



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

8476
p 2

**USE OF
FRUITS**

by

CHICAGO BAKERS



LIBRARY
CURRENT SERIAL RECORD
JUL 12 1951
U. S. DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS

Agriculture Information Bulletin No. 42

WASHINGTON, D. C.

JUNE 1951

This is one of a series of studies of industrial consumer preferences conducted by the Division of Special Surveys under the direction of Forrest E. Clements, Head of the Division.

The study director was:

Jane A. Shepherd

Assisted by:

Pauline S. Taylor

The following persons made up an advisory committee that assisted in planning the study and setting its objectives: Gladys L. Gilpin, Bureau of Human Nutrition and Home Economics, Grayson L. Kuehnert, Production and Marketing Administration, Harry W. von Loesecke, Bureau of Agricultural and Industrial Chemistry, Shelby A. Robert, Jr., Bureau of Agricultural Economics, and Arthur W. True, Agricultural Research Administration.

Use of Fruits by Chicago Bakers



Research conducted under authority of the
Research and Marketing Act of 1946

UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics

Agriculture Information Bulletin No. 42

USE OF FRUITS BY CHICAGO BAKERS

Prepared in the Bureau of Agricultural Economics ^{1/}

CONTENTS

	Page		Page
Introduction -----	1	Survey findings for Chicago --	
Purpose and plan of study -----	2	continued	
Who was eligible for interview ----	2	Advantages and disadvantages of	
Who was interviewed -----	3	fresh fruits -----	54
Development of interview schedule -	3	Advantages and disadvantages of	
Interviewers used -----	3	frozen fruits -----	57
Interview method -----	3	Advantages and disadvantages of	
Fruits included in study -----	4	canned fruits -----	60
Treatment of results -----	4	Advantages and disadvantages of	
Highlights of findings -----	6	dried fruits -----	63
Survey findings for Chicago:		Bakers' reactions to a description	
The bakers' ideal pie -----	9	of dehydrofrozen fruits -----	68
Influence of the bakers' customers	20	Problems related to the use of	
Price and quality -----	24	frozen fruit -----	77
Use of fruits by Chicago bakers --	35	Seasonal variation in the use of	
Advantages and disadvantages of		apples by Chicago bakers -----	81
fresh, frozen, canned, and dried			
fruits from the bakers' point of			
view -----	49		

INTRODUCTION

The great number of pies consumed annually by the American public calls for large quantities of fruit. Commercial and institutional bakers are among the good customers of fruit growers and processors. In 1949, the American Bakers' Association estimates that the pie industry used, among other fruits, approximately 115,500 tons of apples, 17,100 tons of cherries, 8,000 tons of peaches, and 7,500 tons of blueberries.

In comparing these consumption data with yearly production totals, the pie industry uses approximately 7 percent of the cherries, 4 percent of apples, and 1 percent of the peaches harvested in this country. ^{2/} These differences in the relative consumption of certain fruits, together with the limited consumption of all fruits, suggests the possibility of expanding the market for certain fruits and for fruit in the aggregate. Periodic fruit surpluses further augment the need for a larger market.

^{1/} The Bureau of Agricultural Economics assumed major responsibility for this study, with cooperation and advice from the Production and Marketing Administration, the Bureau of Agricultural and Industrial Chemistry with its Western Regional Research Laboratory, and the Bureau of Human Nutrition and Home Economics.

Funds to conduct the study were provided under the Research and Marketing Act of 1946.

^{2/} Production totals obtained from Crop Reporting Board, Bureau of Agricultural Economics, U. S. Dept. of Agriculture, Dec. 1950.

What are the conditions that limit the use of the various fruits by bakers, and under what circumstances could their consumption be increased? Since the size of the harvest apparently is not a limiting factor in consumption, it is evident that selective preferences are operating. An understanding of the basis for these preferences is fundamental in any analysis of the potential market for fruit among bakers.

Purpose and Plan of Study

The Western Regional Research Laboratory of the United States Department of Agriculture, at Albany, Calif., has been working on the development of improved forms of processed fruit. The main purpose of this study was to obtain information that would help the laboratory develop a processed form of fruit best adapted to the needs of commercial users. It is hoped also that the findings will interest fruit growers, processors, and distributors.

Commercial bakers of pies were selected for study because they constitute one of the largest markets for processed fruits. Funds were not available for an intensive national survey so the study was limited to commercial and institutional bakers of fruit pies in Chicago, Ill. This limitation made it possible to explore in detail their present use of fruits; the factors that contribute to their decisions in buying fruits; and their attitudes toward the different forms of fruit -- fresh, frozen, canned, and dried -- now available to them. Special attention was given to the use of apples, peaches, and apricots for pies because of surpluses of these fruits at the time the work was planned.

This pilot study could provide the working basis for a national study. Although findings in a one-city study cannot be used to arrive at estimates for bakers in the country as a whole, it is hoped the findings will lead fruit producers and processors to a better understanding of the bakers' needs.

Who was Eligible for Interview

The groups to be studied included bakers of pies for wholesale and retail sale in Chicago and public and private institutions which do baking on the premises.

On the grounds that their consumption of fruit is of minor importance in total use of fruit, commercial bakers who did not bake fruit pies were excluded. As a rule, restaurants were excluded for the same reason but the retail bakery businesses of a few restaurants that had retail baked-goods counters were considered eligible.

Lists of commercial bakers were obtained from various sources, including Bakers' Review, Bakers' Weekly, Bakers' Helper, and the Classified Telephone Directory. The lists were consolidated and the names of those who reported that they did not bake pies were eliminated. Telephone talks with the individual bakers eliminated further ineligible, such as those who did not bake fruit pies and those who had gone out of business. A few could not be located, presumably because the business had been abandoned.

A list of public and private institutions which did baking on the premises was built up by telephoning the institutions listed in the classified telephone directory; by systematic exploration of baking facilities in city, county, and State institutions in Chicago; and by obtaining names of institutional purchasers of baking supplies. Included were schools, hospitals, penal institutions, and homes for the indigent and aged. It is not claimed that the list of Chicago institutions having bakeries is either exhaustive or representative.

Who was Interviewed

During October and November 1949, a total of 113 interviews were made with owners, managers, or purchasers in commercial bakeries, and with purchasers or dieticians for institutions that had bakeries.

These included interviews with 9, or 100 percent, of the "large" wholesale and retail-chain pie bakers, with 74, or 78 percent, of the "small" commercial pie bakers, regardless of trade classification; and with 30 purchasers and dieticians for institutions.

In classifying commercial bakeries into "large" and "small" pie-baking organizations for the purpose of this survey, the number of apple pies baked per year was used as the criterion. Those organizations that reported baking 100,000 apple pies or more a year were classified as "large" and those that reported baking fewer were classified as "small." Some of the bakeries designated "small" pie bakers reported larger gross incomes than some of those designated "large," but a major part of their production was in bread, rolls, cakes, cookies, or sweet goods. For the purposes of this survey, therefore, they are relatively small consumers of the fruits under study.

Development of the Interview Schedule

Detailed objectives for this study were developed in consultation with officers and executives of bakers' trade organizations and publications, and with technical and marketing experts in the U. S. Department of Agriculture. From these objectives a preliminary interview schedule was drafted and pre-tested on large and small commercial bakers and on purchasers for institutions in Washington, D. C. The final form of the interview schedule was reached only after practice interviews in Chicago.

Interviewers Used

The interviewers were selected because of their general maturity and experience in this field. They were thoroughly trained by means of group discussions of the questionnaire, double interviewing, and individual examination and discussion of all interviews made during the first weeks of interviewing.

Interview Method

Appointments for all interviews were made in advance by telephone, following a letter from the Head of Special Surveys Division, Bureau of Agricultural Economics, that had explained the purpose of the study. As the

interviews lasted from $1\frac{1}{2}$ to 3 hours, they were scheduled at the convenience of the bakers. If necessary, an additional visit was made to get information not available on the first, or to continue an interrupted interview.

Interviewers reported that commercial bakers and institution personnel alike were extremely generous with their time. Most of them expressed interest in the discussion. Only one interview was refused and two were broken off before completion.

In the questionnaire, there were many so-called open, or discussion, questions. Interviewers were instructed to record responses in full and in the words of the person interviewed.

Fruits Included in the Study

Use of all major deciduous tree fruits, as well as berries, grapes, and pineapple, was reported. Excluded from consideration were raisins, dried citron, glazed fruits, mincemeat, currants, citrus fruits, pumpkin, bananas, and rhubarb.

Treatment of Findings

Commercial pie bakers differed widely in volume of production. Eight of the nine large companies reported a total production of 5,943,365 apple pies a year (table 1). (The ninth company did not give production data, but was classified by fellow wholesalers as large.) Reports of apple pie production for the 73 small bakers who reported totaled 652,086. Although the large bakers are a relatively small group, they consumed approximately 91 percent of the apples used for commercial pie baking in Chicago.

In evaluating the tables dealing with apples, therefore, it should be remembered that the average weight given to the reply of a large commercial baker should be around 100 times that attached to the reply of a small commercial baker.

For tables dealing with some other fruits, however, the correct weights might be strikingly different. Estimates of quantities of apricots used for pies (table 1) indicate that the average weight attached to replies of large commercial bakers should be only about 20 times that given to the small bakers.

Conditions of purchase and use in institutions differed decidedly from those in commercial bakeries. In some institutions where there was a purchasing agent in addition to a manager, the purchasing agent was unable to give specific information on the actual use of fruit. In such cases, the purchasing agents were excluded from tabulations relating to the way in which fruit was used. Thus the total number of cases reported in the parts of tables dealing with institutions varies, depending on whether the interviewed purchasers had direct knowledge of the problem under discussion. In every case of this kind, explanation is given in a footnote.

Table 1.-Number of commercial bakers who in fall of 1949 had baked various numbers of apple and apricot pies during the preceding 12 months

Item	Apple pies		Apricot pies	
	Large commercial	Small commercial	Large commercial	Small commercial
	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>
Baked none -----	--	--	4	34
Baked:				
1 to 99 pies -----	--	2	--	11
100 to 9,999 -----	--	51	--	27
10,000 to 49,999 -----	--	18	4	--
50,000 to 99,999 -----	--	2	--	--
100,000 to 499,999 -----	4	--	--	--
500,000 to 999,999 -----	2	--	--	--
1,000,000 and over -----	2	--	--	--
Not ascertained -----	1	1	1	2
Number of cases -----	9	74	9	74
Number of pies reported ^{1/} -----	5,943,365	652,086	77,860	44,861
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Estimated pounds of fruit used by all commercial pie bakers in Chicago ^{2/} -----	^{3/} 7,830,000	^{3/} 796,000	^{3/} 99,000	^{3/} 53,000

^{1/} Excludes bakers not ascertained.

^{2/} Obtained by multiplying the number of pies baked by the reported average weight of fruit in the pie. In a few cases bakers could not give this figure, but it was assumed that their pies contained the average weight for the whole group.

^{3/} Estimates of the total quantities of apricots and apples used by small commercial bakers were obtained by projecting the quantities used by the 73 bakers reporting to the total group of 95 bakers. The non-reporting large baker was assumed to bake the minimum number of apple pies in the classification (100,000) and 10,000 apricot pies.

Because of the difference in character and importance of the three groups, all data are reported separately by type of organization. No totals for all groups interviewed are given because they would not represent any definable group and would actually be misleading.

Number of cases, rather than percentages, are used in most tables because of the small number of cases. The statistical reliability of percentages depends on the absolute number of interviews. Therefore, the use of percentages might be misleading, even though 100 percent of the large commercial bakers and 78 percent of the small commercial bakers were interviewed. But percentages were used in the charts because it was advisable to show the three groups on the same scale.

HIGHLIGHTS OF FINDINGS

What bakers want in fruit pies.-The decisions Chicago bakers made as to the fruits they used were found to be guided by their concept of a pie that would have maximum eye and appetite appeal for their customers. They wanted fruit pies to have a little, but not much, free juice; they wanted the fruit to remain in whole pieces, not mush down; to be tender; and to have a bright, natural color.

Kinds of apples preferred.-Large and small commercial bakers in Chicago disagreed on the varieties of apples that produce the best pies. Jonathan, Baldwin, Grimes Golden, and Willow Twig were most popular with large bakers; Rhode Island Greening was a strong favorite with small bakers. A few bakers preferred apples grown in certain sections, most often mentioning apples from New York and the Northwest. Good flavor and ability to hold shape in baking and to keep well in storage were the main reasons large bakers gave for preferring particular varieties. In addition, small bakers liked varieties that bake up soft and tender. The majority of bakers preferred apples with a tart flavor for pies. A very few said they wanted the apples to be a shade of green in the finished pie; as large a number objected to this color.

Kinds of peaches preferred.-No clear-cut preference was found for either clingstone or freestone peaches. The most frequent reason bakers gave for thinking freestone peaches made a better pie was their flavor; clingstones were most often mentioned as holding their shape in baking. The largest number of bakers wanted full-flavored peaches with a sweet taste. The great majority said they wanted yellow peaches; not one expressed a preference for white. Only a few indicated that it was important to have some red on the inside of the slice where it had been in contact with the pit.

Apricots.-Slightly more than half the commercial bakers said they baked apricot pies. Among these, the majority wanted apricots with a tart, strong flavor and a deep yellow or orange color.

Ranking of fruits for pies.-In all three groups, consumer demand or preference was most often mentioned as the chief factor regulating the bakers' use of fruit for pies. Apple pie was reported to lead in frequency of baking and cherry pie was second. Among commercial bakers, blueberry had a slight

lead over peach for third place and apricot was last. Institutions reported more frequent baking of peach pies than of blueberry. Asked why they did not bake more pies of peaches, apricots, cherries, and blueberries, most of the bakers replied that they baked as many as they could sell. Replies indicate, however, that more blueberries and cherries might be used if prices were lower, and more peaches and apricots if flavor and baking qualities were improved.

Price-quality relations.-The relation between the influence of price and that of quality on the bakers' consumption of fruits was found to be complex. The weight of evidence seems to indicate that the typical baker had minimum quality standards for fruits, and these he would not compromise. Within these standards, he bargained for price advantages with various suppliers. When costs mounted so that he could not maintain both his quality standards and his profits, he cut down on his consumption. Most bakers stated they did not buy the cheapest fruit available to them; they said it was their policy to bake a high-quality pie to meet competition. Cheap fruit, they said also, was likely to give a lower drained weight, have more waste, and take more labor. Bakers mentioned several methods of cutting down on costs and assuring a reasonable profit, but few commercial bakers said that they lowered the quality of fruit used or raised the price for the consumers.

In the purchasing situation, it appeared that the bakers' decisions were influenced almost equally by customer demand, the quality of the fruit offered, the price, and the results from testing a sample. They said they observed many characteristics in judging the quality of the fruits they bought. In order of mention by large commercial bakers, these were flavor, eye-appeal, texture when baked, freedom from bad sections or culls, drained weight, name of packer, section of the country where grown, grade, type of pack, ripeness, uniformity of slices, variety of fruit, size, sugar content, and uniformity of quality. Although large bakers said they discounted brand names as an indication of quality, many small bakers relied heavily on them.

Diversity of fruits used.-Large commercial bakers used, as a round number, an average of eight different fruits, compared with seven used by the average small commercial and the average institutional baker. (The actual arithmetic averages are 8.1, 7.2, and 6.9, respectively.) Large commercial bakers were likely to use a greater variety of frozen fruits, whereas small commercial bakers tended to use a greater variety of canned and fresh. Apparently, bakers were not wedded to any particular form, as such, but bought the one they considered most satisfactory for a specific fruit. For example, large commercial bakers reported that they used either fresh-whole or fresh-prepared fruit for most of their apple pies, but they used canned fruit for the majority, and frozen fruit for the remainder, of their apricot pies. All the large bakers said they used frozen cherries and blueberries for baking and a few also used the fresh. The largest number reported they used frozen peaches, but almost as many used canned. Compared with the large bakers, more of the small ones used canned fruits. Dried fruits of all kinds were apparently avoided by large bakers, but a considerable number of small commercial and institutional bakers used dried apricots and apples.

Reasons for use.-Those who used fresh fruit most said they did so primarily because of its superior flavor and customer appeal. Several small bakers said that they used fresh fruit most because it was cheaper in season. The main reasons given by those who used frozen most, included flavor similar to fresh; bright, natural color; and saving in time and labor. Bakers who used canned fruit most did so primarily for reasons of cost and convenience in handling and storing.

Quantities used.-Asked for detailed reports on their consumption of apples, peaches, and apricots during the week preceding the interview, replies indicated that the 9 large commercial bakers together consumed about five times as many apples in fresh weight during this period as the 74 small commercial bakers. With the exception of a relatively small quantity of canned, all the apples used by the large bakers were reported as fresh. Small commercial bakers used greater quantities of canned, frozen, and dried apples than the large bakers. The quantities of peaches consumed by all three groups during the 1-week period were far below their apple consumption. Again the quantities used by large bakers far outweighed the small and institutional bakers. About 60 percent of the peaches used by large bakers were frozen; the remainder being canned. Small commercial bakers and institutions reported using many more canned peaches than frozen. The quantities of apricots used for baking by all three groups during this period were relatively small, large commercial bakers using less than either the small or institutional bakers.

Bakers' attitudes toward different forms of fruit.-Survey results indicate that none of the existing fruit forms is wholly satisfactory for baking. Although fresh fruit was commended for its flavor and customer appeal, bakers objected to the time and labor involved in its preparation, the lack of uniformity in quality, the scarcity when out of season, and the difficulty of getting fresh fruit that was neither overripe nor green.

The most frequent hindrances mentioned in connection with frozen fruit had to do with the necessity for refrigeration and cost of storage. Criticisms included: Lack of uniformity in both quality and fruit-to-sugar ratio; relatively high cost with respect to drained weight; quick spoilage after thawing; and mushy texture. Some small bakers said the 30-pound container was too large for their business. Frozen apples were considered especially unsatisfactory by large bakers. Although frozen fruits in general were said to have disadvantages, frozen cherries and to a lesser extent frozen blueberries were praised by many bakers for their color, flavor, and texture.

Bakers liked the convenience and cheapness of canned fruit, but a number mentioned its poor flavor; dull, unnatural color; and unsatisfactory baking qualities.

Few bakers saw any advantages in using dried fruit for baking. The time that has to be spent in soaking dried fruit was the most frequent criticism of it, but almost an equal number said its flavor was poor and unnatural. The mashing of dried fruit in baking, its toughness even after soaking, and its dark color, were other disadvantages mentioned. Some bakers said also that dried fruit had a poor reputation among their customers and that sales might be injured if they used it.

Answers to a direct question on what fruits (in the various forms) bakers thought were most in need of improvement suggest that all groups of bakers would welcome the appearance on the market of an improved processed form of peaches and apricots.

Bakers' reactions to dehydrofrozen fruit.-About two-thirds of the commercial bakers and one-half of the institutional bakers expressed a favorable attitude toward a new method of processing fruit which has been developed by the Western Regional Laboratory of the Department of Agriculture and tentatively designated as dehydrofrozen fruit. Questions asked by the bakers about the new process indicated a wish for additional information, especially regarding its flavor, texture, and appearance; its cost; and how dehydration would affect the fruit. Many bakers said the new process would have an advantage in its lower costs for storage and transportation. The disadvantages they foresaw related mostly to their reservations about dehydration: additional costs of time and labor in reconstituting the fruit and possibly undesirable flavor and texture characteristics.

