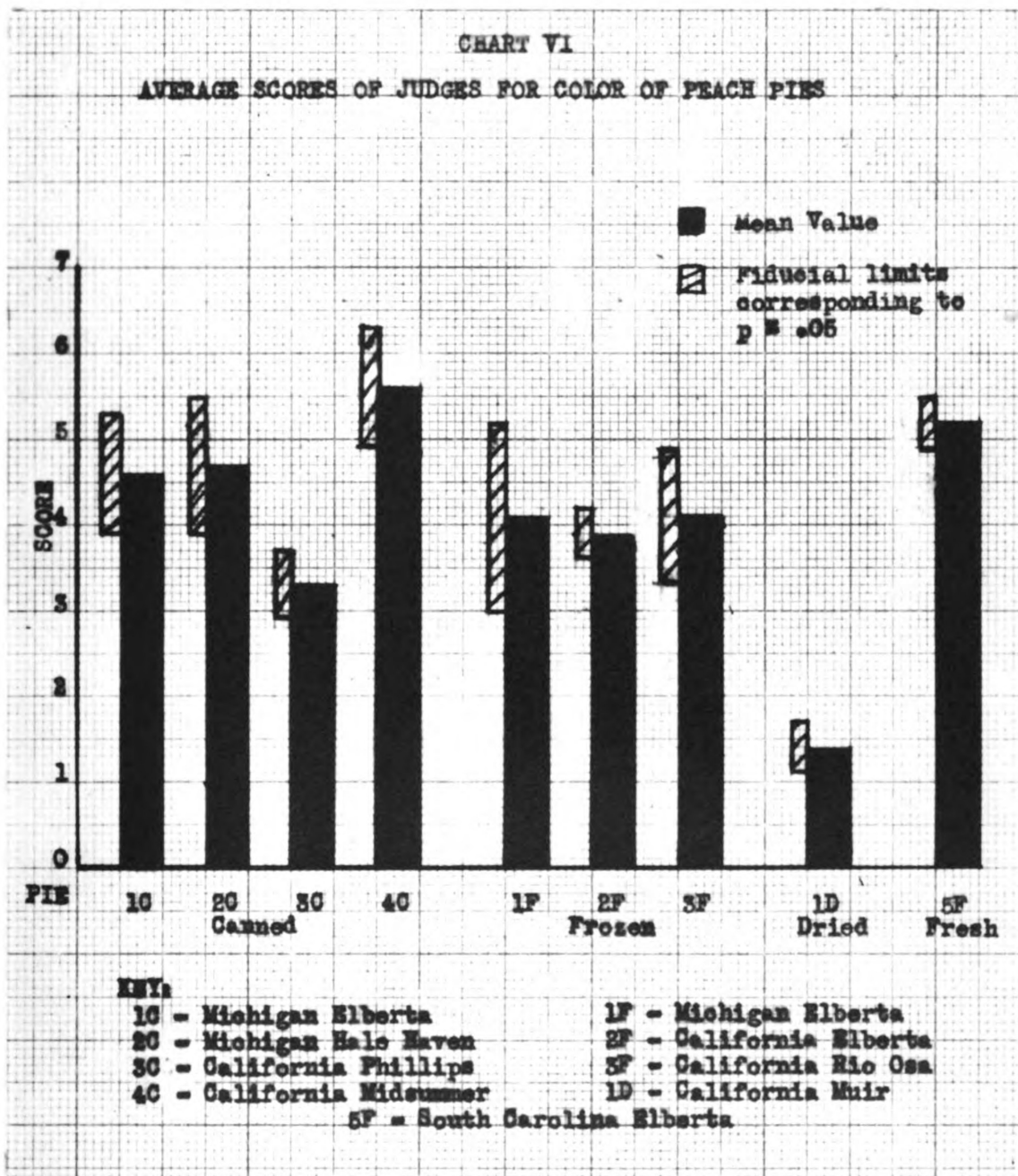
** Highly significant difference

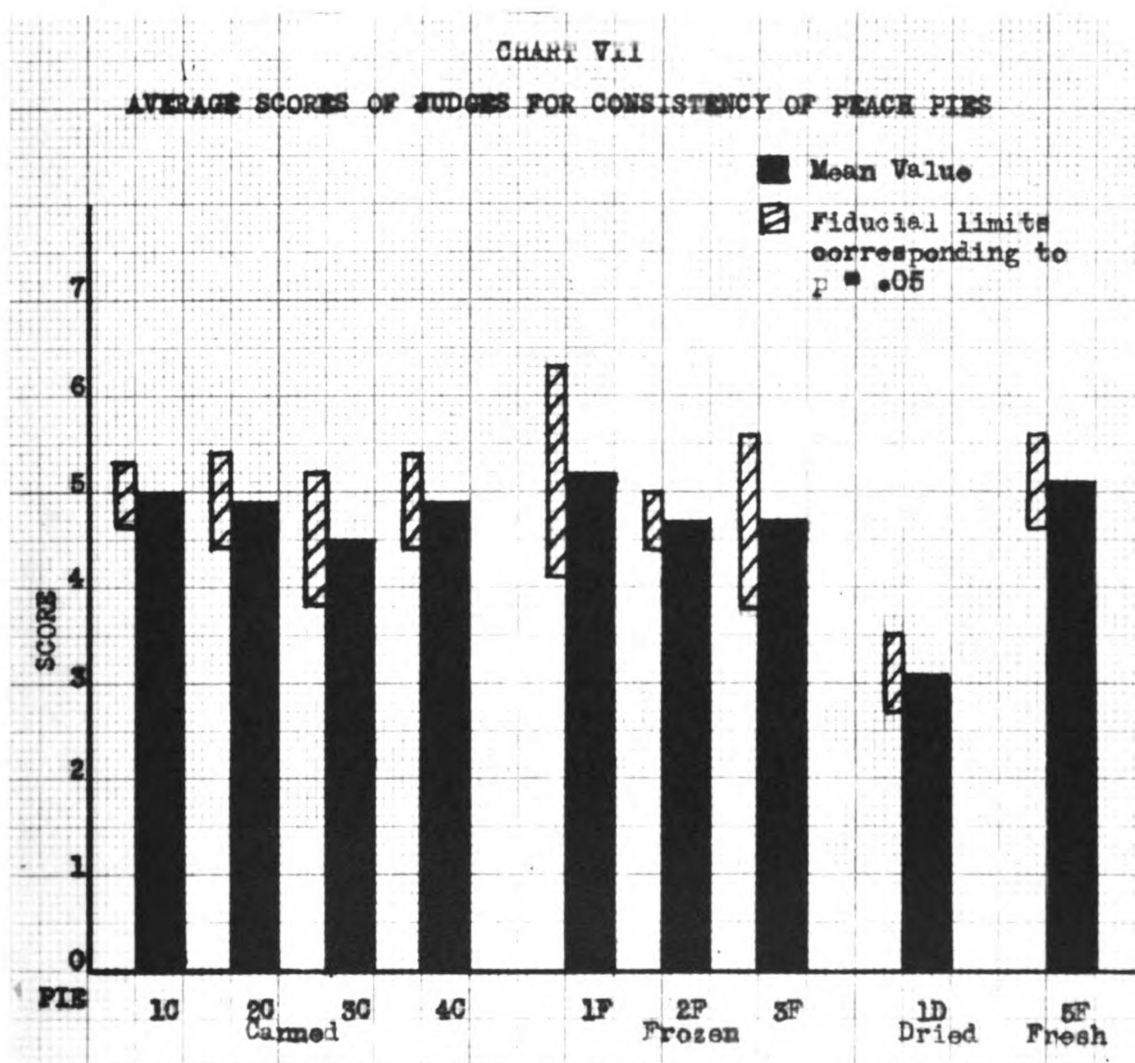
* Significant difference

Differences between Different Lots of Peaches: Data for each individual lot of peaches are tabulated in Charts VI-XI. The heavy bars represent averages of five separate tests except in the examples of Michigan Elberta frozen peaches (1F) where four tests were used and in the case of South Carolina Elberta fresh peaches (5F) where nine separate tests were utilized. The cross hatched sections denote the fiducial limits for $p = .05$. Only canned and frozen varieties are discussed in this section because the data for the fresh and dried peaches are the same as previously discussed in the section preceeding.

Canned peaches: The Phillips variety was inferior to all canned peaches in color and texture. There was no difference in flavor among the canned peaches. The Michigan varieties compared favorably with the California varieties. The California Midsummer variety gave the best results and the California Phillips variety the poorest results. Canned peaches can be recommended as satisfactory for pie making.

Frozen peaches: There was no significant difference within the group of frozen peaches in any of the factors tested. This showed that one variety of frozen peaches is as good as any other. A subjective measure on the score card for the judges' own preference in each pie denoted that frozen peach pies were preferred in most cases. The judges had a difficult time in distinguishing