Frozen fruits.-Findings indicate that consumption of frozen fruit is limited by the available refrigerated space. All large commercial bakers said they depended on public storage, but only a few of the small commercial bakers and none of the institutions reported this practice. The majority in each group had some cooler space where frozen fruits could be kept a short time till they thawed, but relatively few small commercial and institutional bakers had regular-freezer or sharp-freezer space. The majority of bakers reported that they get most of their frozen fruit in 30-pound containers and were satisfied with that size. A few small and institutional bakers would like smaller containers, particularly for berries and other fruits which they use in relatively small quantities. The majority of the bakers were satisfied with the fruit-to-sugar ratio. Most of those who were dissatisfied would like less sugar.

Seasonal variations.-Seasonal fluctuations in the quality, availability, and price of fresh apples were accompanied by shifts from one form to another throughout the year on the part of many bakers. The number of bakers using fresh apples was at its peak during September and October. After October, the proportion who used fresh apples in each group dropped off to a low during March, April, and May for small bakers; and during May, June, and July for large. The low period of commercial apple-pie baking did not correspond exactly with the period when the fewest bakers used fresh fruit. A sizable number of bakers suggested that production was lowest during July and August because people preferred lighter desserts during hot weather.

SURVEY FINDINGS FOR CHICAGO

The Bakers' Ideal Pie

Survey results suggest that commercial bakers characteristically behave like both businessmen and artisans. They must make a profit to stay in business, but their activity is guided by individual standards of craftsmanship. Many of them believe they compete with other bakers and with housewives on the basis of quality as well as price. One small commercial baker commented:

We're competing with the housewife. She goes to the store and buys fresh fruit for her pies. So we have to use fresh fruit as much as possible to make as good a pie and make her want to buy it from us.

Assuming this to be true, bakers' decisions on the quantity and kinds of fruits used are strongly influenced by their concept of the end product, or finished pie. Consequently, it was well to learn how they would describe a pie having maximum eye and appetite appeal to their customers.

How do bakers describe a pie with maximum customer appeal?-Commercial bakers 3/ were asked:

The Government's scientists want to improve fruit products so that they will give the best possible results in baking. That's why we'd like your ideas about the kinds of pies you would like to make. In general, how do you think a fruit pie should look when it is cut?

Could you describe the consistency or texture of the fruit in the pie that you would consider ideal for your business?

Answers to these questions (table 2) evoke a mouth-watering image of the bakers' ideal fruit pie.

In an attempt to discover what bakers considered a good formula for the fruit-to-liquid ratio, they were asked:

How about the proportion of fruit to liquid (juice) ... what do you think it should be in the finished pie?

This was a perplexing question for many. Four of the large commercial bakers and 58 of the small bakers replied. Among large bakers who replied, the average estimate was 68 percent fruit to 32 percent liquid, or about 2 to 1; among small bakers who replied, the average estimate was 75 percent fruit to 25 percent liquid, or 3 to 1.

Almost unanimously, the bakers said they wanted the fruit to remain in whole pieces after baking. Asked: "After the pie is baked, do you like the fruit to remain in whole pieces or to cook down into something more like a sauce?", only one small commercial baker replied that he liked the fruit to cook down into a sauce.

What kind of apples do bakers prefer for pies?-Bakers were asked: "Which apple varieties have given you the best quality pies?" The replies scattered over a large number of varieties, and there was a lack of agreement between large and small commercial bakers (table 3). Among the large commercial bakers, the four most popular varieties in order of number of mentions were: Jonathan, Baldwin, Grimes Golden, and Willow Twig. Among the small commercial bakers, the four most popular in order of number of

3/ Institution personnel were not asked the questions in this section.

Table 2.-Commercial bakers' descriptions of appearance and texture of an ideal fruit pie when it is cut

Descriptions	Type of organization	
	Large commercial	Small commercial
	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}
Pie should have a little free juice that runs out and relatively little starch -----	8	65
Fruit should be in whole pieces, not mashed ----	6	52
Fruit should be tender, soft, easily cut with a fork; not rubbery or tough -----	5	32
Pie should have plenty of fruit, not mostly juice or filler -----	4	18
Fruit and filler should be clear, glossy -----	4	11
Fruit and filler should have a bright, natural color -----	3	16
Fruit and filler should run or flow when pie is cut -----	1	1
Fruit should have a fine grain or texture -----	1	1
Juice should not run out -----	--	3
Other descriptions -----	1	4
Number of cases -----	9	74

^{1/} Columns add to more than the total number of cases because more than one answer was possible.

mentions were: Rhode Island Greening, Northern Spy, McIntosh, and Jonathan. The Rhode Island Greening, especially, seemed to be a favorite of the small bakers, with 37 of the 64 who had a preference, naming it. Small commercial bakers were more poorly informed about varieties than the large, judging by the number who seemed unable to state a preference.

Those who gave a preference for one or more varieties were asked:

What is it about these varieties that makes them so good for baking?

The replies indicate that pie bakers primarily looked for apples that would have a good flavor, would hold their shape in pie baking, and would store well (table 4). In addition, small commercial bakers emphasized the need for an apple that would be tender when baked in pies.

The qualities that the principal users of fresh apples -- the large commercial bakers -- said they liked in the four varieties they most frequently preferred were as follows:

Jonathan.-Flavor seemed to be the quality the large commercial bakers particularly liked in the Jonathan. They also said these apples held up well in baking and had a nice color. One baker said:

The Jonathan will stand up well in baking and it makes a good-looking pie. But the flavor makes it better than the others.

Another baker commented:

We prefer the Jonathans but we can't use them exclusively because they are not good keeping apples in storage. So we use them when they are in season. They have a marvelous flavor and I like their color. A Jonathan has an amber color after it's baked, and I like that color because it has more eye appeal when the pie is displayed in a restaurant.

Baldwin.-Bakers reported they liked the Baldwin for its flavor and the fact that it would hold its shape and not mush down in baking. One baker said:

Baldwins have the tart taste I like in a pie and they won't mush on you. I like their ability to absorb juices in the pie and still retain the apple flavor.

Grimes Golden.-The Grimes Golden was mentioned favorably for its flavor and its baking qualities. One baker said:

I like the flavor and the baking character of the Grimes Golden. It has a good definite flavor and will hold its shape under heat. How an apple reacts under heat is the main thing.

Table 3.-Varieties of apples commercial bakers said they preferred for pie baking

Varieties	Type of organization	
	Large commercial	Small commercial
	Number ^{1/}	Number ^{1/}
Jonathan -----	7	6
Baldwin -----	5	4
Willow Twig -----	4	2
Grimes Golden -----	4	1
Rhode Island Greening -----	3	37
Northern Spy -----	3	9
Wealthy -----	3	3
Winter Banana -----	2	--
Duchess -----	2	--
Winesap -----	1	5
York Imperial -----	1	2
Delicious -----	1	1
McIntosh -----	--	7
Rome Beauty -----	--	4
Other varieties -----	--	9
Apples grown in:		
New York -----	1	9
Michigan -----	1	1
Northwest region -----	--	7
Appalachian area -----	--	4
No preference; didn't know -----	--	10
Number of cases -----	9	74

^{1/} Columns add to more than total number of cases because more than one answer was possible.

Table 4.-Reasons commercial bakers gave for preferring particular varieties of apples for pie baking

Reasons	Type of organization	
	Large commercial	Small commercial
	Number ^{1/}	Number ^{1/}
Have desirable flavor characteristics -----	8	37
Hold their shape and don't mush when baked -----	6	46
Hold up well in storage -----	5	4
Have desirable color -----	3	4
Bake up soft and tender -----	1	19
Are juicy -----	1	2
Are large -----	1	1
Bake up quickly, don't take too long to cook ---	--	4
Bake up fluffy, don't shrink -----	--	3
Other reasons -----	2	5
Number who prefer particular varieties -----	9	64

^{1/} Columns add to more than the total number with a preference for one or more varieties because more than one answer was possible.

Willow Twig.-The principal advantage of the Willow Twig was its ability to hold up in storage over a long period. One baker said:

Willow Twigs are used a great deal toward the end of the season because they hold up well in storage. You can go down and buy up a crop and they'll keep till the end of the season when the others are gone. But I don't particularly like them, except for their storage qualities.

The small commercial bakers' preference for the Rhode Island Greening was most often related to its excellent baking qualities. They said it held up in baking and yet was tender. They also liked the flavor. One small baker said:

The greening bakes up better than any other variety. They are not soft and mushy, but firm and tender. They have a nice tart taste. They're tops, I think, for a good apple pie.

Many bakers who used fresh apples indicated they habitually shifted from one variety to another throughout the year. At any particular time of the year, they said, baking qualities of a variety depend on when it reaches its peak of maturity and how well it will store.

A few bakers said they preferred apples grown in certain parts of the country (table 3). Apples grown in New York State and in the Northwestern States were most often mentioned, but the number of bakers citing such a preference was rather small.

As bakers most often based their variety preferences on flavor, it was important to know what taste characteristics they wanted. Bakers were asked:

Can you describe the taste you think the apples should have after they've been baked in a pie; that is, other than the spices?

The large commercial bakers and a big majority of the small bakers said they preferred a tart apple (table 5). Many also stipulated that they wanted the apples in the pie to taste like fresh apples and have a strong, pronounced flavor.

Table 5.-Taste characteristics commercial bakers said they preferred in apples used for pies

Taste characteristics	Type of organization	
	Large commercial	Small commercial
	Number ^{1/}	Number ^{1/}
Both tart and sweet -----	6	29
Tart only -----	3	26
Like a fresh apple -----	3	20
Strong, distinctive apple flavor, not bland ---	2	10
Sweet only -----	--	10
Other characteristics -----	2	1
Unable to describe desired taste -----	--	3
Number of cases -----	9	74

^{1/} Columns add to more than total number of cases because more than one answer was possible.

Some bakers singled out color for mention in describing an ideal pie (table 4). To obtain a more precise description of the preferred color for apples, bakers were asked:

What color do you like the apples to be in the finished pie?

Interviewers reported it was difficult for bakers to describe the color they preferred, and there is no assurance that when some bakers said they wanted apples in the finished pie to be a shade of yellow, that they did not have in mind the same color meant by other bakers who specified a shade of tan to brown. It was also difficult for bakers to think of the color of apples apart from the masking color of spices.

From the standpoint of varieties, the most significant finding on color preference is the relatively small number of both large and small commercial bakers who said they preferred apples to appear green in the pie. One large and eight small commercial bakers said they wanted their apples to be a shade of green; two large and five small commercial bakers specifically objected to this color.

What kind of peaches do bakers prefer for pies?-Bakers of peach pies were asked:

Which do you think gives a better quality pie -- clingstone or freestone peaches, or a mixture of both?

The replies indicate considerable scattering of opinions as to which type of peach made a better quality pie. Many of those who gave a preference for one type qualified their answers by mentioning advantages of the other (table 6).

Table 6.-Type of peach commercial bakers said made a better quality pie

Type of peach	Type of organization	
	Large commercial	Small commercial
	<u>Number</u>	<u>Number</u>
Freestone -----	4	34
Clingstone -----	3	26
Mixture of freestone and clingstone -----	--	5
Didn't know -----	1	4
Number who baked peach pies -----	8	69

Bakers who said they thought one type of peach made a better quality pie than the other were asked:

In what ways do you think (freestone or clingstone) peaches are better for pies?

The reason most frequently given for choosing freestone peaches was their flavor, while clingstones were most often preferred for holding their shape in baking (table 7).

Table 7.-Reasons commercial bakers gave for thinking either freestone or clingstone peaches made a better quality pie

Reasons	Type of organization			
	Large commercial		Small commercial	
	Preferred freestone	Preferred clingstone	Preferred freestone	Preferred clingstone
	Number ^{1/}	Number ^{1/}	Number ^{1/}	Number ^{1/}
Have a good flavor -----	3	--	20	9
Hold their shape in baking, do not mush; remain in whole pieces -----	1	2	8	12
Bake up soft and tender -----	2	--	3	2
Have a nice color -----	--	1	3	2
Are easier to prepare; take less labor -----	--	--	7	--
Are meaty and juicy; not stringy or dry -----	--	--	2	3
Come off the pit perfectly; not in pieces; less waste ---	--	--	3	--
Hold their color; don't turn dark -----	--	--	--	2
Other reasons -----	2	--	2	5
No reason given -----	--	--	4	2
Number who prefer the type among bakers of peach pies --	4	3	34	26

^{1/} Columns add to more than total number who prefer a type because more than one answer was possible.

As in the case of apples, flavor characteristics were most frequently mentioned by bakers as a reason for preferring a particular type of peach for pies. More information on the taste that bakers of peach pies said they wanted was obtained in reply to the question:

How about the taste of the peaches in the pie? Will you tell me what you think it should be like?

Unlike their flavor preference for apples, large commercial bakers tended to prefer a sweet taste in peaches. Four of them said they wanted peaches to taste sweet; only one wanted some tartness and that was in combination with sweetness (table 8). One large baker and 29 small ones said they wanted peaches to have some tartness. More than a fourth of the small bakers limited the tartness to a slight degree. Another desirable taste characteristic mentioned included a ripe, fresh peach flavor and several mentioned a hint of almond or bitter flavor. A considerable number said the flavor should be full and pronounced, not bland; a smaller group said they believed the flavor should be delicate.

To explore the bakers' choice of colors for peaches used in pies, those who baked peach pies were asked:

What color do you like peaches to be after they are baked in a pie?

Some said they preferred a light shade; others said they liked a dark; but the great majority mentioned some shade of yellow. Not one said he preferred a white peach. Some commented that they added coloring matter to peaches to get a rich, yellow color. One large commercial baker and four small ones indicated that they preferred to have some red on the inside of the slice where it had been in contact with the pit.

What kind of apricots do bakers prefer for pies?-Only 5 of the large commercial bakers and 40 of the small ones said they baked apricot pies. Asked: "Can you describe the taste which you think the fruit in apricot pies should have?", the majority of these gave a preference for a tart, strong flavor (table 9).

Bakers of apricot pies were asked:

What color do you like the fruit in your finished apricot pies to be?

The majority of replies could be classified as referring to a shade of deep yellow or orange. Few of the bakers preferred light shades of yellow and several emphasized that the color should not be a shade of rust or brown which they found to be common in dehydrated fruit.

Table 8.-Taste characteristics commercial bakers said they preferred in peaches used for pies

Taste characteristics	Type of organization	
	Large commercial	Small commercial
	Number ^{1/}	Number ^{1/}
Sweet, not tart -----	3	22
Like a fresh, ripe peach -----	3	21
A strong, distinctive peach flavor, not flat or bland -----	3	15
Delicate, not strong -----	3	5
Like an Elberta -----	3	2
Sweet, but also tart -----	1	12
Tart, rather tart -----	--	9
A little tart -----	--	8
A little almond -----	--	3
Other characteristics -----	1	--
Unable to describe desired taste -----	--	5
Number who baked peach pies -----	8	69

^{1/} Columns add to more than the total number who baked peach pies because more than one answer was possible.

Table 9.-Taste characteristics commercial bakers said they preferred in apricots used for pies

Taste characteristics	Type of organization	
	Large commercial	Small commercial
	Number ^{1/}	Number ^{1/}
Sharp, tart, acid -----	3	18
Sharp or tart, but also sweet -----	--	11
Strong, distinctive apricot flavor -----	3	4
Like a ripe, fresh apricot -----	1	7
Sweet -----	--	4
Other characteristics -----	1	4
Unable to describe desired taste -----	1	1
Number who baked apricot pies -----	5	40

^{1/} Columns add to more than the total number who baked apricot pies because more than one answer was possible.

Influence of the Bakers' Customers

What determines the kinds of fruit pies bakers make?-The baker's goal is not just to bake an appetizing pie. He also wants to sell it to someone. Repeatedly the interviewed bakers referred to their customers' preferences and reactions to explain why they bought and baked as they did. The relative number of different fruit pies Chicago bakers turned out was found to be an outstanding example of the way they guided their activities by customer demand.

Commercial bakers and purchasers and dieticians for institutions were asked:

Thinking of the different fruits you use in making pies, which one fruit do you use most? Which do you use next most? Which do you use next most? Next? Next?

Replies were used to obtain average rank orders for production of apple, cherry, blueberry, peach, and apricot pies. For all three groups interviewed, apple pie was reported to lead in frequency of baking and cherry pie was second (table 10). Reports of commercial bakers gave blueberry a slight lead over peach for third place and put apricot in fifth place.

Institutions on the average reported more frequent baking of peach pies than of blueberry. Comparison of these rank orders with the estimates of the American Bakers' Association of the quantity of various fruits used by commercial bakers (page 1) shows good correspondence.

Table 10.-Average rank order of pie baking for apple, cherry, blueberry, peach, and apricot pies

Fruit pie	Type of organization		
	Large commercial	Small commercial	Institution
	Average-rank order $\frac{1}{/}$	Average-rank order $\frac{1}{/}$	Average-rank order $\frac{1}{/}$
Apple -----	5.0	4.8	4.7
Cherry -----	3.8	3.6	3.8
Blueberry -----	3.0	2.3	1.5
Peach -----	2.6	2.1	2.7
Apricot -----	0.1	0.5	1.5
Number of cases -----	9	74	$\frac{2}{25}$

$\frac{1}{/}$ Obtained by assigning a weight of 5 if the fruit is used most in pie baking; 4 if it is used second most, etc., and averaging the weights. A high average rank order indicates high frequency of baking. If all bakers baked pies of a particular fruit most, the average rank order would be 5.0.

$\frac{2}{/}$ Five purchasing agents for institutions were excluded from this table because they had no specific knowledge of the way the fruit they bought was used.

Bakers were then asked about the fruit they used most in baking pies:

Why do you bake more (name of fruit used most) pies than any other kind?

In all groups interviewed, customer demand or institutional inmates' preferences was most often mentioned as the chief influence on the bakers' use of fruit in pies (table 11). A number said apple pies lead because of traditional or national food habits. A few said they are baked most because they are one of the cheapest fruit pies to make.

Whenever apples, peaches, apricots, cherries, and blueberries were not the fruit used most for pies, bakers were asked about each:

The Department of Agriculture is interested in finding out why some fruits are not used more. In your business, why is it that you aren't baking more (name of fruit) pies?

Answers to these questions, summarized in table 12, again point to the strong influence of consumer preference. In many cases the bakers said they baked as many pies of each fruit as they had found from experience they could sell. Some said they guided their production by means of the sales figures of the previous day.

Replies indicate a possibility, however, that more blueberries and cherries would be used for pies if the prices were lower, and more peaches and apricots might be used if flavor and baking qualities were improved.

Table 11.-Reasons bakers gave for baking more pies of a particular fruit than any other kind

Reasons	Kinds of fruit pies made most by each type of organization						
	Large commercial	Small commercial			Institution		
	Apples	Ap- ples	Cher- ries	Pea- ches	Ap- ples	Cher- ries	Pea- ches
	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}			<u>Number</u> ^{1/}		
More consumer demand	6	53	4	1	17	--	1
National or tradi- tional dessert ---	3	14	--	--	3	--	--
More profitable ----	2	3	--	--	6	--	--
Milder, more neutral flavor; goes well with ice cream; could eat it every day and not get tired of it -----	--	4	--	--	1	--	--
More satisfactory qualities for bak- ing; a more uni- form fruit; firmer; doesn't mush -----	--	1	1	--	1	1	--
More eye appeal ----	--	1	1	--	--	1	--
Fruit donated -----	--	--	--	--	2	--	--
Other reasons -----	3	--	4	--	4	2	--
Not ascertained ----	--	1	--	--	1	--	--
Number who baked each pie "most" --	9	63	6	1	20	2	1

^{1/} Columns add to more than the total number who baked each pie "most" because more than one answer was possible.

Table 12.-Reasons bakers gave for not baking more pies of any of five fruits which are not in first position

Reasons	Kinds of fruit pies which were not the leader in each type of organization														
	Large commercial					Small commercial					Institution				
	Apples	Cherries	Peaches	Apricots	Blue-berries	Apples	Cherries	Peaches	Apricots	Blue-berries	Apples	Cherries	Peaches	Apricots	Blue-berries
<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	<u>1/</u> No.	
Customers didn't buy more -----	--	8	9	7	6	6	47	53	62	37	1	10	14	19	8
Fruit too expensive -----	--	--	--	--	6	--	14	2	--	31	--	10	4	--	15
Flavor not good -----	--	--	2	2	--	--	4	9	12	2	--	3	6	6	--
Qualities not satisfactory for baking: fruit too mushy; shrank when baked; too tough -----	--	--	1	1	--	1	1	2	7	7	1	--	4	4	1
Had less eye appeal -----	--	--	1	1	--	--	--	2	1	--	--	--	2	1	--
Differences in seasonal purchases -----	--	1	--	--	--	--	5	6	--	8	--	--	--	--	--
People ate fruit in other ways, not in pies -----	--	--	--	--	--	--	1	5	--	--	1	--	2	1	1
Stains and seeds affected teeth and mouth -----	--	--	--	--	--	--	2	--	--	6	--	--	--	--	2
Fruit scarce, couldn't get preferred varieties -----	--	--	--	--	--	--	--	1	--	2	--	--	--	--	--
Bad flavor during war -----	--	--	--	--	--	--	--	2	--	--	--	--	--	--	--
Other reasons -----	--	1	--	--	--	3	6	5	3	3	--	--	3	4	--
Didn't know -----	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--
Not ascertained -----	--	--	--	1	1	1	5	6	4	3	2	--	1	2	3
Number of cases the fruit was not in first position -----	--	9	9	9	9	11	68	73	73	74	5	23	24	25	25

1/ Columns add to more than total number of cases the fruit was not in first position because more than one answer was possible.

Price and Quality

A considerable number of bakers said that high prices had kept their consumption of blueberries and cherries for pies relatively low (table 12). When the price of a particular fruit is high, there are at least three kinds of adjustments a baker can make to maintain the same profits, other than raising the price of his pies: (1) He can cut down on the quantity of fruit used in each pie, (2) he can bake fewer pies of the expensive fruit and more of the less expensive fruits, making up profits on the latter, and (3) he can shift to a cheaper grade or poorer quality of fruit. Other adjustments can be made as well.

Adoption of the first or second alternatives would result in a decrease in consumption of the fruit and no change in quality requirements for the fruit itself. Adoption of the third would result in a shift to a less expensive form or grade of the fruit and a sacrifice in quality. Both kinds of adjustment have significance for fruit growers and processors.

Results of this survey indicate that the relation between the influence of price and the influence of quality on a baker's consumption of fruits is not simple. For one thing, a baker's definition of quality is likely to include aspects of cost, such as the relative yield from a given weight of fruit. For another, it is clear that both cost limitations and quality standards enforce boundaries on a baker's purchasing behavior. The balance of the evidence reported in this section seems to indicate that the typical baker interviewed in the study had minimum quality standards for fruits regarding which he would not compromise. Within these standards, he bargained for price advantages with various suppliers. When costs mounted so that he could not maintain both his quality and his profits, he cut down on his consumption.

Table 13 indicates that almost all those interviewed said they did not usually buy the cheapest available fruit products.

Table 13.-Replies to the question: "Do you usually buy the cheapest kind of fruit you can get?"

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u>	<u>Number</u>	<u>Number</u>
No -----	9	73	22
Depends -----	--	1	2
Yes -----	--	--	1
Number of cases -----	9	74	$\frac{1}{25}$

^{1/} The replies of five purchasing agents for institutions are not shown separately, but were included in the tabulations of their member institutions.

Asked to explain their reasons for avoiding the cheapest available fruit, all the large commercial bakers said it was their policy to bake a high-quality product (table 14). The majority of this group indicated that they held to this policy because the competition with other bakers in the Chicago market was on the basis of quality as much as price; and almost half said that when they had experimented in reducing the quality of fruit in their pies, the sales had dropped noticeably. An executive of a large pie bakery said:

It's very expensive to use fresh apples, but if we ever switched, we'd be out of business. I'm not kidding, we tried frozen apples for awhile a couple of years ago and we changed back fast. Our business dropped almost 35 percent within a week. (Why?) Something about the baking; the frozen apples just won't hold up in baking.

This experience was corroborated by another large bakery executive who said:

We tried about 5 years ago when we had a short crop of apples, to use the frozen, and we darn near ruined our business. Sales fell off 50 percent within a week. We have to use the fresh to make a good apple pie.

Some of the large bakers explained that high quality was economically synonymous with best buys. Cheaper fruits, they said, tended to give a lower yield of solid fruit, had more waste, and took more labor for cleaning and culling. Among the smaller bakers and institutions, though relatively fewer mentions were made of a policy to bake a high-quality product, the reasons were similar to those given by large commercial bakers (table 14).

To get a picture of the way a baker's standards of quality interact with his limitations on costs, a series of questions was asked regarding his buying of the pack form he most often used and about his pricing policies. These questions were as follows:

Another thing which would be helpful for the Department of Agriculture to know is how bakers actually decide about buying fruits. In your case, how do you decide whom to order from?

How do you usually go about ordering fruits?

When you are ordering fruits, what question do you usually ask the salesman about them?

What sorts of things do you tell the salesman you want?

What is your usual method of trying out a new fruit product to see whether you want to buy it again?

If you didn't have to worry about costs, in what ways would it be possible to improve your fruit pies?

In pricing fruit pies, any baker has to take a lot of things into consideration. As far as your business is concerned, what different things do you have to consider in setting the prices for your pies?

From the answers to all these questions, it was possible to classify most bakers into the attitudinal groups shown in table 15. The majority of large bakers said they made no compromises with quality and paid whatever was necessary for fruit that came up to their requirements. Three of them volunteered that they baked more than one quality of pie for different markets, buying cheaper fruit or cutting down on the quantity of fruit for the cheaper grade of pie. Almost a third of the small bakers and four-fifths of the institutions made statements in answer to the above questions that indicated some compromising on quality to save costs, even though they said they didn't go so far as to buy the cheapest quality they could get.

Table 14.-Reasons bakers gave for not usually buying the cheapest fruit they could get

Reasons given	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Policy to bake a high-quality product and to use high-quality fruit -----	9	50	9
Must make high-quality pie to meet standards of competitors-	7	8	--
Sales affected when quality was lowered, or consumers objected	4	21	6
Cheap fruit involved more waste, less yield -----	2	32	13
Not ascertained -----	--	7	7
Number who did not buy the cheapest fruit or answered "depends"	9	74	^{2/} 24

1/ Columns add to more than total number who did not buy cheapest fruit or answered "depends," because more than one answer was possible.

2/ The replies of five purchasing agents for institutions are not shown separately, but were included in the tabulations of their member institutions.

Table 15.-Bakers' attitudes toward price and quality

Attitudes	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u>	<u>Number</u>	<u>Number</u>
Paid what was necessary for a top-quality product ---	6	49	4
Made a top-quality product and a poorer quality product for different markets--	3	--	--
Had quality standards but balanced price against quality ---	--	23	20
Price was determining factor, bought the cheapest available--	--	1	1
No rating possible -	--	1	--
Number of cases -----	9	74	<u>1</u> / 25

¹/₁ The replies of five purchasing agents for institutions are now shown separately, but were included in the tabulations of their member institutions.

From answers to the same group of questions descriptions of methods of saving on costs and assuring a reasonable profit were tabulated. These replies (table 16) demonstrate the wide variety of adjustments bakers practice in a competitive economy. Only a few said they had passed along increased costs to the customers through higher prices. Relatively few said they had lowered the quality of fruit they bought, to save on costs. A more common adjustment they described was cutting down on consumption of fruit by reducing the quantity of fruit in the pie, or baking fewer pies of the expensive fruit, or stopping the baking of expensive fruit pies until prices declined. Bargaining, buying in quantity, and taking chances on market prices and supply, were mentioned by sizable numbers in each group. A few said that they experimented with different baking methods to improve efficiency.

Table 16.-Ways bakers said they saved on costs and assured a reasonable profit

Ways of cutting costs	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}
Purchasing methods:			
Comparative shopping among suppliers: looked for best price for a particular quality -----	7	47	19
Bought in quantity -----	6	22	9
Took advantage of condition of market: seasonal fluctuations in price, distressed packers, took chances on size of crop, other bargains -----	5	10	5
Saved on storage costs: by buying short when crop was big; by buying for a year with frequent delivery -----	2	--	--
Experimented to save costs within quality standards -----	--	1	4
Cutting consumption of particular fruit:			
Used less fruit: more filler in pie, a more shallow pie -----	5	34	6
Made up losses on expensive fruit for baking by using more of cheaper kind of fruit: for example, made more apple and fewer strawberry pies -----	4	28	19
Stopped buying or baking when price of a fruit got too high to make a profit or to meet institutional budget -----	3	9	5
Used cheaper fruit: cheaper form, grade, or quality -----	2	11	11
Raised price of finished product when prices or costs went up -----	1	5	--
Other ways of cutting costs -----	--	1	--
No ways of making savings on fruit mentioned -----	--	8	1
Number of cases -----	9	74	2/25

^{1/} Columns add to more than total number of cases because more than one answer was possible.

^{2/} The replies of five purchasing agents for institutions are not shown separately, but were included in the tabulations of their member institutions.

In giving an account of their usual purchasing methods, bakers indicated that one or more factors had influenced their decisions on buying fruit. Table 17 shows that price was mentioned by almost everyone. The complete list of such determinants, however, includes a large number of categories related to the baker's insistence on acceptable quality. Almost all those interviewed said their decisions had been formed on the basis of consumer preferences, the qualities of competing fruit products, and the way those products performed in an actual test. In addition, many said they relied on salesmen and brokers with whom they had had previous experience to assure high quality in the fruits they bought. Large commercial bakers also tended to rely on their experience with packing houses and fruit growers. The majority of these bought in such a way as to protect themselves against shortages of the fruits they used.

Among small bakers and institutions, relatively fewer said they bought by name of packing house or grower. A considerable number said they relied on the brand name of the product but none of the large commercial bakers said they did so. Prompt and dependable service was said to influence buying decisions in the case of a few in each group.

For anyone interested in promoting a new fruit product, the results reported in tables 15 and 17 are suggestive. For example, it seems clear that there would be genuine interest, particularly among large bakers, in a product that offers superior flavor and baking qualities, but the price would have to be competitive with the present products they are using. It also seems clear that the support of supply houses and packers would have to be obtained because of the heavy reliance baker consumers place on their advice. Demonstrations of the product, with adequate instructions on preparation, would be essential in order to gain acceptance.

The importance bakers attached to the quality of the fruit they bought has been given so much emphasis thus far that it is pertinent to ask here just what they meant by "quality." In an attempt to answer this question, a tabulation was made of quality characteristics mentioned by bakers in describing how they went about buying, the questions they asked the salesman, their methods of testing a new product, etc. Flavor, eye-appeal, and texture were the quality characteristics which led the field for both large and small bakers. Also mentioned by many were two characteristics which are aspects of both cost and quality -- yield or drained weight and freedom from blemishes that result in waste of fruit and labor (table 18).

Table 17.-Factors which bakers said influenced decisions in buying fruit

Factors mentioned	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Consumers' demand and preference -----	9	74	25
Quality: had established certain quality standards ^{2/} for fruit such as variety, grade, texture, ripeness, color, drained weight, etc. -----	9	73	25
Price: watched fluctuations, bargains, storage and labor costs; compared prices	9	72	25
Test of product: test of sample, taste panel, consumer reaction -----	9	72	25
Reputation of or experience with brokers, firms, salesmen, "people we deal with" --	8	30	10
Reputation of or experience with packing house -----	5	8	--
Reputation of or experience with orchards or growers -----	4	--	--
Reputation of or experience with brand ----	--	31	7
Supply: protected by advance buying; watched size and quality of crop -----	6	8	4
Service: prompt, frequent, and dependable delivery -----	2	12	4
Donations: Government and private -----	--	--	5
Other factors -----	--	2	1
Number of cases -----	9	74	^{3/} 25

^{1/} Columns add to more than total number of cases because more than one answer was possible.

^{2/} See table 18.

^{3/} The replies of five purchasing agents for institutions are not shown separately, but were included in the tabulations of their member institutions.

Table 18.-Qualities bakers said they looked for in buying or testing fruit

Qualities mentioned	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Flavor or taste -----	9	61	25
Eye-appeal: a good, bright, natural color -----	9	39	14
Texture: firmness; stayed in whole pieces when baked, didn't mush -----	8	49	20
No bad section or culls: no bruises; not oxidized -----	5	9	8
Yield, drained weight: water content; weight; count -----	4	27	18
Packer -----	4	6	1
Section of country grown -----	3	18	3
Grade of fruit: "1st grade fruit," U. S. No. 1 -----	3	9	9
Grade of fruit: "2nd grade," "3rd grade," U. S. Utility, etc. -----	1	--	10
Solid pack -----	2	26	3
Other mentions of pack -----	--	7	4
Ripeness: not overripe, not green; uniform in ripeness -----	2	13	6
Uniform pieces of fruit: uniformity in size of slice; fruit whole, not broken up -----	2	10	8
Variety -----	2	9	2
Size: "the proper size;" not too big -----	2	2	5
Low sugar content, or without sugar -----	2	6	1
Sugar content: quantity of sugar in the pack; wanted sugar for flavor; wanted "sugar-cured" fruit -----	--	10	3
Tender, soft, not rubbery when baked -----	1	18	4
Uniformity in quality -----	1	2	1
Brand -----	--	25	5
No foreign matter: no twigs, leaves; wanted fruit "clean" -----	--	2	2
Freshness: wanted it fresh, not last year's crop -----	--	3	--
Other qualities -----	2	4	1
Number of cases -----	9	74	<u>2/</u> 25

^{1/} Columns add to more than total number of cases because more than one answer was possible.

^{2/} The replies of five purchasing agents for institutions are not shown separately but were included in the tabulations of their member institutions.

Interviews showing buying practices.-The relationships among the factors that influence the bakers' purchasing decisions are complicated and subtle. To tell this story in the bakers' own words, parts of the interviews are reproduced here. Because the large commercial bakers comprise such a large part of the market for fruit, two interviews from this group are given. One interview from a small commercial baker is included to show the contrast in buying practices between the large and small commercial bakers.

One large commercial baker said:

We have our own apple buyers who buy directly from the orchards. We know certain growers from long years of experience and we know what we'll get from them - and they know what we want. As long as they play square with us, we'll deal with them.

On our frozen fruit we have several brokers who supply us. They represent packers who, we know from past experience, have what we want. It's the packer that is important, brands don't mean a thing and we know our packers, believe me! ... Generally the incentive to trade with a new person is price. Once in awhile something happens to my regular sources of supply and I look around.

We buy our fresh and frozen fruit for a year at a time. That's why we have about five times as big an inventory as the ordinary business. We do that for two reasons: to be sure of what we're getting and that we get it. Most packers of frozen fruits pack only to order ... if we don't order from them all we'll need at the beginning of the season, the fruit won't be available from these packers later on. If we have a good year, we may run out and then I get it any place I can. Sometimes, after January, the packers and brokers try to get rid of anything they have on hand, but it doesn't work right for me somehow. When I'm "long" everyone else is too; and when I'm "short," so is everyone else!

I don't buy canned fruit on a yearly basis. It's not so likely to run out and I can almost always get it. I just keep a running supply on hand. The packers of canned goods will take more risk than the frozen, because they can keep it longer if they have to.

If I'm buying from my regular packer, the broker knows what I want. But if I'm not sure of my source of supply or when I'm dealing with a new person, I ask for a sample or buy "subject to inspection." That means that the packers take a chance on my integrity for after the car gets here we inspect it and take a sample and run a bake on it. If it's not up to what we asked for, we won't take it. Of course, lots of times we can't do this because we have to buy before they start packing the fruit. When no sample is available or we can't buy subject to inspection, we take a look at their last year's pack. For example,

we can't buy subject to inspection in peaches and so we watch them pack some. They're packed according to our specifications and we're at their mercy on the drained weight if they want to be dishonest - unless we take it to court. Of course, we would never trade with them again. We buy Canadian blueberries subject to inspection....

The important thing about fruit is the kind of a finished product I get with it - the flavor, color, and texture of the fruit in the pie.

I have to have my quality, but I save money when I can. For instance, I always buy commercial (ungraded) instead of U. S. No. 1 fruit, especially if I'm going to use it or freeze it right away. In peaches, I buy tree-run Michigan peaches which includes both commercial and U. S. No. 1; the tree-run are only graded for ripeness. They're a little cheaper and suit my purposes as well. Then in the apples I prefer to have the No. 1's left out of what I buy. They're too big and they don't keep as well - and the flavor of the others is just as good. These commercial grades will make as good a pie, and they're a little cheaper in the long run.

I always buy the best fruit at the best price from the processor who will give me the best price on what I want. Our competition is in quality, and we've got to make as good a pie as we possibly can. So I have to have good fruit, but of course, I get it at the best price I can.

another large commercial baker said:

We've established good will with the growers and packers over a period of time and I know the quality and the dependability I can expect from them. Packing names are the most important, not brands. Some packers are co-ops, some own their own orchards, and some contract with certain orchards for their fruit. You can depend on certain packing houses. Of course, if we ever get stung, we don't go back. I always buy through brokers - there are five or six different ones I try to take care of - and I know I'll get quality from them. The prices are about the same between brokers; if you get a cheaper price, you get a cheaper fruit! Brokers handle certain growers and packers and they're specialty men in either a particular process or fruit and I can't be a specialist in all of them. It's their job to get the best quality for us and if they come through, I keep ordering from them.

I buy a year's supply of my frozen fruits within 2 weeks' time -- cherries, blueberries, and strawberries. I have to, to be sure I'll have it. I can't afford to run short and that's the only way I can be sure I won't. I ... send it to the warehouse and we pay storage charges on it all year round. Of course, all frozen fruits get more expensive because of storage charges. If business is unusually good, I'll buy more toward the end of the season

if I can get them. Of course, I always get the best price I can, but I can't gamble at the beginning of the season unless there's a bumper crop. Every now and then I can take advantage of a distressed packer who wants to unload his fruit toward the end of the season because he's gambled wrong. I always try to buy a little short and I also take into consideration the condition and size of the crop, but I can't gamble because I have to have fruit.

In canned goods, I ordinarily buy for a year, but have deliveries three or four times in the year. In that way I can save on storage space and still get them at the single price I contracted for. Actually, I don't have to be as careful in ordering canned as I do frozen for they're generally more available....

I ask about condition, size, brightness, etc., but they know what I want. Some cherries have wind bruises on them, but a better-grade packer won't put out blemished cherries. It's the packer who determines the uniformity in quality, no matter if he cans or freezes fruit. That's why I depend on certain packers.

We buy the best there is. It makes a better product in appearance and flavor and you can depend on it to be uniform. Take our fresh apples, we buy U. S. No. 1. They're graded and they're uniform in size and ripeness. We pay a little more for them, but in the long run they're the cheapest apple.