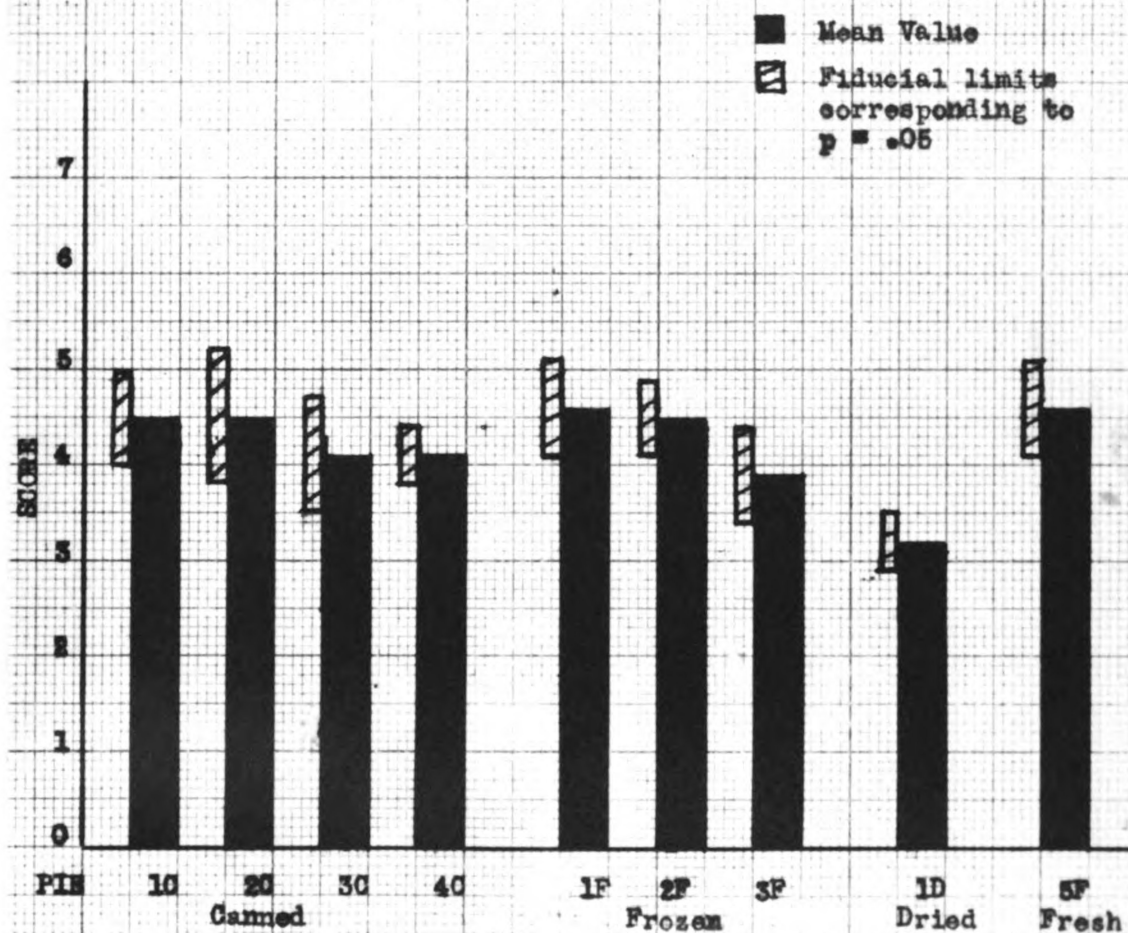


KEY:

1C - Michigan Elberta	1F - Michigan Elberta
2C - Michigan Hale Haven	2F - California Elberta
3C - California Phillips	3F - California Rio Oso
4C - California Midsummer	1D - California Muir
5F - South Carolina Elberta	