I try to pursue a happy medium in buying. I don't buy from the first broker who calls necessarily, and I watch the market closely. I get the best price I can but I can't run the risk of being caught short.

A small commercial baker discussed his buying of canned fruit as follows:

We generally look the fruit over first before buying. We try a sample before buying a whole lot. I look for flavor, color, and pack. We get a solid pack all the time so as not to have to pay for liquid. The color is important and whether it's firm enough. I want a nice fruit that's not black-spotted or overripe and mushy. If a fruit is too ripe you have to work with pulp and juice, not with a whole, ripe, firm fruit like you're supposed to. So we don't want overripe fruit. Sometimes solid packed fruit is packed when it's overripe and it's mushy, so we've got to watch that.

We take the samples and buy from a company that we know we can depend on...where we know the fruit will be uniformly the way we want it. If I like a sample I buy for a whole year. I usually buy at harvest time when the stuff has just come from the cannery. Also we know which brands give us the qualities we want and we buy from a company where we can get those brands.

I ask the salesman what kind of packed fruit they've got and I'm always interested in the price. From then on it all depends on what they show me in the samples. They'll send me three brands and I choose the one I like the best.

There's no money in buying the cheapest fruit you can get because if you don't buy a solid pack, which is a higher price, you have to pay for juice and water. So we always buy a top-quality fruit. Otherwise we cheat ourselves. We look for quality and a solid pack, not cheaper priced fruit.

Use of Fruits by Chicago Bakers

Presumably bakers buy and use the products they consider most satisfactory with respect to price, quality, convenience, and customer appeal, giving each of these factors a weight corresponding to its importance in their business. Consequently much can be learned about the preferences of Chicago bakers for different kinds and forms of fruits from their patterns of consumption during a recent period of operation.

In evaluating the consumption data given in this section, some caution should be used. First, the accuracy of bakers' reports on their consumption of fruit is questionable in some cases. Although some of the bakers went to considerable trouble to provide consumption and production data from their records, some were unwilling to check estimates made from memory against their detailed accounts. Some of the small commercial bakers did not keep records of purchasing and production, or had inadequate records. Consequently some of the replies on which the tables dealing with consumption are based represent informed judgments rather than accurate records. The data should not be taken as literally true, but as estimates that have an unknown error.

A second limitation on the use of consumption data as a guide to preference is perhaps more serious. It is impossible to tell from such data the extent to which bakers had compromised their preferences because of factors relating to convenience, quality, and variety of fruits; or because of the disadvantages of existing processed fruit products. For example, although the large commercial bakers reported that, on the average, 96 percent of all apples used in pies were fresh (table 24), the proportion might change radically if frozen apples could be improved so that they would hold up better in baking. Already these same bakers had shifted to the use of frozen cherries and blueberries, which, they said, had excellent baking qualities.

What fruits had Chicago bakers used during the preceding year for baking?—Bakers were asked:

Which frozen fruits have you used in the last 12 months for baking? Which canned? Which fresh? Which dried?

The replies summarized in table 19 indicate that all three groups had used a wide variety of fruits for baking during the year. Though apples, cherries, blueberries, and peaches were the leading fruits according to their

reports, large commercial bakers used on the average eight different fruits, as compared with seven used by the average small commercial and average institutional baker. ^{4/} Large commercial bakers were inclined to use a greater variety of frozen fruits, whereas small commercial bakers were likely to use a greater variety of canned and fresh.

Table 19.-Average number of different fruits in each form which bakers said they had used for baking during the 12 months preceding the interview

Fruit form	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Average number</u>	<u>Average number</u>	<u>Average number</u>
Frozen -----	6.1	3.5	3.6
Fresh -----	3.3	4.0	2.2
Canned -----	1.4	4.2	4.0
Dried -----	.3	.4	1.3
Average number of all different fruits used, regardless of form -----	8.1	7.2	6.9
Number of cases -----	9	74	30

Table 20 shows that the majority of bakers were not insistent upon any particular fruit form, as such, but bought the one they considered most satisfactory for a specific fruit. For example, replies indicate that more large commercial bakers used fresh apples than any other form, while greater numbers used the frozen form of cherries, blueberries, peaches, and most other kinds of berries, in comparison with other processing methods for these fruits. In general, the large commercial bakers tended to use either fresh or frozen forms, except for pineapples, apricots, and peaches. Compared with the large commercial bakers, relatively more of the small commercial and institutional bakers said they used the canned forms.

Though dried fruits of any kind were avoided by almost all large commercial bakers, a considerable number of small commercial and institutional bakers reported that they had used dried apricots and apples. Nearly a third of the institutional bakers had also used dried peaches. Comments indicated that much of the institutional consumption of dried fruit was the result of donations by the Government of surplus commodities.

^{4/} These figures have been rounded for convenience. The actual arithmetical averages are 8.1, 7.2, and 6.9 respectively.

Table 20.-Different fruits bakers said they had used in each form during the 12 months preceding interview

Fruits reported used	Type of organization														
	Large commercial					Small commercial					Institution				
	Total using	Fresh	Frozen	Canned	Dried	Total using	Fresh	Frozen	Canned	Dried	Total using	Fresh	Frozen	Canned	Dried
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Apples -----	9	9	3	1	1	74	68	32	64	17	30	25	13	22	6
Cherries -----	9	3	9	--	--	72	12	63	45	--	29	6	20	24	--
Blueberries --	9	3	9	--	--	72	46	63	33	--	27	6	19	16	--
Peaches -----	8	3	5	4	--	72	49	16	65	1	28	14	12	23	9
Boysenberries	6	2	6	--	--	9	--	6	4	--	9	1	4	4	--
Apricots -----	5	--	2	3	--	55	20	18	47	10	28	2	12	18	14
Strawberries -	5	4	4	--	--	50	40	24	1	--	13	6	8	--	--
Pineapple -----	5	--	2	5	--	38	1	5	35	--	7	1	3	5	--
Raspberries --	5	3	4	--	--	34	25	17	5	--	6	2	4	1	--
Youngberries -	5	1	5	--	--	--	--	--	--	--	--	--	--	--	--
Blackberries -	4	2	4	--	--	6	3	3	1	--	2	--	1	1	--
Plums -----	2	--	1	--	2	31	28	7	1	3	14	2	8	2	6
Loganberries -	--	--	--	--	--	2	--	1	1	--	2	--	2	--	--
Number of cases	9	9	9	9	9	74	74	74	74	74	30	30	30	30	30

The use of fresh, frozen, canned, and dried forms reported by Chicago bakers.-Bakers were asked:

In the last 12 months, have you used any fresh fruit for baking? Any frozen fruit for baking? Any canned fruit for baking? Any dried fruit for baking?

The replies shown in table 21 indicate that most of the bakers in all three groups had used some fresh, frozen, and canned fruit during the year. Only about a third of the large and small commercial bakers said they had used any dried fruit, while half the institutions reported using some of this form.

A considerable number of bakers had had no actual experience with dried fruits, reporting that they had never used them for baking. In every group, more bakers had discontinued the use of dried fruits, after trying them, than had stopped using any other form of processed fruit.

When bakers were asked which form they used most, and which they used next most, the difference in patterns of use among the three groups showed up clearly. Nearly all the large commercial bakers put fresh and frozen forms in first or second place. Though only one large commercial baker reported that he used the canned form most, nearly two out of five small commercial bakers and nearly one out of two institutional bakers gave this reply (table 22). Only among institutional bakers were a few cases found in which dried fruits were used for baking more than any other form.

Table 21.-Use of fresh, frozen, canned, and dried forms of fruit for baking reported by Chicago bakers

Use	Type of organization											
	Large commercial				Small commercial				Institution			
	Fresh	Frozen	Canned	Dried	Fresh	Frozen	Canned	Dried	Fresh	Frozen	Canned	Dried
	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>	<u>No.</u>
Had used during last 12 months	9	9	7	3	71	69	72	22	27	24	28	15
Had used, but not during last 12 months -----	--	--	1	3	2	4	--	17	2	3	1	5
Had never used for baking -----	--	--	1	3	1	1	2	35	--	3	1	10
Not ascertained -----	--	--	--	--	--	--	--	--	1	--	--	--
Number of cases -----	9	9	9	9	74	74	74	74	30	30	30	30

947314 O-51-6

Table 22.-Forms of fruit Chicago bakers said they used most and next most

Form	Type of organization					
	Large commercial		Small commercial		Institution	
	Used most	Used next most	Used most	Used next most	Used most	Used next most
	Number	Number	Number	Number	Number	Number
Frozen -----	5	4	29	23	9	8
Fresh -----	3	5	13	24	3	6
Canned -----	1	--	29	21	14	12
Dried -----	--	--	--	--	2	3
Same amount of two or more fruits -----	--	--	3	4	2	1
Used only one form of fruit -----	--	--	--	2	--	--
Number of cases -----	9	9	74	74	30	30

Why do bakers use one form of fruit more than others?-Bakers were asked about the form of fruit they said they used most:

Can you tell me why you use (fresh, frozen, canned, or dried) fruit the most for baking?

The replies (table 23) lead to the following conclusions:

FRESH.-Bakers who used fresh fruits most did so primarily because they preferred the flavor of the fresh fruit. Customer appeal, or demand, was given as a reason by about a third of this group. Several of the small commercial bakers said that fresh fruit had a price advantage over other forms at certain times of the year, and comments indicated that they thought this was particularly true of apples. Scattered mentions were made about the superior color, firmness after baking, food value, cheapness and ease of storing, and convenience in handling of fresh fruit.

FROZEN.-Again, better flavor was the outstanding reason given for using more frozen fruit than any other form. Eye-appeal, especially brighter and more natural colors, and saving in time and labor were also mentioned by a considerable number. Among the reasons given by a few were: firmer texture after baking; price advantage taking into account saving on waste; uniform quality; more convenient size of container; greater availability at all times of the year; greater consumer appeal; ease of storage; and higher quality of fruit than other processed forms.

CANNED.-Unlike those who used fresh or frozen fruit most, the bakers who used more canned than any other form put less emphasis on flavor and color, and more on convenience and cost. The one large commercial baker who used this form most said he did so because of greater uniformity in quality, better size of container, and saving on time, labor, and charges for refrigerated storage. Among the small commercial bakers who used this form most, the most frequent reason given was saving in time and labor. Also mentioned frequently were: uniformity in quality, ease and cheapness of storage without refrigeration, and better size of container. Relatively few mentioned the qualities of the fruit, itself. Among institutional bakers many of the same reasons were given, but the price advantage of the canned led in frequency of mention.

How much of the various forms of fruit did Chicago bakers use?-To get an idea of the relative quantity of fresh, frozen, canned, and dried apples and apricots commercial bakers used for pies, they were asked:

About what proportion of your (apple, apricot) pies are made from fresh fruit? Frozen? Canned? Dried?

Each answer was weighted by the number of pies the baker reported he had made of each fruit during the preceding year and the quantity of fruit in his average pie. Results of these computations (table 24) indicate that most of the apple pies made by large commercial bakers during the preceding year were of fresh fruit. The majority of their apricot pies were made of canned, with the remainder of frozen. Among small commercial bakers, a greater proportion of pies were made of canned and frozen apples, and relatively more were made of frozen apricots.

Institutional respondents were not asked these questions since, in a number of cases, the buyer who did not have this information readily available was the one interviewed rather than the baker.

Table 23.-Reasons bakers gave for using a particular form of fruit most

Reasons given	Bakers who used the following forms most									
	Large commercial			Small commercial			Institution			
	Fresh	Frozen	Canned	Fresh	Frozen	Canned	Fresh	Frozen	Canned	Dried
No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/	No. 1/
Good flavor, flavor like fresh fruit -----	2	3	--	11	24	3	2	9	1	--
Ripeness, tree-ripened, ripe when picked -----	--	--	--	--	1	1	--	--	--	--
Held up well in baking, firm, good texture, didn't mush -----	--	1	--	1	3	3	--	1	1	--
Baked up tender, not tough or rubbery -----	--	--	--	--	--	1	--	--	--	--
Had eye appeal; a good, bright, natural color --	1	3	--	1	10	1	--	5	--	--
More food value, more healthful -----	--	--	--	--	--	--	2	--	--	--
Quality of fruit generally better -----	--	--	--	--	2	--	--	--	--	--
Uniform in quality -----	--	1	1	--	3	9	--	1	2	--
Uniform in weight, drained weight; consistent yield -----	--	--	--	--	1	--	--	--	--	--
Convenient size of container -----	--	--	1	--	3	5	--	--	2	--
On hand, for fill-in, available at a moment's notice -----	--	--	--	--	--	1	--	--	--	--
Could store better, "easy to store," kept in storage longer -----	--	--	--	--	2	6	--	--	2	--
Cheap to store, didn't require refrigeration ---	1	--	1	1	--	8	--	--	6	--
Kept better, didn't have to be cooked quickly, didn't turn dark -----	1	--	--	--	1	1	--	--	--	--
Time and labor saver, convenient to handle -----	--	1	1	1	9	11	--	4	5	--
Price advantage, general; less waste, more yield	--	--	--	--	3	3	--	1	8	1
Price advantage, at certain times of year; cheaper in season -----	--	--	--	3	--	2	--	--	--	--
Available at any time, "all-year round" -----	--	1	--	--	3	3	--	--	--	--
Product or variety not available in other forms	--	--	--	--	--	--	--	--	1	--
Customer appeal, prestige of "fresh fruit pie" -	1	1	--	4	2	--	1	--	--	--
Other -----	--	--	--	--	3	--	--	--	1	--
Number who used the form most -----	3	5	1	13	29	29	3	9	14	2

1/ Columns generally add to more than total number who used the form most because most bakers gave more than one reason.

Table 24.-Average proportions of apple and apricot pies which commercial bakers reported were made of fresh, canned, frozen, and dried fruit during preceding year ^{1/}

Form reported	Type of organization			
	Large commercial		Small commercial	
	Apples	Apricots	Apples	Apricots
	<u>Average percent</u>	<u>Average percent</u>	<u>Average percent</u>	<u>Average percent</u>
Fresh -----	96	--	56	3
Canned -----	2	78	25	40
Frozen -----	2	22	19	57
Dried -----	--	--	(2)	(2)
Total -----	100	100	100	100
Number who baked pies of each fruit -	9	5	74	40

^{1/} The data in this table were derived by multiplying the actual quantities (weight of fruit in pie X number of pies) of fruit used by each organization by the proportions of each form of fruit each organization reported using. These individual quantities were then totaled for each form. The total quantity of fruit used by each sample was used as a base for computing the percentages reported above.

^{2/} Less than 0.5 percent.

Further information on the quantities of apples, peaches, and apricots used in various forms by the Chicago bakers was obtained by asking about their consumption of these fruits for baking during the week prior to the interview. As quantities of fresh, frozen, canned, and dried fruits cannot be compared directly because of variations in sugar and liquid content, tables 25, 26, and 27 show the conversion of the quantities reported into corresponding farm weights. Table 28 gives the total farm weight of apples, peaches, and apricots, used during the week's period in each of the four forms by the three groups of bakers.

As these tables are based on a single week (the week preceding the interviewing), generalizations about the use of the different forms and packs throughout the year would not be legitimate because of the roughness of the estimate and because of seasonal variation in consumption patterns. The interviewing was done during October and November -- about the beginning of the fresh-apple season. Consequently somewhat greater use of fresh apples might be expected than during the spring and summer, and somewhat lower use of fresh peaches and apricots than at the height of their seasons.

Altogether, replies indicated, the 9 large commercial bakers consumed about five times as many apples in farm weight during this period as did the 74 small commercial bakers. With the exception of a relatively small quantity of canned, all the apples used by the large bakers were fresh. In spite of their much lower total consumption, the small commercial bakers were evidently better customers at that time, of the canned, frozen, and dried apple processors, than were the large bakers. Institutions also reported using more frozen apples than the large bakers (table 28).

The quantities of peaches consumed by all three groups during the 1-week period were far below their apple consumption. The farm weight of peaches which large commercial bakers said they used was four times that reported by small commercial bakers. Unlike apples, about 60 percent of the peaches used by large commercial bakers were frozen, and the remainder were canned. Small commercial bakers and institutions used many more canned peaches than frozen, according to their replies.

The quantities of apricots used for baking by all three groups were small in comparison with the two other fruits. In striking contrast to the consumption data on apples and peaches, the large commercial bakers reported that they used less apricots than either the small commercial or institutional bakers who were interviewed. Large commercial bakers reported using no dried apricots, but about 16 percent of the apricots used by small commercial and institutional bakers during this period were dried.

Table 25.-Farm weight of different forms of apples bakers reported they used for baking during the week prior to interviewing

Pack forms	Type of organization					
	Large commercial		Small commercial		Institution	
	Amounts reported	Farm weight	Amounts reported	Farm weight	Amounts reported	Farm weight
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Fresh apples:						
Whole -----	125,440	125,440	1,088	1,088	4,741	4,741
Prepared -----	64,000	128,000	15,085	30,170	850	1,700
Total quantities of fresh apples used, converted to farm weight -----		253,440		31,258		6,441
Frozen apples:						
Unsweetened -----	--	--	410	820	30	60
Sweetened:						
4:1 sugar ratio -----	--	--	390	624	30	48
5:1 sugar ratio -----	--	--	1,510	2,522	470	1,010
7:1 sugar ratio -----	--	--	1,000	1,750	--	--
Didn't know sugar ratio -----	--	--	--	--	2/135	--
Total quantities of frozen apples used, converted to farm weight -----		--		5,716		1,118
	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>
Canned apples:						
Solid pack -----	600	5,328	1,360	12,077	92	817
Syrup pack -----	--	--	113	780	8	55
Water pack -----	--	--	147	1,014	11	76
Total quantities of canned apples used, converted to farm weight -----		5,328		13,871		948
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Dried apples -----	--	--	95	760	--	--
Number of cases -----	9	9	74	74	3/25	3/25

1/ Includes assumed weight of apples used by those who did not know the ratio.

2/ Assumed to be 5:1 ratio.

3/ Five purchasing agents for institutions were excluded from this table because they had no specific knowledge of the quantities used during a specific period.

Table 26.-Farm weight of different pack forms of peaches bakers reported they used for baking during the week prior to interviewing

Pack forms	Type of organization					
	Large commercial		Small commercial		Institution	
	Amounts reported	Farm weight	Amounts reported	Farm weight	Amounts reported	Farm weight
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Fresh peaches -----	--	--	15	15	--	--
Frozen peaches:						
Sweetened:						
4:1 sugar ratio -----	7,500	^{1/} 17,850	^{2/} 120	143	30	36
5:1 sugar ratio -----	2,000	2,480	720	930	320	434
Didn't know sugar ratio -----	^{3/} 7,500	--	--	--	--	--
Total quantities of frozen peaches used, converted to farm weight -----		20,330		1,073		470
	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>
Canned peaches:						
Solid pack -----	1,338	13,447	576	5,789	11	111
Syrup pack -----	--	--	68	474	339	2,362
Water pack -----	--	--	114	794	20	139
Total quantities of canned peaches used, converted to farm weight -----		13,447		7,057		2,612
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Dried peaches -----	--	--	--	--	40	250
Number of cases -----	9	9	74	74	^{4/} 25	^{4/} 25

^{1/} Includes assumed weight used by those who did not know the ratio.

^{2/} Includes 30 pounds reported to be unsweetened.

^{3/} Assumed to be 4:1 ratio.

^{4/} Five purchasing agents for institutions were excluded from this table because they had no specific knowledge of the quantities used during a specific period.

Table 27.-Farm weight of different pack forms of apricots bakers reported they used for baking during the week prior to interviewing

Pack forms	Type of organization					
	Large commercial		Small commercial		Institution	
	Amounts reported	Farm weight	Amounts reported	Farm weight	Amounts reported	Farm weight
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Fresh apricots -----	--	--	--	--	--	--
Frozen apricots:						
Sweetened:						
3:1 sugar ratio -----	--	--	--	--	8	8
4:1 sugar ratio -----	600	618	30	31	30	31
5:1 sugar ratio -----	--	--	<u>1/</u> 950	1,017	1,465	<u>2/</u> 1,584
Didn't know sugar ratio -----	--	--	--	--	<u>3/</u> 15	--
Total quantities of frozen apricots used, converted to farm weight -----		618		1,048		1,623
	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>	<u>No. of #10 cans</u>	<u>Pounds</u>
Canned apricots:						
Solid pack -----	127	1,089	309	2,650	2	17
Syrup pack -----	--	--	16	89	10	56
Water pack -----	--	--	18	100	--	--
Total quantities of canned apricots used, converted to farm weight -----		1,089		2,839		73
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Dried apricots -----	--	--	150	771	65	334
Number of cases -----	9	9	74	74	<u>4/</u> 25	<u>4/</u> 25

1/ Includes 200 pounds reported to be unsweetened.

2/ Includes assumed weight of apricots used by those who did not know the ratio.

3/ Assumed to be 5:1 ratio.

4/ Five purchasing agents for institutions were excluded from this table because they had no specific knowledge of the quantities used during a specific period.

Table 28.-Total farm weight of fresh, frozen, canned, and dried apples, peaches, and apricots bakers said they used for baking during the week prior to interviewing

Pack forms	Type of organization								
	Large commercial			Small commercial			Institution		
	Apples	Peaches	Apricots	Apples	Peaches	Apricots	Apples	Peaches	Apricots
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Fresh -----	253,440	--	--	31,258	15	--	6,441	--	--
Frozen -----	--	20,330	618	5,716	1,073	1,048	1,118	470	1,623
Canned -----	5,328	13,447	1,089	13,871	7,057	2,839	948	2,612	73
Dried -----	--	--	--	760	--	771	--	250	334
Total number of pounds in farm weight -----	258,768	33,777	1,707	51,605	8,145	4,658	8,507	3,332	2,030
Number reporting use of any form during the week prior to interviewing -----	8	6	3	74	62	36	23	14	12
Number of cases -----	9	9	9	74	74	74	$\frac{1}{25}$	$\frac{1}{25}$	$\frac{1}{25}$

$\frac{1}{25}$ Five purchasing agents for institutions were excluded from this table because they had no specific knowledge of the quantities used during a specific period.

Advantages and Disadvantages of Fresh, Frozen, Canned, and Dried Fruits from
the Bakers' Viewpoint

This section treats in detail the preferences, nonpreferences, and reasons for the attitudes which bakers displayed regarding the different forms of various fruits.

Although bakers have considerable choice among fresh, frozen, canned, and dried fruits, results of this survey indicate that none of the existing forms is wholly satisfactory to them. When the Chicago bakers discussed the advantages and disadvantages of the various forms, it became apparent that the patterns of consumption reported in the preceding section often represented a choice among several more or less unsatisfactory alternatives.

In addition to the questions on their reasons for using particular forms most, or second most, bakers were asked the following questions about each of the fruit forms:

In general, what do you like about using (fresh, frozen, canned, dried) fruits for baking?

In general, are there any things you don't like about using (fresh, frozen, canned, dried) fruits for baking?

Have you had any (other) problems with any particular (fresh, frozen, canned, dried) fruits in baking? How about (fresh, frozen, canned, dried) apples? How about (fresh, frozen, canned, dried) peaches? How about (fresh, frozen, canned, dried) apricots?

Those who had not used a particular form during the preceding 12 months were asked:

Have you ever used (fresh, frozen, canned, dried) fruits for baking?

Why don't you use (fresh, frozen, canned, dried) fruits for baking (now)?

Bakers were also asked their reasons for any seasonal variation in their use of fresh, frozen, canned, dried apples and apricots.

Advantages and disadvantages of the various forms mentioned in answering any of the above questions were included in the tabulations shown in this section.

In classifying responses, a distinction was made between (1) those characteristics which were descriptive of all fruits within a form, and (2) those characteristics which varied among the different fruits within the same form.

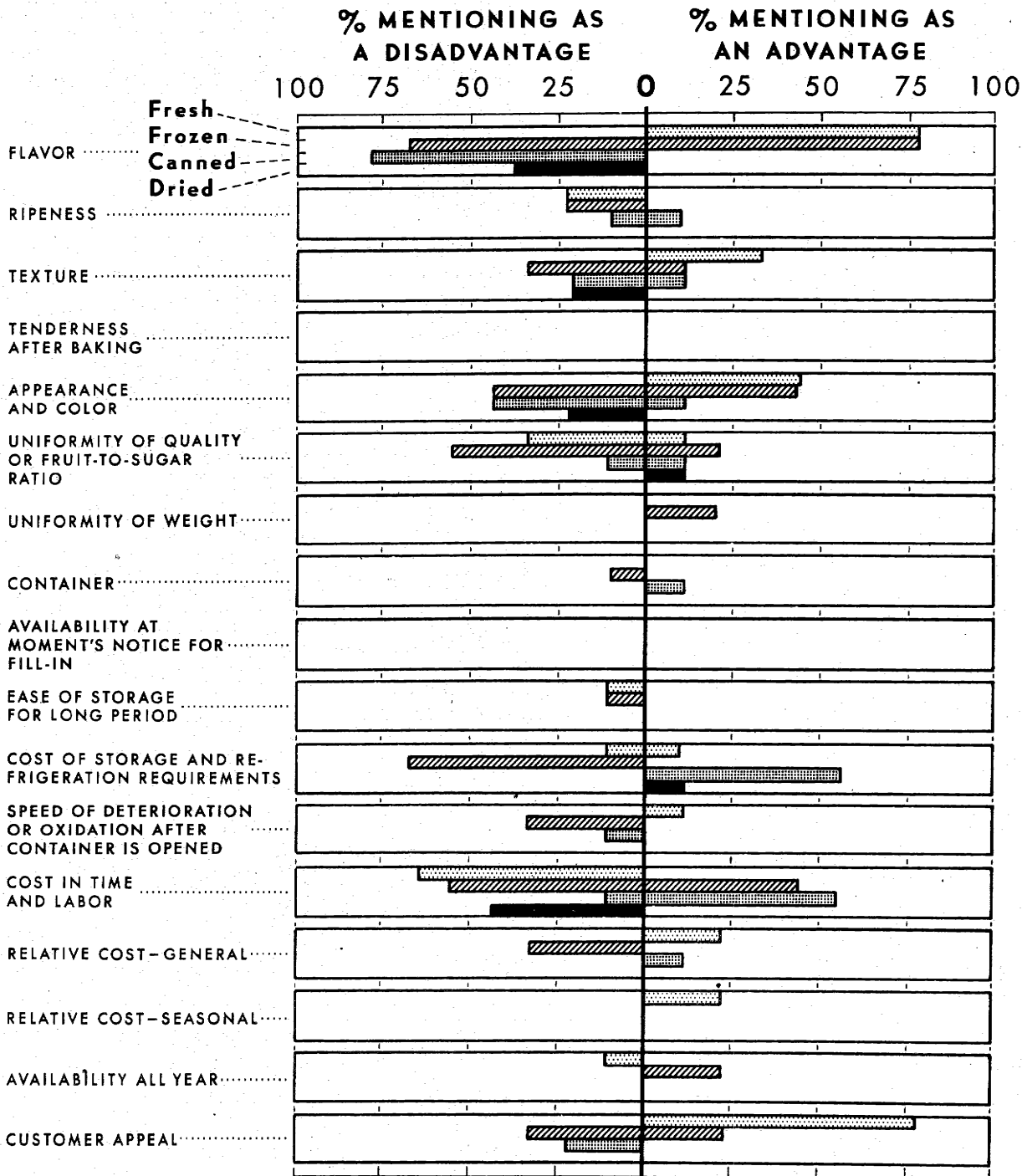
Characteristics in the first group included such categories as size of container, storage, and time and labor in preparation. For example, all frozen fruits need refrigerated storage, and all fresh fruits -- whether apples, peaches, or cherries -- take considerable time and labor to prepare for baking. Such characteristics were classified as general categories and were tabulated always as an attribute of the general fruit form. Whenever they were mentioned in connection with a specific fruit, they were also classed as an advantage or disadvantage of that specific fruit. If a baker spoke of the cost of storing frozen cherries as the principal reason for using canned cherries, this disadvantage would be tabulated both as a disadvantage of the frozen cherry and of frozen fruit in general. It would also be coded as an advantage of canned cherries and of the canned form in general. On the other hand, if he had said that because frozen fruit required refrigeration, he used it only in limited quantities, then it would be coded only as a disadvantage of the frozen form in general.

Characteristics in the second group have to do with qualities of the fruit itself, such as flavor, ability to hold up in baking, or eye appeal. These may vary from fruit to fruit within a form. For example, a canned peach may be considered by many bakers to have a good color, while the canned cherry may be criticized for its greyish color. Frozen cherries may hold up well in baking, but not so frozen apples. If a baker discussed such categories in relation to a specific fruit, they were tabulated only for that fruit and not for the fruit form generally. They were coded as an advantage or disadvantage of the fruit form in general only when bakers generalized about the fruit form without referring to a specific fruit.

All analysis was made on the basis of a comparison between forms. If the mention of an advantage of one form implied a disadvantage in others, the implied disadvantages were tabulated. No material dealing with advantages of one type of pack or variety over other types within the same form was included.

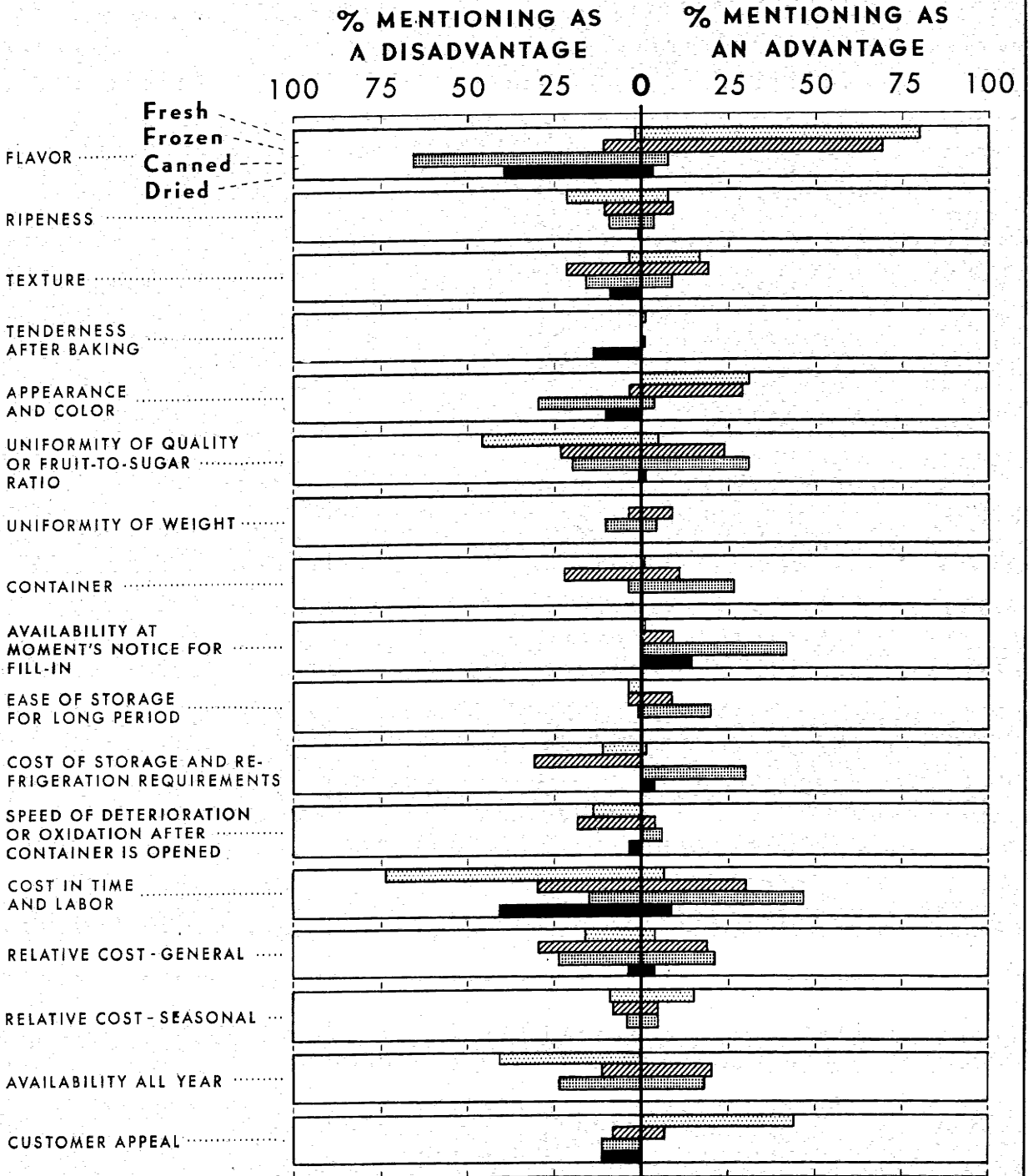
Figures 1, 2, and 3 represent the advantages and disadvantages of the four forms of fruit -- fresh, frozen, canned, and dried -- as they were discussed by large commercial, small commercial, and institutional bakers. By comparing the length of the bars on both the advantage and the disadvantage sides for each form, one can quickly compare the bakers' attitudes toward any particular characteristic of fresh, frozen, canned, and dried fruits.

PROPORTION OF LARGE COMMERCIAL BAKERS SPECIFYING ADVANTAGES AND DISADVANTAGES OF FRESH, FROZEN, CANNED, AND DRIED FRUIT*



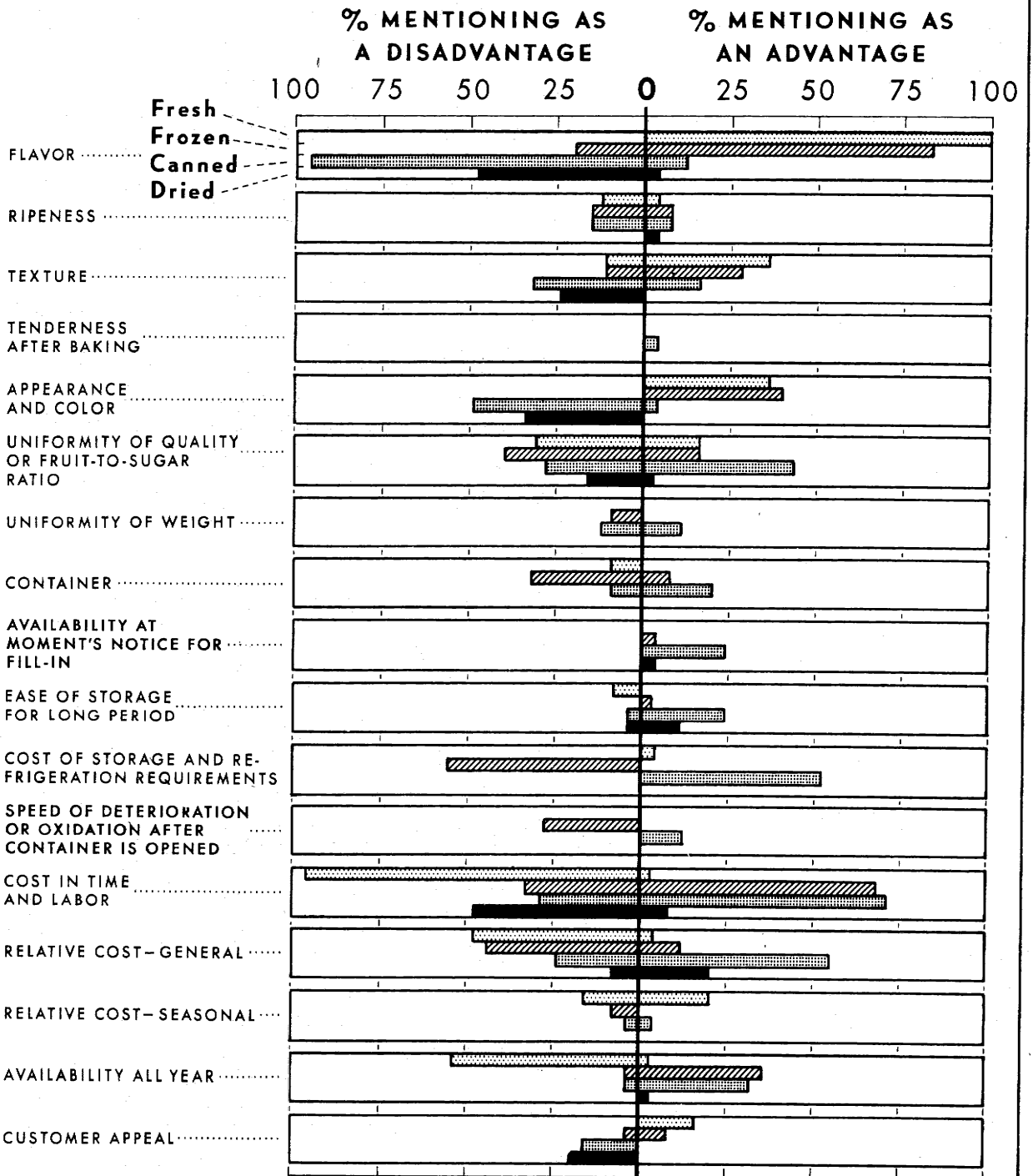
*AS REPORTED BY CHICAGO BAKERS IN SPECIAL SURVEY

PROPORTION OF SMALL COMMERCIAL BAKERS SPECIFYING ADVANTAGES AND DISADVANTAGES OF FRESH, FROZEN, CANNED, AND DRIED FRUIT *



* AS REPORTED BY CHICAGO BAKERS IN SPECIAL SURVEY

PROPORTION OF INSTITUTIONAL BAKERS SPECIFYING ADVANTAGES AND DISADVANTAGES OF FRESH, FROZEN, CANNED, AND DRIED FRUIT*



*AS REPORTED BY CHICAGO BAKERS IN SPECIAL SURVEY

What are the Advantages and Disadvantages of Fresh Fruits from the Bakers' Viewpoint?

Advantages of fresh fruits.-From the bakers' viewpoint, the outstanding advantage of fresh fruit was its flavor, commented on by more than three-fourths of the interviewed commercial bakers and all the institutional bakers (figs. 1, 2, and 3).

Among large commercial bakers the superior sales appeal of fresh fruit was stressed as often as its flavor, and was second in number of mentions among small bakers. One large commercial baker said:

I like to be able to say that pies are made out of fresh fruit because the public likes it -- even if it isn't as good as the frozen. It's a matter of merchandising ... Fresh fruit appeals to our customers.

A small commercial baker phrased it this way:

It is just the idea for the customer. The fact that fresh is used is a better selling point. It seems to be preferred by homemakers -- after all, they use fresh fruit when they bake a pie. When I can say I use fresh fruit it seems to sell the goods faster.

The eye-appeal of fresh fruit, especially its bright, natural color, was compared favorably with other forms by 4 large commercial, 23 small commercial, and 9 institutional bakers.