CHART VIII

AVERAGE SCORES OF JUDGES FOR ODOR OF PEACH PIES

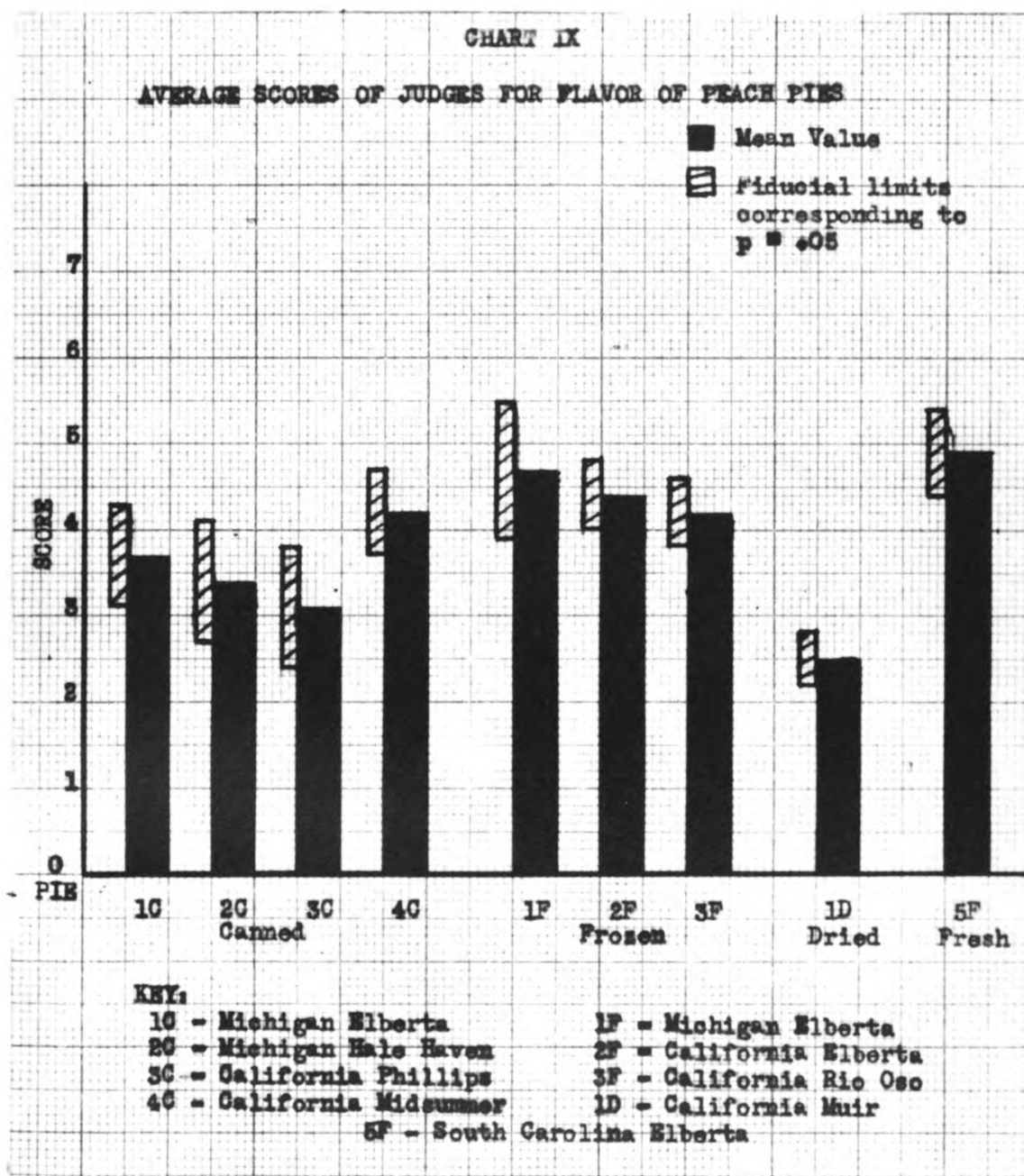


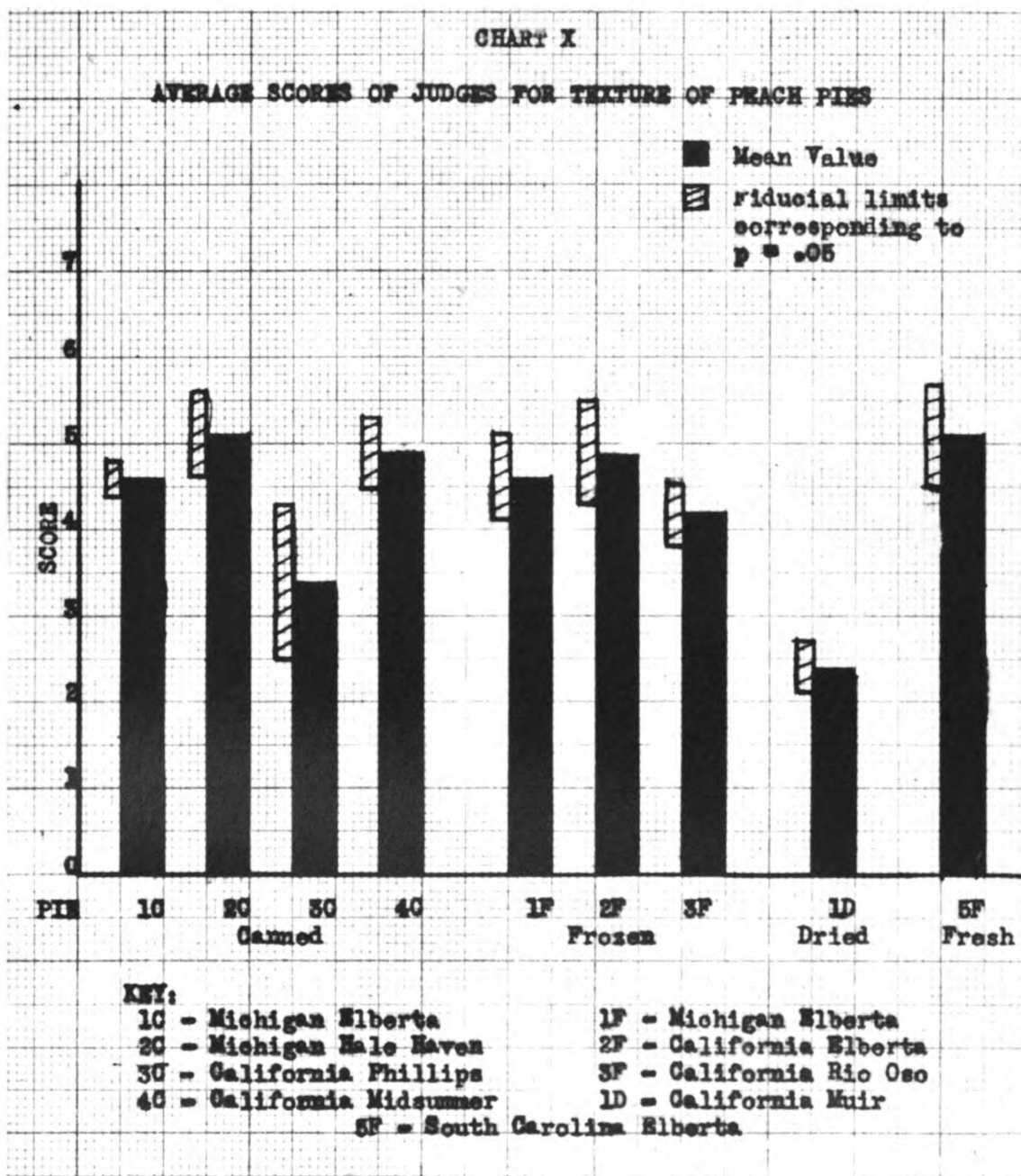