Fourth in order of mention among commercial bakers was the better texture of fresh fruit -- that is, its ability to hold up in baking, to remain in whole pieces and not mush down.

Significantly, the qualities of fresh fruit mentioned favorably most often by bakers -- flavor, color, and texture -- were identical with those bakers most often said they looked for in buying or testing fruit (table 18, page 31).

The following statement of one of the large commercial bakers is representative of the reasons given by most bakers for liking fresh fruit:

I like the fresh fruits. They have the best flavor, the best texture, and the best color. And they sell the best! What more could you ask? People see the fruit on the stands and they know it's in season. It just makes them want that kind of pie. Besides they know it's a better pie when it's made out of fresh fruit.

Disadvantages of fresh fruit.-Too much time and labor involved in preparation was the most frequent criticism bakers made of fresh fruit. Six of the large commercial, 54 of the small commercial, and 24 of the institutional bakers objected to the cleaning, peeling, coring, and pitting, which they said often raised the cost of fresh fruit above processed forms (figs. 1, 2, and 3).

Among commercial bakers lack of uniformity in the quality of fresh fruit elicited the second largest number of adverse comments. About one-third of the institutional bakers also mentioned this disadvantage. According to the bakers interviewed, uniformity is desirable because it enables them to standardize their formulae and baking methods and to produce pies which will be uniformly appealing to customers.

The scarcity of the fresh fruit at certain times of the year was regarded by 30 small commercial and 12 institutional bakers as a disadvantage. On the other hand only one of the large bakers mentioned this, perhaps because, according to their reports, these bakers were likely to buy a full year's supply of fresh apples at harvest-time and store them for use throughout the year.

More than 20 percent of the commercial bakers reported difficulty in getting fresh fruit that was neither too green nor overripe.

Twelve small commercial and 12 institutional bakers looked upon the waste involved in fresh fruit as a price disadvantage. If many Chicago bakers did not buy their fresh apples already peeled and cored, this disadvantage might have been mentioned much more often.

A scattering of small commercial bakers said they objected to fresh fruit because of the tight time schedule one had to work under to prevent spoilage and oxidation.

Advantages and disadvantages of specific fresh fruits.-

FRESH APPLES.-Large commercial bakers used fresh apples in far greater quantities than any other fresh fruit. It is natural that their attitude toward fresh fruit in general was often identified with their feeling about fresh apples. As in fresh fruit generally, they said they particularly liked the succulent flavor, the firmness, and the pleasing, natural appearance of fresh apples. Too, the fact that their customers were more interested in buying when the advertisement said "fresh apple pie" was important to these bakers. Several of them also said it was cheaper in the long run to use fresh rather than processed apples in making pies.

One large baker expressed his attitude toward fresh apples in this way:

We use fresh apples exclusively all year around because they're the only kind that will hold up for our juiced apple pie. They will hold up in baking while the other forms will mush. The fresh fruit has definitely a finer flavor than any processed fruit, and this is very much so in an apple. The processed apple doesn't have the acid factor that fresh apples do, they've a flatter taste....As far as labor is concerned ... I can use fresh apples much cheaper than the frozen by preparing them myself.

Another large baker said:

The cost of storing fresh apples is considerable and there's a big waste factor, but they're still the best and the cheapest for our use.

Large bakers looked upon the labor of peeling and preparing fresh apples for baking as a genuine drawback. Other adverse comments centered around the problems in storing fresh apples from one season to the next: frequent spoilage in storage and probable poor quality by the end of the season. One large commercial baker said:

Sometimes fresh apples don't keep so well -- that's our big trouble. We can begin to expect trouble around June and into July and August. Sometimes we have a big percentage loss; other years they keep fine.... They begin to lose their flavor around June and they get dryer. The cooler keeps pulling moisture out and we have to add more moisture in preparation. In November we add 8 ounces of moisture -- in June, 12 ounces. Then we add lemon juice after June to help the flavor.

Small commercial and institutional bakers both said that the flavor of fresh apples was the ideal. Aside from this, they were more interested in the cheapness of fresh apples at the peak of the season than in any other characteristic. A considerable number of small commercial bakers also said that using fresh apples was generally less expensive than using processed apples.

Differences in baking qualities depend on differences in variety and maturity. Therefore, it could be expected that small bakers, who usually buy fresh apples in small quantities, have divided attitudes toward baking qualities. Although some of these bakers said that fresh apples would hold up nicely in baking and remain in whole pieces, more said they mashed. Criticisms of texture were often found in combination with statements that fresh apples varied a great deal in quality.

The additional time that had to be spent in preparing fresh apples for baking and the fact that they are not available throughout the year to those who cannot store them were two important reasons small commercial and institutional bakers gave for not using fresh apples for baking.

FRESH PEACHES.-Bakers did not often discuss fresh peaches. When they did, they most often said they liked them for their sweet and delicate flavor. Many also looked upon their bright yellow color as an ideal by which processed peaches should be measured.

In criticizing fresh peaches, bakers were most concerned because they were so difficult to prepare for baking. Their softness and juiciness made them messy and time-consuming to handle. This slowness of preparation is a double handicap because, the bakers said, within a matter of minutes, the peaches begin to turn an unappetizing brown and are spoiled for use in a pie.

These reasons, more than any others, were given for not liking to use fresh peaches. One large commercial baker said:

Fresh peaches discolor on you so fast. You have to work with them at top speed. And then they're messy to handle and involve a lot of labor.

A few small commercial bakers said they were dissatisfied with fresh peaches because they varied so much in quality. This may be a matter of difference in variety or maturity. Bakers said that fresh peaches were often hard and tasteless because they were too green; or were soft and mushy because they were too ripe. With so much of the fresh peach discarded as waste, some bakers thought they were too expensive to use despite their low price in season.

FRESH APRICOTS.-Apricots were used very little by the interviewed bakers and fresh apricots almost never. Unlike other fresh fruit, the few bakers who discussed apricots complained of their dull, almost unpleasant taste; some said this lack of good flavor came from being picked too green. A typical comment was:

I don't use fresh apricots and I don't like them. They're tasteless. That's one fruit that processing seems to help, as far as taste is concerned.

What are the Advantages and Disadvantages of Frozen Fruits from the Bakers' Viewpoint?

Advantages of frozen fruit.-Bakers most often mentioned favorably the flavor of frozen fruit. Approximately three-fourths of all the interviewed bakers said the flavor of the frozen fruit was superior to the flavor in other processed forms. Those who mentioned the flavor of frozen fruit disparagingly were commonly using the fresh form as their standard (figs. 1, 2, and 3).

Unlike the fresh fruit, a large number of the bakers said that frozen fruit was desirable because it was already cleaned, peeled, and cored for baking, which meant a saving of time and labor. In fact, this advantage of frozen fruit was second only to flavor in number of mentions in all three groups of bakers. However, almost as many bakers said frozen fruit was inconvenient to handle because it required thawing, was likely to melt over the floor, and was slippery to handle when it had to be moved from one place to another.

The eye-appeal of frozen fruit, especially its bright natural color, was compared favorably with other forms by 4 large commercial, 21 small commercial, and 10 institutional bakers. Here again, as many of the large bakers mentioned the color of frozen fruit as a disadvantage.

Disadvantages of frozen fruit.-The disadvantage of frozen fruit most frequently mentioned by bakers is that it requires refrigeration and is expensive to store. Six of the large commercial, 24 of the small commercial,

and 14 of the institutional bakers objected to frozen fruit on this basis (figs. 1, 2, and 3). Since the large commercial bakers paid rent for a great part of their storage space, they looked upon the problem primarily from the standpoint of rental costs. One large commercial baker said:

Cold-storage rates have increased and we're trying to get away from frozen whenever we can. So we use fresh fruits in season whenever labor costs won't make them higher than the frozen.

The small commercial bakers and the institutions had limited or lacked refrigerated storage space in their plant. One small commercial baker phrased it this way:

If I had the time and help and the place for it, I'd use frozen fruit entirely ... but I don't have any deep-freeze space.

A purchasing agent for an institution said:

Storage is a prohibitive factor where you don't have it. We can't use frozen fruits where we don't have refrigeration ... Where we do have it, we never seem to have enough.

Details about bakers' facilities for storing frozen fruits are given on page 77.

Two other disadvantages which bakers mentioned relatively often were a lack of uniformity in the quality of frozen fruit and higher costs per pie. Five large commercial, 17 small commercial, and 10 institutional bakers said frozen fruits varied in quality, and commented on, among other things, the lack of standardization of fruit-to-sugar ratios, which they said made it impossible to apply set formulae.

Three large commercial, 22 small commercial, and 11 institutional bakers said that frozen fruit was more expensive to use. They often related this to the low drained weight or high sugar content of frozen fruits.

A considerable number of bakers said that frozen fruit came in containers that were too large for their purposes (see pages 77 - 80).

The necessity of using thawed frozen fruit within a short time, before it had a chance to discolor and spoil, was considered a disadvantage by 3 large commercial, 14 small commercial, and 7 institutional bakers. One small commercial baker said:

In a very few hours, the layer on top of frozen fruit turns black, especially in the cherries and apples ... The minute you thaw out frozen fruit, it has to be cooked up.

Although some bakers believed the baking qualities or texture of frozen fruit compared favorably with other forms, more said that other forms were superior on this score. Three large commercial, 16 small commercial,

and 3 institutional bakers reported that frozen fruits were watery or mushy. One large commercial baker summarized his ideas about the texture of frozen fruit in this way:

The frozen peach doesn't hold up as well in baking as the canned; it's a little soft. In fact, that's the main thing wrong with frozen fruits -- their texture. In chemical terms, the enzymes continue to operate in frozen fruits and the texture gets softer the longer it's frozen and it affects the taste, too. This is particularly true in peaches, apples, apricots. The fibrous texture of the cherry doesn't break down and it has a skin to protect it, and the blueberries are small and whole so they can resist this chemical reaction.

Despite the fact that commercial bakers mentioned many disadvantages of frozen fruit, it should be remembered that frozen fruit is one of the top two forms used most by commercial bakers (table 22). Therefore, bakers are either setting aside their preferences because they are unable to get what they want and can best satisfy their needs with the frozen fruit, or they believe the advantages outweigh the disadvantages.

Advantages and disadvantages of specific frozen fruits:

FROZEN APPLES.—Generally speaking, all three groups of bakers commented adversely on frozen apples more often than they mentioned advantages, but large commercial bakers were specially critical. The effect of their attitudes on their purchasing practices is dramatized in this case by the fact that only 2 percent of all the apples they used in pies were frozen (table 24).

Poor baking quality was mentioned most frequently as a disadvantage of frozen apples. Bakers also did not like their flavor, saying that it was flat and tasteless. One large commercial baker said:

Something happens in the processing. All the fresh flavor seems to be killed in the frozen apple ... It's almost tasteless.

They also mentioned variations in quality, saying that frozen apples could not be systematically used in set formulae. A considerable number of the small bakers believed that frozen apples cost more in the long run than other forms.

As far as advantages for frozen apples are concerned, six small commercial and five institutional bakers listed a price advantage at certain times of the year. Six small commercial bakers also thought they were useful as a fill-in when they temporarily ran out of the forms they normally used.

FROZEN PEACHES.—Bakers, particularly those in the large commercial category, liked the flavor of frozen peaches, frequently comparing it with fresh peaches. But they did not like the fact that the fruit discolored

so quickly in thawing; they said it was sometimes necessary to discard the top layers of the package. Many objected to the softness of their texture and their tendency to mush in baking. A considerable number of the small bakers also believed that frozen peaches were relatively expensive to use.

These attitudes of commercial bakers are illustrated by the following quotation:

The flavor is wonderful, but it's a very expensive filling to make. You have to thaw completely and drain the juice. It involves a lot of handling and you've got to work against time on discoloring, because when you drain the juice, the chemicals which prevent oxidation are drained off and the peaches will discolor on you in a hurry....They're soft, too, and they don't hold up in baking as well as the canned.

FROZEN APRICOTS.-The limited discussion of frozen apricots gave no clear-cut picture of bakers' over-all attitudes. The flavor of frozen apricots was mentioned several times as desirable, but almost as often as undesirable. There was scattered mention of the softness of their texture and their fast rate of oxidation after being thawed. One baker expressed his attitude thus:

They have the same disadvantages as the frozen peaches, only not so much so....They're not so pronounced in discoloration or mushiness.

FROZEN CHERRIES and BLUEBERRIES.-These two fruits seem to be particularly desirable in frozen form, more so than apples, peaches, or apricots. Bakers who discussed them commended their natural flavor and their firm texture. The brilliant red of frozen cherries was mentioned by many bakers as particularly appealing. For example:

In the case of cherries, the frozen are better than the fresh, mostly because they are convenient to use...and are cheapest for us...they have a beautiful color and a wonderful taste.... The frozen cherry is an excellent product.

The favorable attitudes bakers expressed toward frozen cherries and blueberries were corroborated by the fact that all 9 of the large commercial bakers and 63 of the 72 small commercial bakers who used these two fruits, bought them in the frozen form (table 20).

What are the Advantages and Disadvantages of Canned Fruits from the Bakers' Viewpoint?

Two-thirds of the small commercial bakers said they used canned fruit most or second most in their baking (table 22). This was true of only 1 of the 9 large commercial bakers. This greater use of canned fruit by many small bakers is probably related to the way it fits into their over-all baking operation, rather than to its superior baking qualities. Most small commercial pie bakers have limited working space, and their labor force is often restricted to their family or to one additional worker.

This type of operation often forces the owner to function as a combination owner-manager, chief baker, and salesman, in the course of a prolonged working day. In addition, small bakers generally have a tight margin of profit in which every cent counts. Therefore, any conservation of space or short-cut in time and labor may mean the difference between staying in business or being forced out.

Similarly, most institutions must work within a limited budget. They, too, reported that they used canned fruit more than any other form, with 26 of the 30 interviewed using canned fruit either most or second-most in their baking (table 22).

Advantages of canned fruit.-From the charts it is strikingly apparent that cost and convenience are the characteristics of canned fruits bakers most often mentioned favorably (figs. 1, 2, and 3). They most frequently commended canned fruit because it is ready for baking, requiring little time or labor in preparation. This ease of handling was mentioned by 5 of the large commercial bakers, 35 of the small, and 18 of the institutional bakers.

That canned fruit is cheap to store and requires no refrigeration was also considered an advantage by the majority of large commercial and institutional bakers and by 3 out of 10 small commercial bakers.

A considerable number of small commercial and institutional bakers said they liked canned fruit because they could depend upon it to be uniform in quality or in fruit-to-sugar ratio. Again, this saves time and labor by allowing them to use set formulae, so less skilled workers are required than when formulae must be adjusted. More than half the institutional bakers said they considered canned fruit cheaper to use. A good number of small commercial bakers mentioned this as an advantage, but just as many of this group said that canned fruit was more expensive to use.

To be able to have on hand fruit that can be used as a fill-in at a moment's notice is important to the small commercial baker in adjusting his daily production to the demands of his customers. Around 40 percent of the small commercial and 25 percent of the institutional bakers liked canned fruit for this purpose.

A number of small bakers and institutions said that the smaller container in which canned fruit is available, together with its ease of storing, was more suitable for their needs. Bakers said the No. 10 can holding 6 pounds allowed greater variety and less waste for the small business than the 30-pound container in which most frozen fruit must be bought. (See pages 77 - 80.)

The availability of canned goods throughout the year was mentioned by several small commercial and institutional bakers as an advantage.

Disadvantages of canned fruit.-The disadvantages of the canned form mentioned most frequently by bakers related to the quality characteristics of the fruit itself. These disadvantages corresponded to those qualities of flavor, color, and texture, which the greatest number of bakers said they looked for when they went to buy their fruit (table 18, page 31).

Bakers mentioned canned fruit most frequently as having poor flavor; 7 of the large commercial, 49 of the small, and 24 of the institutional bakers mentioned this as a disadvantage. A relatively large number of bakers also reported a dislike of its dull and artificial color and looked upon the texture as a drawback (figs. 1, 2, and 3).

Lack of uniformity in quality and a general cost disadvantage were attributed to canned fruit by a considerable number of small commercial and institutional bakers.

Almost one out of four of the small commercial bakers reported that they weren't always able to get canned fruit in the spring. This was especially true of apples in those years when the crop was short.

Advantages and disadvantages of specific canned fruits:

CANNED APPLES.--The large commercial bakers were very critical of canned apples, mentioning most often a flat, unnatural flavor, a tendency to mush down in baking, and an unappetizing appearance. This attitude on the part of the large bakers no doubt accounts for the fact that only 2 per cent of their apple pies were made from canned apples (table 24).

Small commercial and institutional bakers mentioned about the same advantages and disadvantages regarding canned apples that they did for canned fruit generally.

CANNED PEACHES.--Of all the bakers interviewed, more used canned than any other form of peaches, but their comments indicated that they were far from satisfied with them.

Most frequently, bakers commented unfavorably on the flavor of canned peaches. One large commercial baker said:

Canned peaches are flat--just not much taste to them. I think that's probably what's wrong with our peach pie sales. We use canned peaches because, all around, they're the best we can get, but they don't make very good pies. They don't have a definite enough flavor.

Several small commercial bakers also said that canned peaches were expensive to use.

An advantage frequently mentioned was that canned peaches were easy to prepare -- they did not turn dark when exposed to the air -- which gave the baker more freedom in his time schedule.

One-third of the large commercial bakers said that canned peaches held up well in baking and that they liked their bright yellow color. It is probable that these qualities were responsible for this group's using a substantial quantity of canned peaches when they avoided most other fruits in the canned form. On the other hand, the attitudes of the small commercial and institutional bakers toward texture and color were divided, some criticizing and some liking them.

CANNED APRICOTS.-As so few apricots were used in pies in the Chicago market, only a very few bakers discussed canned apricots. Those who did, talked of the flavor and the texture more than they did of other characteristics, but they did not seem to be in agreement. About an equal number thought canned apricots were flat as thought their flavor was good. Baking qualities fared about the same way, although the small commercial bakers had more criticisms of the texture than did the other bakers. One baker said:

Canned apricots don't have the eye appeal in a pie that they should have. They go to mush, cook out. Ninety percent of the people eat through their eyes. We need a nice, firm apricot. These we get are all mush.

There was no concensus as to the merit of canned apricots among the bakers who discussed them.

CANNED CHERRIES and BLUEBERRIES.-Only a few bakers mentioned canned cherries and blueberries, and they were likely to be critical in their appraisal. For the most part, their discussions followed the pattern of the bakers' criticism of canned fruit generally. The canned cherries were often said to have a dull, greyish color. The unsatisfactory reaction of canned blueberries to baking stood out as their main drawback. One baker said:

The canned cherries and blueberries are definitely inferior products. They mush down, break down. The canned cherry has an insipid color, a grey cast to it, and it has a flat taste. The canned blueberries have a nice taste--even better than the frozen, but they don't hold their shape.

Several small commercial and institutional bakers also said that canned blueberries were expensive to use.

What are the Advantages and Disadvantages of Dried Fruits from the Bakers' Viewpoint?

Disadvantages of dried fruit.-Dried fruit is by far the least used of all the fruit forms. Of the bakers interviewed, only 3 large commercial, 22 small, and 15 institutional bakers reported that they had used dried fruit at all in the year preceding the interviewing (table 21). Only 5 institutional bakers said they had used dried fruit most, or second most, in their baking, and in some cases donations were the reason for use (table 22). As few bakers used dried fruit and as many had had no experience with it, it is not surprising that bakers talked almost altogether about its disadvantages.

The time that dried fruit has to soak in order to be reconstituted for baking and the labor involved in this additional step was the most frequent disadvantage reported. One baker commented:

Dried fruit's not worth our fooling with. It's the time involved -- you have to soak them and they take too much handling....Anything that has to be reconstituted is a messy job and takes extra floor space and handling.

Almost equally criticized was the reported poor and artificial flavor. More than a third of all the bakers said they did not like its flavor, some stating that the taste of the preservative was strong.

The mashing of dried fruit in baking, toughness, and dark color were other disadvantages mentioned by a number of the bakers. The toughness, even after soaking, was more often criticized by the small commercial bakers than this aspect of texture in other processed forms of fruit.

About 12 percent of the small commercial bakers and 20 percent of the institutional bakers also said that dried fruit had a poor reputation among consumers; they believed their sales might be injured if their customers thought they used it.

Table 29 lists the reasons bakers gave for not using dried fruit at all in their baking. It can be seen that these were parallel to the disadvantages that were mentioned by bakers who criticized dried fruit, regardless of whether they used it or not.

Advantages of dried fruit.-Relatively few advantages of dried fruit for baking were discussed. Ten small commercial bakers liked it because it was easy to keep on hand to use as a fill-in when they ran short of the forms they customarily used.

A few small commercial and institutional bakers also said dried fruit was cheaper to use than other forms.

Advantages and disadvantages of specific dried fruits.-The pattern of advantages and disadvantages bakers gave for specific dried fruits, such as apples, peaches, and apricots, was similar to that of dried fruit in general. However, unlike other dried fruits, the flavor of dried apricots was commended more often than criticized. Four large commercial bakers, six small commercial bakers, and five institutional bakers listed flavor as an advantage of dried apricots. This was the only case in which some bakers from all three groups credited an advantage to a specific dried fruit.

Table 29.-Reasons bakers gave for not using dried fruits for baking

Reasons given	Type of organization					
	Large commercial		Small commercial		Institution	
	Number	1/	Number	1/	Number	1/
Flavor -----		1		22		7
Bad flavor, general -----	--		1		3	
Apples had a bad flavor -----	1		4		1	
Didn't taste like fresh -----	--		15		3	
Chemical treatment caused bad flavor -----	--		2		--	
Other criticisms of flavor -----	--		3		1	
Preparation -----		3		20		4
Too much time and labor in preparing, general -----	2		2		2	
Had to soak them -----	1		17		3	
Had to cook them -----	--		4		--	
Had to watch them closely while preparing -----	--		1		--	
Other criticisms relating to preparation -----	1		2		2	
Texture -----		2		16		3
Didn't hold shape or firmness -----	1		5		3	
Tough, general -----	--		7		--	
Apples were tough -----	1		5		--	
Other criticisms of texture -----	1		--		--	
Color -----		2		7		--
Color not right, general -----	--		3		--	
Color too dark -----	1		1		--	
Apples were too dark -----	--		3		--	
Other criticisms of color -----	1		--		--	
Expense -----		--		3		2
Too expensive -----	--		2		2	
Other cost factors -----	--		1		--	
Other reasons -----		3		5		6
Other forms of fruit preferred, general -----	2		1		5	
No demand for dried fruits -----	1		3		3	
Other -----	--		2		--	
Didn't know -----		--		5		2
Not ascertained -----		--		2		1
Number who didn't use dried fruit -----		6		52		15

1/ Numbers in left columns sometimes add to more than subtotals in right columns and these add to more than total who did not use dried fruit because more than one answer was possible.

Which fruits do bakers feel need improvement most?-To investigate further the need for improving processed fruits used in baking, the Chicago bakers were asked:

From your point of view, which of the fruits on today's market do you think are most in need of improvement?

Replies again indicate that the great majority of bakers are not satisfied with the products now available to them on the market. One large commercial baker, 12 small commercial, and 5 institutional bakers said all products they used were satisfactory. On the other hand, 7 of the small commercial bakers and 2 of the institutional bakers went so far as to say that all processed fruits were in need of improvement (table 30).

Peaches were the fruit most frequently criticized by all three groups of bakers. Seven of the large commercial bakers, 31 of the small bakers, and 13 of the institutions, said that they are the fruit most in need of improvement. When they specified a form, the frozen was more often mentioned as unsatisfactory by the commercial bakers and the canned by the institutions.

Second highest number of criticisms was directed at apricots. When bakers specified the form of the apricots they thought was unsatisfactory, canned was most frequently designated by small commercial and institutional bakers. Almost half the large commercial bakers said that apricots needed to be improved, but none expressed their dissatisfaction in terms of a specific processed form.

A number of bakers said strawberries and apples were unsatisfactory for their baking. Frozen strawberries were mentioned especially for excessive juiciness and mushiness.

Of the major fruits, all three groups of bakers were least critical of cherries and blueberries. Among the available forms of these fruits, the canned cherries and blueberries came in for the most disapproval. Frozen cherries, especially, seemed to be the processed fruit that was rated by bakers as a superior product. Of all the bakers interviewed, only one said he thought frozen cherries were in need of improvement (table 30).

Table 30.-Replies to the question: "From your point of view, which of the fruits on today's market do you think are most in need of improvement?"

Replies	Type of organization					
	Large commercial		Small commercial		Institution	
	Number	1/	Number	1/	Number	1/
Peaches -----		7		31		13
Frozen -----	2		12		5	
Canned -----	1		6		7	
Dried -----	1		2		2	
Fresh -----	1		--		1	
Form unspecified -----	5		16		3	
Apricots -----		4		26		11
Frozen -----	--		5		4	
Canned -----	--		8		6	
Dried -----	--		2		1	
Fresh -----	1		1		1	
Form unspecified -----	3		14		2	
Apples -----		3		13		6
Frozen -----	2		7		4	
Canned -----	2		3		4	
Dried -----	2		1		--	
Fresh -----	1		1		--	
Prepared fresh -----	--		1		--	
Form unspecified -----	1		4		--	
Strawberries -----		2		14		8
Frozen -----	1		7		4	
Canned -----	1		2		1	
Form unspecified -----	1		7		4	
Blueberries -----		2		8		3
Frozen -----	--		3		1	
Canned -----	1		4		1	
Fresh -----	1		--		--	
Form unspecified -----	1		1		1	
Cherries -----		1		8		3
Frozen -----	--		1		--	
Canned -----	1		5		3	
Fresh -----	1		--		--	
Form unspecified -----	--		2		--	
Other fruits -----		--		5		7
All fruits need improvement -----		--		7		2
All frozen -----		--	4		1	
All canned -----		--	3		1	
Form unspecified -----		--	2		1	
Products used now are satisfactory -----		1		12		5
Didn't know -----		--		2		2
Number of cases -----		9		74		30

1/ Numbers in left columns sometimes add to more than subtotals in right columns and these add to more than total number of cases because more than one answer was possible.

Bakers' Reactions to a Description of Dehydrofrozen Fruit

The Western Regional Research Laboratory of the U. S. Department of Agriculture has developed a new method of preserving fruit. Fruit processed by this method has been tentatively described as dehydrofrozen fruit, although this is not an official name. The process involves removing part of the moisture from the fruit to reduce its weight and volume to approximately one-half that of the fresh fruit, and then freezing it to preserve the quality. The amount of dehydration used is the maximum achievable without important loss of quality of the particular fruit. The object of the reduction in weight and volume is to reduce packaging, transportation, and storage costs.

Tests in commercial bakeries using dehydrofrozen fruits in the preparation of pies have indicated that the product may have advantages over some other commonly used pie stocks with regard to flavor, texture, and convenience of use.

One of the purposes of this study was to estimate, before the product was put on the market, how bakers might accept it. It was found in the planning of the study and the pretesting that when bakers were asked whether they would try the dehydrofrozen fruit if it were placed on the market, they could not answer realistically because of a lack of information. Instead, they asked questions about the product. Because these questions were indicative of the types of information that would need to accompany the successful promotion and marketing of dehydrofrozen fruit, or almost any new fruit product, it was decided to include in the study a section on the information needs of bakers with respect to dehydrofrozen fruit. It was hoped, too, that some indication of their interest in the product could be obtained. Reactions to the description of dehydrofrozen fruit might also serve as an example of the kinds of responses to be expected to any new fruit product. Such information, it was thought, might be helpful not only to the Western Regional Laboratory but to any private enterprise that might be interested in marketing a new fruit product.

Things bakers said they would need to know about dehydrofrozen fruit before they could decide whether they would want to use it.-Bakers were asked:

The Department of Agriculture is experimenting with a (fruit) product which might overcome some of your difficulties. This product would fit into your present bakery practices. The product is similar to frozen orange-juice concentrate now on the market in that it is first condensed to reduce weight and volume and then frozen to preserve fresh quality. First, if a new condensed-frozen product came on the market, what things would you need to know about it before you could decide whether or not you'd want to use it?

Bakers responded by asking many questions of their own. In almost every case their questions indicated interest in the product. They were both positive and negative in content, pointing up definite barriers to acceptance as well as an eagerness to know more. The large number of different questions they

asked seems in itself an indication of their interest in a new fruit product. On the average, large commercial bakers asked more than 7.5 questions each, small commercial bakers 5 questions, and the institutional bakers more than 6 questions each.

From table 31, it is evident that bakers' questions about dehydrofrozen fruit tended to fall into three fields of inquiry.

First, they wanted to know what the flavor, texture, and appearance of dehydrofrozen fruit would be like. It will be remembered that these are the characteristics which bakers most often said they looked for in buying or testing fruit (table 18, page 31).

Second, they were interested in knowing the cost of this new product. The questions on cost were concerned not so much with the initial price of dehydrofrozen fruit -- although certainly they were interested in that -- but more with its over-all cost, including such factors as relative yield, labor, and storage. More institutional bakers asked questions relating to the cost than asked questions relating to any other single item. Almost as many commercial bakers were concerned with its cost as were concerned with its flavor -- the single characteristic that commercial bakers stressed most often.

Third, bakers were interested in the effect of dehydration on the fruit. In earlier sections of the report, it was shown that some bakers associated dark color, artificial flavor, toughness, and mushiness with dried fruit when cooked in pies. Many of them wanted to know if the removal of 50 percent of the water would have a similar effect. A considerable number also associated dried fruit with additional labor required to reconstitute the product, and with clutter in their shops while the fruit was soaking or cooking. One small baker expressed his attitude toward dehydration in this way:

The word dehydration would turn me against it. It means they've taken something away that nature has put in that can't be replaced by human hands....I can't put back what they've taken out.

Relatively more of the large commercial bakers were concerned with problems associated with dehydration than of the other two groups, although more than half the small commercial and institutional bakers asked questions about dehydration. The large bakers were particularly interested in the quality of the fruit that had been dehydrated, with two-thirds of them raising a doubt as to whether fruit that had been processed in this way would have high quality. Certainly, the concern expressed by all three groups of bakers is direct evidence that before bakers will accept this product generally, they must be convinced that partial dehydration can result in high-quality fruit which is easy to prepare and involves no increase in labor costs.

In addition to being concerned about the characteristics of fruit that had been dehydrated, some bakers also asked questions which related to the freezing part of the dehydrofrozen process. These questions had to do primarily with problems of refrigerated storage and perishability -- disadvantages they tended to associate with frozen fruits. The majority of questions asked by the small commercial and institutional bakers in this vein had to do with whether refrigerated storage would be needed.

Table 31.-Replies to the question: "First, if a new condensed-frozen product came on the market, what things would you need to know about it before you could decide whether or not you'd want to use it?"

Replies	Type of organization					
	Large commercial		Small commercial		Institution	
	Number	1/	Number	1/	Number	1/
Questions about FLAVOR -----		9		50		24
Would it have a fresh-fruit flavor? -----	3		22		12	
Would it have as good or better flavor than fruit now used? -----	2		17		9	
Would flavor be hurt by dehydration? -----	4		8		3	
Would it have a good flavor (general)? -----	2		11		6	
Other questions about flavor -----	1		4		3	
Questions about COST -----		7		47		29
How would the cost per pie compare with what is on the market now? -----	6		32		18	
How much time and labor would it require to prepare for baking? -----	3		32		17	
What would storage costs be? -----	--		3		--	
How much does it cost (general)? -----	--		8		6	
Other questions about cost -----	--		--		1	
Questions about TEXTURE and CONSISTENCY -----		7		41		17
Would the fruit stay firm and not mush in baking? -----	6		23		14	
Would the fruit have right quantity of juice, neither too juicy nor too dry? -----	--		15		7	
Would the texture be hurt by dehydration? -----	1		6		2	
How would the texture and consistency compare with what is on the market now? -----	--		4		--	
Does it have a good texture (general)? -----	1		2		--	
Other questions about texture -----	--		2		2	
Questions about DEHYDRATION and RECONSTITUTION PROCESSES -----		8		38		15
Doubt if you can get a high-quality fruit that has been dehydrated -----	6		15		9	
How much water is taken out and how much would have to be put back in? -----	3		13		6	
Would you have to soak the fruit? -----	1		7		--	
How do you reconstitute it (general)? -----	1		10		3	
Other questions about dehydration and re-constitution processes -----	--		4		2	

See footnote at end of table.

Table 31.-Replies to the question: "First, if a new condensed-frozen product came on the market, what things would you need to know about it before you could decide whether or not you'd want to use it?" --Continued

Replies	Type of organization					
	Large commercial		Small commercial		Institution	
	Number	1/	Number	1/	Number	1/
Questions about APPEARANCE -----		8		34		18
General:						
Does the pie look like one made of fresh fruit? Does the fruit regain its original size and shape after reconstitution?-----	3		8		4	
How does its appearance compare with products used now? -----	--		5		6	
Is the fruit uniform in size and shape after reconstitution? -----	2		1		2	
Does it have a nice appearance (general)? -	1		9		4	
Other questions about appearance (excluding color) -----	2		3		2	
Color:						
Is the color natural and like the fresh fruit? -----	3		9		6	
Does it have a nice bright color? -----	2		--		2	
Does it have as good color as fruit used now (such as frozen)? -----	1		3		1	
Does it have a good color (general)? -----	2		1		1	
Other questions about color -----	--		3		--	
Questions about STORAGE and PERISHABILITY -----		4		23		11
Would it have to be kept under refrigeration; is a deep freeze needed? -----	1		15		8	
How long would it keep out of storage? -----	2		5		2	
How long would the fruit keep in storage-- would the enzymes be inactivated? -----	1		6		3	
What kind and size of containers would it come in? -----	--		4		--	
Other questions about storage and perishability -----	1		3		--	
MISCELLANEOUS REPLIES -----		4		42		19
I wouldn't really have a good idea until I tried it myself or saw it demonstrated ----	2		14		12	
How much sugar would have to be added? -----	--		10		4	
I'd want to know the customers' reaction ----	--		7		1	
How does it compare in quality to other products now used? -----	1		8		2	
What preservatives are added? -----	--		4		1	
How much vitamin or mineral loss is there in processing? -----	--		--		4	
What products can be made from it? -----	--		3		--	
Other replies -----	4		12		2	
Number of cases -----		9		74		30

1/ Columns add to more than total number answering because more than one answer was possible.

How bakers would test the new product to see whether they would use it.-To throw additional light on ways in which the new fruit product might be promoted, bakers were asked:

Assuming you were to try it (dehydrofrozen fruit), in what ways would you test it to see whether or not you'd use it?

What is your usual method of trying out a new fruit product to see whether you want to buy it again?

Replies indicate that one demonstration would be worth 10,000 words in gaining acceptance for the new product (table 32). Bakers evidently have to be "shown" that a new product will measure up to the standards they have set for their business. Almost all those interviewed said they decided whether to buy and use a new product through personal experience. They bake a pie, taste it to test its quality, or try it out on members of their staff or their customers.

A residual group of 5 out of the 74 small commercial bakers said they would not try dehydrofrozen fruit under any circumstances because they were convinced beforehand the product would be unsatisfactory.

Table 32.-Replies to the questions: "Assuming you were to try it (a new condensed-frozen fruit product), in what ways would you test it to see whether or not you'd use it?" "What is your usual method of trying out a new fruit product to see whether you want to buy it again?"

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
I'd bake up a pie and see if it makes a good product -----	9	60	23
I'd bake it up and see whether the customers like it - see whether it sells -----	--	26	9
I'd bake up a sample, have members of my staff taste it, and get their opinion -----	3	7	9
I'd check the condition of the fruit before baking - feel it for texture, taste it, see if it looks like fresh fruit -----	--	4	--
Other ways of testing -----	--	4	5
I wouldn't try it because I know it wouldn't be good -----	--	5	--
Not ascertained -----	--	1	--
Number of cases -----	9	74	30

^{1/} Columns add to more than total number answering because more than one answer was possible.

Advantages and disadvantages that bakers said dehydrofrozen fruit might have in their business.-In an attempt to gauge the degree of acceptance that dehydrofrozen fruit might have among bakers, they were asked to discuss the advantages and disadvantages that they thought dehydrofrozen fruit might have for them in their business. Bakers were asked:

Do you think such a fruit product would have any advantages to you in your business?

What advantages would it have?

What disadvantages would it have?

On the basis of bakers' answers to these questions, their attitudes were rated as favorable, unfavorable, or neutral, as shown in table 33. About two-thirds of the commercial bakers and one-half of the institutional bakers believed that dehydrofrozen fruit would have advantages in their business. However, the big majority of these qualified their answer, indicating they needed more information or wanted an opportunity to try it out before they would know. On the other hand, approximately 22 percent of the commercial bakers had an unfavorable attitude toward the new product, saying that it would probably have no particular advantage to them. Thirty-seven percent of the institutional bakers expressed an unfavorable attitude toward the new product. Fifteen percent of the small commercial bakers and 7 percent of the institutional bakers were definitely negative in their attitude.

Table 33.-Replies to the question: "Do you think such a (condensed-frozen) fruit product would have any advantages to you in your business?"

Replies	Type of organization					
	Large commercial		Small commercial		Institution	
	Number		Number		Number	
Total with favorable attitude -----		6		48		16
Unqualified "Yes" -----	1		10		1	
Qualified "Yes" -----	5		38		15	
Undecided, or advantages and disadvantages equally balanced -----		1		9		3
Total with unfavorable attitude -----		2		17		11
Qualified "No" -----	2		6		9	
Unqualified "No" -----	--		11		2	
Number of cases -----		9		74		30

In listing specific disadvantages that they thought dehydrofrozen fruit might have for them in their business, bakers related most of their criticisms to their reservation about dehydration (table 34). If a dehydrofrozen fruit requires soaking or precooking to reconstitute it properly, many bakers will be reluctant to use it because of the additional cost of time and labor. Some also distrust the flavor and texture of a fruit that has been dehydrated. Several would not identify their reluctance other than to indicate a prejudice against anything dehydrated. One large baker said:

I don't like dehydrated stuff. But we'd just have to try it and see. Dehydrated fruit never has the taste and besides, it's a mess to handle.

A small baker commented:

I'm just afraid the dehydrating might destroy some of the flavor. I've had too much experience with dried fruit, so I'm skeptical....Once you have to add too much water you take away flavor.

It seems obvious that at least part of the promotional work incident to launching this product on the market should be directed toward allaying the fears and dislodging the dislikes which many bakers have about dehydration.

The need for refrigerated storage space is a disadvantage in the eyes of some bakers.