KEY:

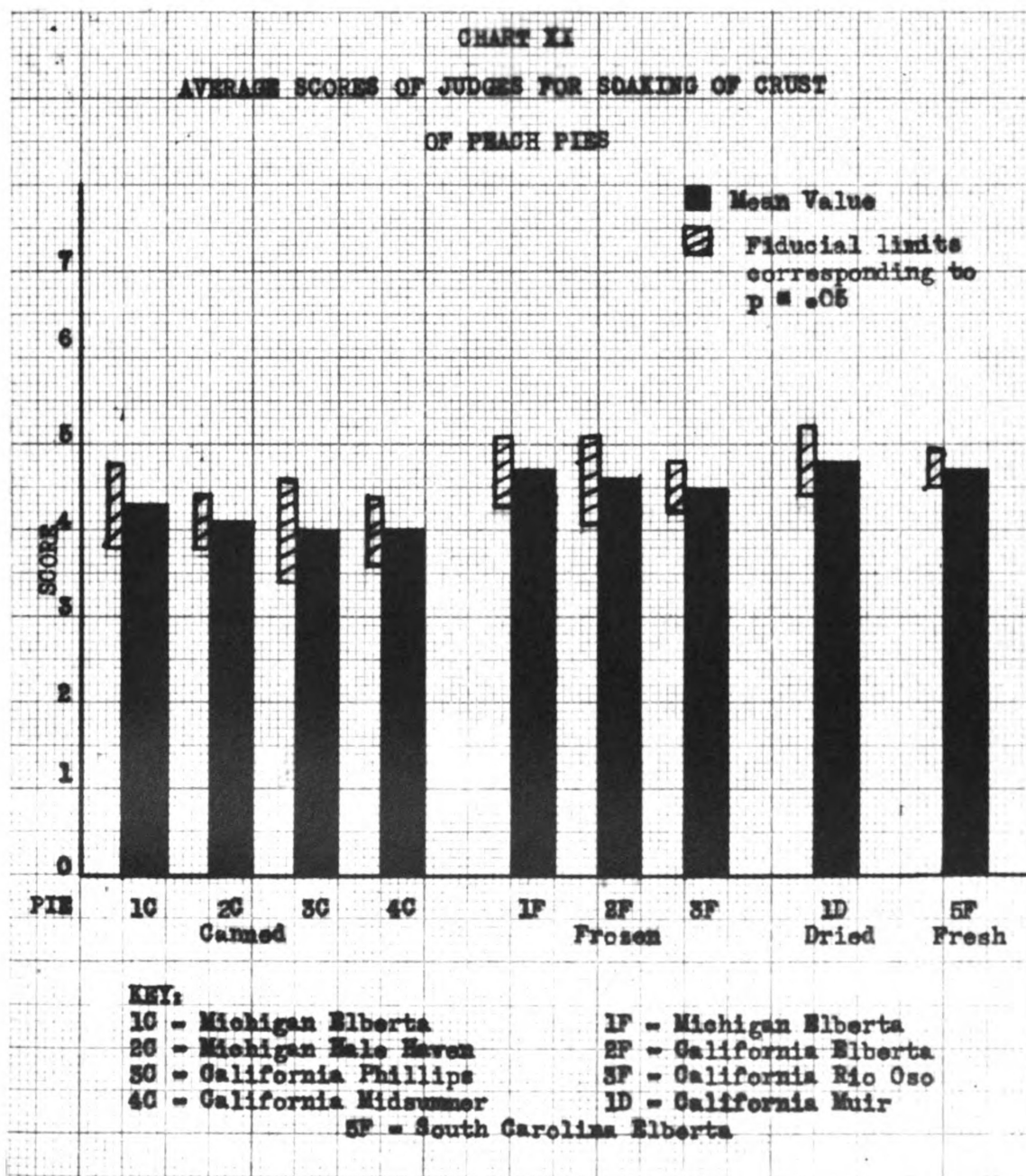
1C - Michigan Elberta
 2C - Michigan Hale Haven
 3C - California Phillips
 4C - California Midsummer