Despite their reservations about dehydration, many bakers listed specific advantages that they thought dehydrofrozen fruit might have for them in their business. For the most part, bakers seemed to feel that the principal advantages of the new product were monetary (table 35). They mentioned a variety of ways that it might save them money: lowering storage and transportation costs, eliminating the inconvenience of using cans, saving labor, increasing sales through the appeal of a new product, and the like. One large commercial baker said:

I'd be interested in trying it. The main thing that appeals to me is that it would cut storage costs and anything that reduces storage costs is a big help to me.

A small baker commented:

...on the whole, something new never hurts business. People like to try a new product. It might help our sales from that standpoint.

Other than advantages which were associated either directly or indirectly with a cost factor, 1 large commercial baker, 16 small commercial bakers, and 7 institutional bakers said they thought that dehydrofrozen fruit might be a high-quality product -- particularly that it might have an excellent flavor, very nearly approximating fresh fruit.

Table 34.-Replies to the question: (If a new condensed-frozen product came on the market), "What disadvantages might it have?"

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Would require too much time and labor to reconstitute, thus increasing costs -----	3	21	12
Dehydrated fruit doesn't have a good flavor (loss of flavor in drying and soaking; has taste of sulphur, etc.) -----	4	7	4
Would require refrigerated storage space --	2	8	5
Dehydrated fruit doesn't have good texture (would be a paste, broken up, etc.) -----	--	7	2
Bakers and public are prejudiced against dehydrated fruit (general) -----	--	8	3
Might be more expensive -----	--	3	1
Would be necessary to develop methods of handling it and get everyone used to using it -----	--	3	--
Other disadvantages -----	--	7	4
Sees no disadvantages now -----	2	22	9
Number of cases -----	9	74	30

^{1/} Columns add to more than total number answering because more than one answer was possible.

Table 35.-Replies to the question: "What advantages would (a new condensed-frozen fruit product) have?"

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Storage costs would be lowered -----	8	24	9
Might be a higher quality product, have a fine, fresh flavor -----	1	16	7
Would be more convenient to use (easier to handle, no cans, etc.) -----	2	4	2
Transportation costs would be lower -----	--	6	1
Would give more fruit for the money by reducing moisture -----	--	5	1
A new thing might appeal to the public and increase sales and profit -----	--	6	--
Would be a time and labor saver -----	--	4	--
Might save money in other ways (eliminate cost of garbage disposal; make it unnecessary to buy a year in advance to protect supply; eliminate waste from deterioration) -----	2	1	--
Might be cheaper (ways unspecified) -----	--	4	5
Other advantages -----	--	2	2
Could see no advantages or don't know what advantages it might have -----	1	27	10
Number of cases -----	9	74	30

^{1/} Columns add to more than total number answering because more than one answer was possible.

Problems Related to the Use of Frozen Fruit

Although the majority of the interviewed bakers reported that they used at least some frozen fruits for baking, the findings of this study suggest that consumption of this form by bakers is limited by several problems related to the use of the frozen form. These problems center around the necessity for refrigerated storage space and the cost of public storage, as well as bakers' objections to the size of container in which frozen fruits are available. Some bakers also were not satisfied with the fruit-to-sugar ratios of the frozen fruits available to them.

In a previous section, these factors were touched upon as advantages and disadvantages of frozen fruit. A more detailed examination of these problems is given here.

Bakers' facilities for storing frozen fruit.-Need for refrigerated storage space was mentioned more often than any other disadvantage of frozen fruit. Two institutional and one small commercial baker gave this as their sole reason for not using frozen fruits, and a number of small bakers said they relied on canned fruit primarily because of ease or cheapness of storage.

Bakers who used frozen fruit were asked about the amount of refrigerated storage space they had on the premises and the temperatures used. In addition, they were asked whether they were renting any deep-freeze storage. Table 36 shows that all the large commercial bakers said they depended on public storage for frozen fruits; but only a few of the small commercial bakers and none of the institutions reported that they took advantage of these public facilities.

Although the majority in all groups had some cooler space (30° F., and above) where frozen fruits could be kept for a short time while they thawed, relatively few of the small bakers and institutions had any regular freezer (0 to 30° F.) where frozen fruits could be kept for longer periods, or sharp freezer (below 0° F.) where fresh fruits could be quick-frozen. Many of the small bakers and institutions pointed out that they needed their refrigerator space for other things like milk, ice cream, meat, or vegetables.

Interviewers reported that bakers' estimates of the amount of space available for frozen fruits were rough guesses made in a variety of units of measurement which were difficult to convert accurately. Therefore, no data are shown on the actual refrigerated space bakers said they had.

How do bakers feel about the size of containers of frozen fruit?-In order to learn about the size of container that would be most acceptable to bakers, they were asked:

What size container do you usually get your frozen fruit in?
Are you satisfied with this size container?

Table 36.-Facilities bakers said they had for storing frozen fruit

Cold storage facilities	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}	<u>Number</u> ^{1/}
Cooler (30° Fahrenheit and above) -----	7	64	17
Regular freezer (0 to 30° Fahrenheit) ---	4	4	6
Sharp freezer (below 0° Fahrenheit) -----	2	4	2
Used public storage -----	9	8	--
No facilities on premises for storing frozen fruit -----	1	1	1
Number who used frozen fruit -----	9	69	24

^{1/} Columns add to more than total number who used frozen fruit because some bakers had more than one type of facility.

The great majority of bakers said they got most of their fruit in the 30-pound container and were satisfied with the size. Only 2 large commercial bakers, 6 small commercial, and 10 institutional bakers said they were not completely satisfied (tables 37 and 38). It will be remembered that more small bakers mentioned the size of container when discussing the disadvantages of frozen fruit. This discrepancy may be explained by the fact that these bakers were dissatisfied not with the containers of the fruit they customarily used, but with the containers available in fruits they did not usually buy in frozen form.

Table 37.-Replies to the question: "In what size container have you usually been getting your frozen fruit?"

Size container	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
55-pound -----	--	1	--
45-pound -----	--	--	1
40-pound -----	--	1	--
35-pound -----	--	1	--
30-pound -----	9	68	18
25-pound -----	--	2	3
20-pound -----	--	1	1
10-pound -----	--	7	2
8-pound -----	--	--	1
Not ascertained -----	--	--	1
Number who bought frozen fruit -----	9	69	24

^{1/} Columns sometimes add to more than total number who bought frozen fruit because more than one answer was possible.

Table 38.-Replies to the question: "Are you satisfied with this size container?" ^{1/}

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	Number	Number	Number
Satisfied -----	7	63	12
Not satisfied -----	1	4	7
Satisfied with some fruits, not with others -----	1	2	3
Not ascertained -----	--	--	2
Number who bought frozen fruit -----	9	69	24

^{1/} "This" refers to size container in which the baker had usually been getting his frozen fruit.

When the relatively few bakers who were dissatisfied with the size container they were now using were asked, "What size would you prefer?", one large commercial, 4 small commercial, and eight institutional bakers said they would be interested in a 15-pound container or smaller (table 39). Those who said they wanted smaller containers than the usual 30-pound package said the size of their business did not warrant the use of 30 pounds of fruit at one time. The opening of a 30-pound can meant spoilage of left-over fruit. In addition, the large container required more storage space and limited the varieties of fruit that could be used. Fruits like strawberries and raspberries, which are used in small quantities, were the ones these bakers particularly wanted available in smaller packages. Smaller containers for berries were also considered desirable to avoid the crushing of the fruit on the bottom.

One baker suggested that it would be helpful to small bakers if frozen-fruit containers were divided into sections so that part of the fruit could be used without opening or thawing the rest of it.

Table 39.-Replies to the question: "What size would you prefer?"

Size container mentioned	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u>	<u>Number</u>	<u>Number</u>
60-pound -----	--	1	--
50-pound -----	1	--	--
27-pound -----	--	--	1
20-pound -----	--	--	1
17-pound -----	--	1	--
15-pound -----	--	1	1
12-pound -----	--	--	1
11-pound -----	--	--	1
10-pound -----	1	3	4
2-pound -----	--	--	1
Satisfied with present size container ---	7	63	12
Not ascertained -----	--	--	2
Number who bought frozen fruit -----	9	69	24

How do bakers who use frozen fruit feel about fruit-to-sugar ratios?-

To get a clear picture of how bakers who used frozen fruit felt about the fruit-to-sugar ratio, the following question was asked:

Are you satisfied with the amount of fruit-to-sugar in the frozen fruits you buy?

The large majority said they were satisfied with the fruit-to-sugar ratio in the frozen fruits they bought. Only 3 of the large commercial, 12 of the small, and 3 of the institutional bakers gave a negative or qualified answer to this question (table 40). Most of these said they preferred to buy fruit unsweetened. They thought it would be cheaper to buy their own sugar and add it rather than pay fruit prices for the sugar added by the processing. Moreover, they thought that, particularly in the case of berries, too much sugar bled the fruit, making it too watery for baking. A very few bakers said they would prefer to have even more sugar in the fruit than was normally added in the processing.

Table 40.-Replies to the question: "Are you satisfied with the amount of fruit-to-sugar in the frozen fruits you buy?"

Replies	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u>	<u>Number</u>	<u>Number</u>
Satisfied -----	6	57	20
Not satisfied -----	2	11	2
Satisfied with some fruits, not with others -----	1	1	1
Not ascertained -----	--	--	1
Number who bought frozen fruit -----	9	69	24

Seasonal Variation in the Use of Apples by Chicago Bakers

The new crop of early apples enters the market in August, generally at prices somewhat higher than are asked for apples that mature later. For some months before this, certain conditions make fresh apples less satisfactory from the bakers' viewpoint. By the month of May, apples that have been stored from the previous autumn have undergone some deterioration so that they lose the tart apple flavor which most bakers said they considered

desirable for pies. Moreover, by March the smaller bakers, who have no facilities for storing fresh apples in large quantities, must pay relatively high prices because of scarcity.

What effect do fluctuations in the quality, availability, and price of fresh apples have on bakers' patterns of consumption? Commercial bakers were asked about each form of apples they used:

What months of the year do you use (fresh, frozen, canned, dried) apples?

Replies grouped in table 41 indicate that many bakers shifted from one form of apples to another throughout the year. Furthermore, some who said they used a particular form the year round commented that they used less of this form during certain months, supplementing with another that was less expensive, more plentiful, or of better quality. In a few cases, bakers added dried or canned apples to the fresh in order to make the fresh fruit go farther, but still retain the qualities of flavor or texture they desired.

Figure 4 shows the quarterly variation through the year of the proportion of large and small bakers respectively who reported using fresh apples during each period. These data begin with the September-November quarter-year during which the main fresh-apple harvest takes place. This is also the period when the highest percentage of both groups of bakers reported using fresh apples. Among the large commercial bakers this percentage declined steadily throughout the rest of the year. It also declined among the group of small bakers during the period December-May but increased again in the June-August quarter.

Figure 4 also illustrates the quarterly variation, for large and small bakers respectively, of the percentage of total apple pies baked during the year which are produced in each quarter-year. These data also begin with the September-November period when the fresh-apple harvest is at its height. Among the large commercial bakers, the production of apple pies increased slightly but steadily from this fall period and reached a peak during the March-May quarter; after that it dropped abruptly. Production of apple pies among small bakers, however, remained fairly constant from September to June and then dropped to its low point during the summer quarter, when the low point among the large bakers was also reached.

Bakers pointed out that sales of all pies generally decline during the hot weather. They think that consumers prefer lighter desserts and generally eat less pastry at that time. Bakers also noted that pies made of fresh berries and peaches enter the market during the summer and provide more competition for apple pies. Finally, it is worth noting that the actual variation in the production of apple pies from quarter to quarter was relatively small. Among the large bakers, production ranged from 27 percent of yearly output in the March-May quarter to 23 percent in the June-August period -- a difference of only 4 percent. Small bakers showed even less variation.

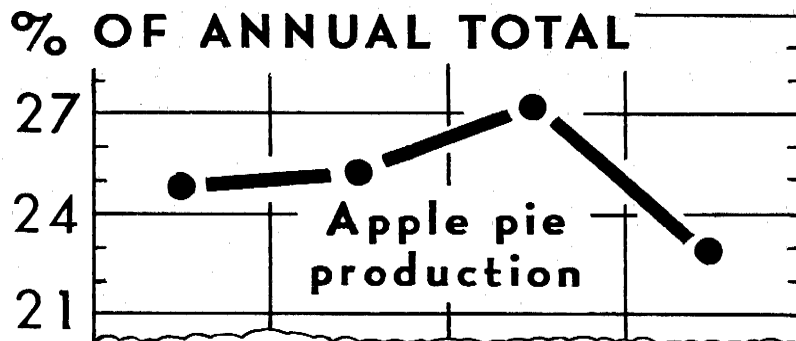
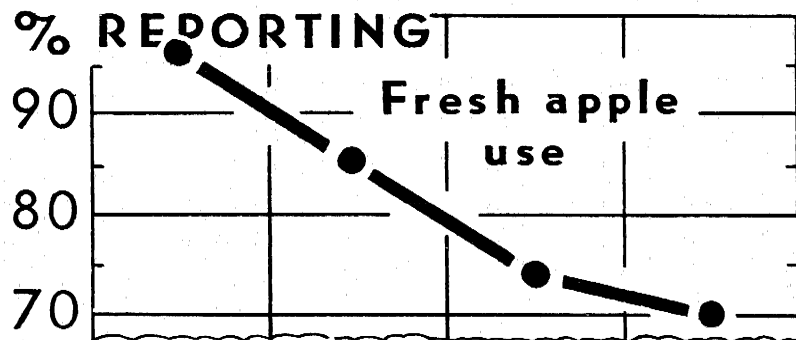
Table 41.-Fluctuations in bakers' use of fresh, frozen, canned, and dried apples

Apples	Type of organization											
	Large commercial				Small commercial				Institution			
	Fresh	Frozen	Canned	Dried	Fresh	Frozen	Canned	Dried	Fresh	Frozen	Canned	Dried
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Used the form all year around -----	6	1	1	--	34	14	37	3	5	8	13	4
Used the form only during some months-	3	2	--	--	31	14	25	9	15	3	6	--
Other use patterns - for emergencies, experiment, irregularly, etc. ---	--	--	--	1	3	4	2	5	4	2	3	2
Didn't use the form at all -----	--	6	8	8	6	42	10	57	5	16	8	23
Not ascertained -----	--	--	--	--	--	--	--	--	1	1	--	1
Number of cases -----	9	9	9	9	74	74	74	74	30	30	30	30

FRESH-APPLE USE AND APPLE-PIE PRODUCTION

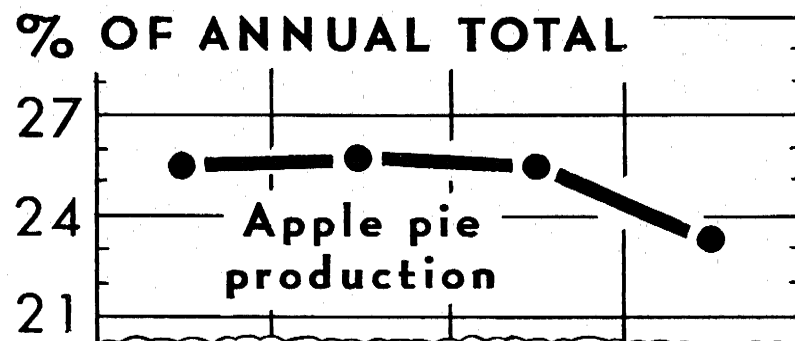
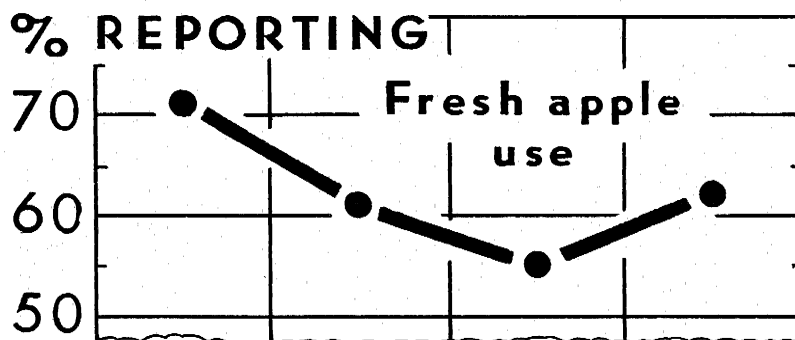
Quarterly Variation as Reported by Commercial Bakers

LARGE BAKERS



SEPT.-NOV. DEC.-FEB. MAR.-MAY JUNE-AUG.

SMALL BAKERS



SEPT.-NOV. DEC.-FEB. MAR.-MAY JUNE-AUG.

18

These data have certain implications for producers of processed apples of whatever form. They show that most bakers used fresh apples during the fall season of the new harvest and that fewer and fewer used them as the season advanced. Yet, except for the summer decline, the production of apple pies remained constant among the small bakers and increased among the large bakers who accounted for a much greater part of the total volume than did the more numerous small bakers. It is obvious that this period -- when fewer bakers are using fresh apples but apple-pie production is either constant or increasing -- is the time when processed apples should come into their greatest use in the industry. In view of the expressed dissatisfaction with the forms of processed apples now on the market, so far as pie-baking is concerned, it would appear that the best time to launch a new form of processed apple would be during the winter and spring.

Bakers who did not use fresh apples all the year round, or whose comments indicated that they used less at certain times of the year were asked:

Why do you use fresh apples during these months and not (so much) during the rest of the year?

The replies suggest that the use of fresh apples by the large commercial bakers drops off during certain months primarily because of deterioration in quality (table 42). Among small commercial bakers, almost as many said they were influenced by increases in price as by the decline in quality. Institutional bakers most often gave price rises as a reason for using fewer fresh apples during some months.

Table 42.-Reasons bakers gave for using less fresh apples during certain months

Reasons given	Type of organization		
	Large commercial	Small commercial	Institution
	Number ^{1/}	Number ^{1/}	Number ^{1/}
Quality of fresh apples is lower during months when less are used -----	3	17	6
Price of fresh apples is higher during months when less are used -----	1	15	11
Used fresh apples in season only -----	1	3	8
Fresh apples used as a substitute for other preferred forms -----	1	9	--
Fresh apples are less available during months when less are used -----	--	9	8
Fresh apples donated during season; bought other preferred forms rest of year -----	--	--	3
Schools closed down in summer -----	--	--	2
Other reasons -----	1	3	1
Didn't know; not ascertained -----	--	--	3
Number who used less fresh apples during certain months of the year ^{2/} -----	4	38	22

^{1/} Columns add to more than total number who used less fresh apples at certain times of the year because some bakers gave more than one reason.

^{2/} Excludes the organizations that reported using the same quantity of fresh apples all year and institutions that said they did not use fresh apples.

When bakers decrease their consumption of fresh apples, what other forms do they use as substitutes or supplements. Table 43 shows that most large commercial bakers who did not use fresh apples exclusively tended to shift to frozen, whereas most of the small commercial and institutional bakers were more likely to shift to canned. A considerable number of bakers in the second and third groups used more than one additional form.

Table 43.-Other forms of apple reported used during the year by bakers who used fresh apples

Other forms of apple reported used	Type of organization		
	Large commercial	Small commercial	Institution
	<u>Number</u>	<u>Number</u>	<u>Number</u>
Frozen -----	3	4	3
Canned -----	1	24	5
Dried -----	1	--	1
Frozen and canned -----	--	16	6
Frozen and dried -----	--	--	--
Canned and dried -----	--	12	4
Frozen, canned, and dried ---	--	6	2
Used fresh apple only -----	4	6	4
Number who used fresh apples-	9	68	25