1F - Michigan Elberta
 2F - California Elberta
 3F - California Rio Oso
 1D - California Muir

5F - South Carolina Elberta







between fresh and frozen peach pies. Frozen peach pies were preferred to canned and dried peach pies.

Preparation Time, Material and Labor Cost: The institution in its use of peaches for pies is not only interested in the factors of color, texture, flavor, etc. which have been discussed but also in the cost in preparation time and materials. The results of this survey may be found in Table VII and in the labor data and cost data per individual pie. The cooking of the filling, the pie crust preparation and rolling of the dough, and the baking time for each group of the types of peaches are standardized. The variables in each group were: for dried peaches--soaking, cooking of soaked peaches, cooling, slicing; for canned--draining time; for frozen--defroasting time and for fresh peaches the preparation time for peeling, slicing, etc. The preparation time including all variables in each case was greatest for the dried peaches and least for canned peaches. Labor cost was calculated at the present wage rate of \$1.00 per hour. The labor cost was the greatest for fresh peaches and lowest for frozen and dried peaches. The total material cost, including labor and materials, was lowest for dried peaches. For some types of institutions, as school cafeterias, where cost is a chief consideration in use, dried peaches would be recommended on this basis. Fresh peaches are the most costly in preparation time and materials. There is also a factor of

waste which does not affect the other types. Customer demand, the type of clientele of a restaurant or hotel may make their use desirable even in the face of these disadvantages. The prices for products made with fresh peaches must be correspondingly greater. Canned and frozen peaches are both advantageously used. Canned peaches are very good for their short preparation time. Frozen peaches must be allowed time to thaw but this may be done at such a time to offset the disadvantage of the length of time necessary. Michigan peaches were found to be cheaper than California peaches in both frozen and canned types.

TABLE VII
SURVEY OF PREPARATION TIME, MATERIAL AND LABOR COST

Type of Peaches	Total Preparation Time		Total Material Cost	Total Labor Cost	Total Cost Material and Labor
<u>Average</u>					
Fresh	1 hr.	14.5 min.	\$.3480	\$1.145	\$1.493
Frozen	4 hrs.	4.5 min.	.4286	1.045	1.474
Canned	1 hr.	7.5 min.	.3896	1.075	1.465
Dried	4 hrs.	29.5 min.	.3401	1.045	1.3851

* Actual labor time figured on basis of \$1. per hour.

Cost Data per Individual Pie

Fresh Peach Pies

1 1/2 lbs. fresh peaches at .07 lb.	.105
1 1/4 cups sugar and 1/2 oz. cornstarch	.0870
Pastry cost	<u>.156</u>
Material cost	\$.3480
1 hr. 14.5 min. preparation time.	
Labor cost	<u>1.145</u>
Total Material and Labor Cost	\$1.493

Frozen Peach Pies

1F	
1 1/2 lbs. frozen peaches at .12 lb.	.1800
1/4 cup sugar and 1/2 oz. cornstarch	.0326
Pastry cost	<u>.1560</u>
Material cost	\$.3686

1 hr. 4.5 min. actual preparation time.	Labor cost	<u>1.0450</u>
	Total Material and Labor Cost	\$1.4136

2F and 3F	
1 1/2 lbs. frozen peaches at .18 lb.	.27
1/4 cup sugar and 1/2 oz. cornstarch	.0326
Pastry cost	<u>.1560</u>
Material cost	\$.4586

1 hr. 4.5 min. actual preparation time.	Labor cost	<u>1.045</u>
	Total Material and Labor Cost	\$1.5036

Dried Peach Pies

3/4 lb. dried peaches at .2020 lb.	.1515
1/4 cup sugar and 1/2 oz. cornstarch	.0326
Pastry cost	<u>.1560</u>
Material cost	\$.3401

1 hr. 4.5 min. actual preparation time.	Labor cost	<u>1.045</u>
	Total Material and Labor Cost	\$1.3851

Cost Data per Individual Pie (Continued)

Canned Peach Pie

10		
2 cups peaches (1/4 of #10 can at .75)		.1875
1/4 cup sugar and 1/2 oz. cornstarch		.0326
Pastry cost		.1560
	Material cost	<u>\$.3761</u>

1 hr. 7.5 min. actual preparation time.	Labor cost	<u>1.075</u>
	Total Material and Labor Cost	<u>\$1.4511</u>

20		
2 cups peaches (1/4 of #10 can at .78)		.1950
1/4 cup sugar and 1/2 oz. cornstarch		.0326
Pastry cost		.1560
	Material cost	<u>\$.3836</u>

1 hr. 7.5 min. actual preparation time.	Labor cost	<u>1.075</u>
	Total Material and Labor Cost	<u>\$1.4586</u>

30		
2 cups peaches (1/4 of #10 can at .82)		.2050
1/4 cup sugar and 1/2 oz. cornstarch		.0326
Pastry cost		.1560
	Material cost	<u>\$.3936</u>

1 hr. 7.5 min. actual preparation time.	Labor cost	<u>1.075</u>
	Total Material and Labor Cost	<u>\$1.4686</u>

40		
2 cups peaches (1/4 of #10 can at .865)		.2153
1/4 cup sugar and 1/2 oz. cornstarch		.0326
Pastry cost		.1560
	Material cost	<u>\$.4049</u>

1 hr. 7.5 min. actual preparation time.	Labor cost	<u>1.075</u>
	Total Material and Labor Cost	<u>\$1.4799</u>

Pastry cost obtained from Union Cafeteria; other costs are computed from market prices to institutions.

Labor Data

Fresh Peaches

Pre-ple preparation (Peeling etc.)	10 min.
Preparation (sugaring, juice)	2 "
Cooking of filling	4 "
Put in filling in crust	1 "
Crust preparation	12.5 "
Baking time	45
Total time	<u>1 hr. 14.5 min.</u>

Frozen Peaches

Defrosting time	3 hrs.
Preparation (draining, sugar etc.)	2 min.
Cooking of filling	4 "
Put in filling in crust	1 "
Crust preparation	12.5 "
Baking time	45 "
Total time	<u>4 hrs. 4.5 min.</u>
Actual labor time	1 hr. 4.5 min.

Canned Peaches

Draining and opening can	3 min.
Preparation (sugar, cornstarch)	2 "
Cooking of filling	4 "
Put in filling in crust	1 "
Crust preparation	12.5 "
Baking time	45
Total time	<u>1 hr. 7.5 min.</u>

Dried Peaches

Soaking time	3 hrs.
Cooking	15 min.
Cooling	10 "
Slicing and preparation (sugar etc.)	2 "
Cooking of filling	4 "
Put in filling in crust	1 "
Crust preparation	12.5 "
Baking time	45 "
Total time	<u>4 hrs. 29.5 min.</u>
Actual labor time	1 hr. 4.5 min.

V. SUMMARY AND CONCLUSIONS

Canned, frozen, dried and fresh peach varieties were used for pie baking under institution conditions. Four varieties of canned, three of frozen, and one each of dried and fresh peaches were utilized. The fresh peach pie was the standard pie. Each pie was baked five times with the exceptions of the fresh peach pie baked nine times and the frozen Michigan Elberta peach pie baked four times. The pies were scored by seven judges on the basis of color, consistency, odor, flavor, texture and soaking of crust. The preparation time and cost of materials and labor were also considered. It can be concluded on the basis of this study that frozen, canned and fresh peaches are acceptable for pie baking. The dried peach pies made during this study were inferior to those made with other forms of peaches. Within the canned variety group, the Midsummer peach was most satisfactory and the Phillips variety was inferior and not to be recommended. There was no significant difference between frozen varieties. Michigan peach varieties compared favorably with California varieties. In the canned peach group, the Michigan varieties were superior to the California Phillips variety. In cost, Michigan peaches were cheaper in both the frozen and canned types.

Dried peaches were the lowest in material and

labor cost but had the highest total preparation time. Canned peaches were the lowest in preparation time but were more expensive than dried peaches. Each institution must determine the factors of most importance to it and select the type best suited to its needs. Peaches are very satisfactory for use in institutions for all types are available. More experimental work needs to be done so that recommendations may be made to the institution user of peaches. An acquaintance with varieties and their suitability for institution use must be promoted. Experimental work in the use of various varieties for products other than pies should be studied.

A P P E N D I X

Pie Filling Score Card

Name _____ Date _____

Sample Number					
Color					
Consistency					
Odor					
Flavor					
Texture of Fruit					
Soaking of Crust					
General Conclusion					
Acceptability Yes or No					
Rating Order of Preference					

- Key**
1. Very Poor
 2. Poor
 3. Fair
 4. Medium
 5. Good
 6. Very Good
 7. Excellent
- Defects**
1. Color: Brown, spotted
 2. Consistency: Excessively juicy, dry pulp, too thick juice
 3. Texture of Fruit: Hard, mushy
 4. Flavor: Flat, too sweet, too tart, oxidized other off flavors
 5. Odor: Lacking, oxidized, foreign, hay
 6. Feathering: Pronounced, medium, slight
- Standard**
- clear, yellow juice well retained in pulp tender but holds shape



TABLE VIII

AVERAGE SCORES OF EACH JUDGE FOR FROZEN PEACH PIES

FACTORS COLOR CONSISTENCY ODOR FLAVOR TEXTURE SOAKING

Pie 1F

Judge A	5.3	6.7	6.7	7.0	6.3	6.3
B	4.5	5.8	4.5	5.0	5.0	5.0
C	4.8	6.0	5.8	5.5	6.0	5.2
D	4.8	5.7	4.8	5.0	4.7	3.5
E	2.5	4.0	3.8	4.0	3.5	3.7
F	3.2	4.5	3.0	3.0	3.8	4.5
G	3.5	3.5	3.5	3.0	3.3	4.5
Av.	4.1	5.2	4.6	4.7	4.6	4.7

Pie 2F

Judge A	4.8	6.2	6.2	6.6	6.0	6.0
B	4.0	5.0	4.4	4.0	4.8	5.0
C	4.2	5.0	5.0	5.0	5.8	4.8
D	4.0	5.2	5.2	3.4	5.0	3.6
E	3.0	4.0	3.5	4.6	4.6	4.4
F	3.4	3.8	2.8	3.2	4.4	4.4
G	3.6	3.8	4.0	4.0	4.0	4.2
Av.	3.9	4.7	4.5	4.4	4.9	4.6

Pie 3F

Judge A	5.6	5.8	5.6	5.2	5.2	5.6
B	3.8	4.8	4.0	4.8	4.6	4.8
C	4.0	5.4	4.4	4.6	5.6	4.8
D	3.6	4.4	3.8	3.0	3.4	3.6
E	3.8	3.8	3.8	4.8	4.0	4.0
F	3.2	3.6	3.0	3.8	3.2	4.2
G	4.5	4.8	2.5	2.8	3.5	4.2
Av.	4.0	4.6	3.9	4.2	4.2	4.6

AVERAGE SCORES OF EACH JUDGE FOR DRIED PEACH PIE

Pie 1D

Judge A	1.2	2.8	4.0	4.0	3.6	5.8
B	1.2	4.0	3.4	1.6	1.2	4.8
C	2.2	4.8	4.8	4.4	5.2	4.4
D	2.0	3.0	2.8	2.2	3.0	4.4
E	1.0	2.0	2.0	1.7	1.0	4.8
F	1.0	1.4	2.2	1.6	1.0	4.4
G	1.0	2.6	2.2	1.2	1.2	4.6
Av.	1.4	3.1	3.2	2.5	2.4	4.7

TABLE VIII (Continued)

AVERAGE SCORES OF EACH JUDGE FOR FRESH PEACH PIE
(STANDARD)

FACTORS COLOR CONSISTENCY ODOR FLAVOR TEXTURE SOAKING

Pie Fresh

Judge A	6.4	6.1	5.9	6.0	6.8	5.9
B	4.9	5.0	4.8	5.6	5.4	4.9
C	5.6	5.3	5.3	4.5	4.4	4.7
D	5.5	5.4	4.8	4.6	4.4	3.7
E	4.6	4.4	4.1	4.8	4.6	4.4
F	4.7	4.4	3.4	4.2	4.7	4.6
G	4.9	5.0	3.7	4.8	5.1	4.5
Av.	5.2	5.1	4.6	4.9	5.0	4.7

AVERAGE SCORES OF EACH JUDGE FOR CANNED PEACH PIES

Pie 1C

Judge A	5.4	6.2	6.6	4.6	5.8	4.6
B	4.6	5.4	4.2	4.6	4.2	5.0
C	5.0	5.2	5.2	4.6	5.0	4.2
D	5.0	4.8	5.0	3.4	4.8	4.0
E	4.0	4.3	3.8	3.0	4.7	3.8
F	3.8	4.6	2.6	1.8	3.8	4.0
G	4.6	4.8	4.0	4.0	4.2	4.4
Av.	4.6	5.0	4.5	3.7	4.6	4.2

Pie 2C

Judge A	4.6	5.3	6.4	4.6	5.4	4.4
B	4.2	4.6	3.8	4.0	5.2	4.6
C	5.4	5.4	5.6	4.6	5.8	3.8
D	5.0	5.0	4.6	3.2	4.8	3.6
E	4.8	5.0	3.7	2.0	5.0	4.3
F	4.4	4.0	3.4	2.0	4.8	3.4
G	4.4	4.8	3.6	2.8	4.6	4.4
Av.	4.7	4.9	4.5	3.4	5.1	4.0

Pie 3C

Judge A	3.4	4.8	4.4	3.6	3.0	4.2
B	3.8	4.4	4.4	3.8	3.4	4.6
C	4.0	5.4	4.4	3.6	5.2	3.4
D	3.4	4.2	3.6	2.6	3.8	3.6
E	3.0	3.6	3.6	2.0	2.6	3.6
F	2.2	3.6	3.8	2.0	2.4	3.6
G	3.0	5.7	4.3	4.0	3.0	5.0
Av.	3.2	4.5	4.0	3.0	3.4	4.0



TABLE VIII (Continued)

AVERAGE SCORES OF EACH JUDGE FOR CANNED PEACH PIES

FACTORS COLOR CONSISTENCY ODOR FLAVOR TEXTURE SOAKING

Pie 4C

Judge	A	6.8	5.6	4.2	4.4	5.8	4.4
	B	6.2	5.0	3.8	4.4	5.2	4.4
	C	6.0	5.2	5.0	4.4	5.0	3.1
	D	5.4	4.6	4.2	3.8	4.4	3.4
	E	5.0	4.6	4.0	4.2	5.0	3.6
	F	4.6	4.2	3.8	3.8	3.8	3.6
	G	5.6	5.2	3.5	4.3	5.0	5.0
	AV.	5.6	4.9	4.1	4.2	4.9	3.9

TABLE IX
AVERAGE SCORES FOR DAILY SAMPLES

Sample 10

Date	8-12	8-18	8-22	8-27	8-28	Total
Color	4.2	3.9	4.8	4.6	5.4	22.9
Consistency	5.0	4.7	5.4	5.0	5.1	25.2
Odor	4.5	4.7	4.8	3.8	4.6	22.4
Flavor	3.7	3.8	4.3	3.0	3.9	18.7
Texture	4.3	4.7	4.5	4.7	4.7	22.9
Soaking	3.6	4.6	4.0	4.3	4.4	20.9
Total	25.3	26.4	27.8	25.4	28.1	133.0

Sample 20

Date	8-12	8-18	8-22	8-26	8-27	Total
Color	5.3	4.0	4.0	5.0	5.0	23.3
Consistency	5.3	4.3	5.3	4.9	5.0	24.8
Odor	4.6	4.7	5.3	4.0	3.8	22.4
Flavor	3.8	3.7	3.9	2.9	2.6	16.9
Texture	5.3	5.6	5.2	4.8	4.6	25.5
Soaking	3.7	4.1	4.0	4.0	4.4	20.2
Total	28.0	26.4	27.7	25.6	25.4	133.1

Sample 30

Date	8-12	8-14	8-16	8-18	8-20	Total
Color	3.1	3.0	3.4	3.0	3.7	16.2
Consistency	5.1	4.7	4.9	4.0	3.8	22.5
Odor	4.3	4.4	4.4	3.8	3.3	20.2
Flavor	3.0	3.6	3.3	2.7	2.2	14.8
Texture	3.8	3.7	4.0	3.1	2.3	16.9
Soaking	3.4	4.3	4.7	3.7	4.0	20.1
Total	22.7	23.7	24.7	20.3	19.3	110.7

Sample 40

Date	8-12	8-14	8-18	8-20	8-29	Total
Color	5.3	6.1	5.7	5.5	5.6	28.2
Consistency	5.4	4.8	4.9	4.3	5.1	24.5
Odor	4.0	3.7	4.3	4.0	4.4	20.4
Flavor	4.3	4.3	4.7	3.7	3.9	20.9
Texture	5.3	4.9	4.9	4.5	4.9	24.5
Soaking	3.4	4.1	4.1	4.0	4.0	19.6
Total	27.7	27.9	28.6	26.0	27.9	138.1

TABLE IX (Continued)
AVERAGE SCORES FOR DAILY SAMPLES

Sample 1F

Date	8-26	8-27	8-28	8-29	Total
Color	3.4	3.6	4.6	4.7	16.3
Consistency	5.3	4.9	5.1	5.4	20.7
Odor	4.6	4.1	4.9	4.7	18.3
Flavor	4.0	4.9	4.6	5.1	18.6
Texture	4.4	4.4	5.1	4.6	18.5
Soaking	4.4	5.0	4.7	4.6	18.7
Total	26.1	26.9	29.0	29.1	111.1

Sample 2F

Date	8-14	8-16	8-26	8-27	8-29	Total
Color	4.1	3.6	3.6	4.1	3.9	19.3
Consistency	4.6	4.3	4.9	5.0	4.8	23.6
Odor	4.7	4.6	4.3	4.0	4.7	22.3
Flavor	4.9	4.1	4.1	4.6	4.3	22.0
Texture	5.6	4.8	5.1	4.7	4.4	24.6
Soaking	5.0	5.0	4.6	4.6	4.0	23.2
Total	28.9	26.4	26.6	27.0	26.1	135.0

Sample 3F

Date	8-16	8-20	8-26	8-28	8-29	Total
Color	4.4	3.3	3.3	4.6	4.6	20.2
Consistency	5.1	4.0	3.6	5.1	5.3	23.1
Odor	4.0	3.8	3.3	4.3	4.1	19.5
Flavor	4.3	3.9	3.8	4.5	4.4	20.9
Texture	4.4	4.0	3.8	4.4	4.4	21.0
Soaking	4.9	4.2	4.6	4.4	4.3	22.4
Total	27.1	23.2	22.4	27.3	27.1	127.1

Sample 1D

Date	8-14	8-16	8-20	8-22	8-28	Total
Color	1.0	1.4	1.5	1.3	1.7	6.9
Consistency	3.2	2.7	3.0	3.5	2.9	15.3
Odor	3.0	3.2	3.5	3.2	3.0	15.9
Flavor	2.7	2.3	2.7	2.5	2.2	12.4
Texture	2.1	2.3	2.3	2.8	2.4	11.9
Soaking	5.0	5.0	4.3	5.0	4.4	23.7
Total	17.0	16.9	17.3	18.3	16.6	86.1

TABLE IX (Continued)
AVERAGE SCORES FOR DAILY SAMPLES

Sample 5F

Date	8-14	8-16	8-18	8-20	8-22
Color	4.9	5.7	5.4	4.8	4.5
Consistency	5.4	5.6	5.6	5.5	3.5
Odor	4.6	5.7	5.0	4.5	4.2
Flavor	5.3	5.7	5.6	4.5	4.2
Texture	5.1	5.9	6.0	3.5	4.3
Soaking	4.6	5.0	4.7	4.4	4.6
Total	29.9	33.6	32.3	27.2	25.3

Sample 5F (Continued)

Date	8-26	8-27	8-28	8-29	Total
Color	5.6	5.0	5.4	5.7	47.0
Consistency	5.2	4.4	5.0	5.6	45.8
Odor	4.0	3.7	5.0	4.4	41.1
Flavor	4.7	4.0	4.8	5.3	44.1
Texture	5.3	4.6	5.1	5.6	45.4
Soaking	4.3	5.0	4.6	4.7	41.9
Total	29.1	26.7	29.9	31.3	265.3

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