

# *Citrus Preferences Among Customers of Selected Stores*

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# *Digest*

Texas citrus growers, shippers and processors are confronted with a competitive struggle if they are to maintain a fair return on their investment, in comparison with other citrus producing areas. If the expansion of the frozen orange juice concentrate industry continues as recently evident, canners of single strength juices and handlers of fresh fruit will face stronger competition for consumer sales. Maintenance of quality citrus highly acceptable to consumers will be a prime requirement for obtaining a normal share of the consumer's citrus dollar in the years ahead. Knowledge of consumers' preferences and buying behavior under changing conditions of supply, price, quality and family income are useful to the citrus industry from grower to retailer.

This is a report of consumer preferences and buying behavior for a selected area in Houston, Texas. Of the several studies undertaken cooperatively by public research agencies, this is one of the few that have integrated the results of a consumer preference survey of households in a selected area with retail sales data from stores supplying the same area. In this way information was obtained as to shoppers' likes and dislikes of the citrus products available to them, consumers' stated buying behavior, and consumers' actual buying behavior when confronted with a wide range of citrus products. In addition, consumers' opinions as to the relative values of citrus foods available in fresh and processed forms were checked against laboratory tests.

This study is a phase of the Southern regional citrus marketing research program under the Research and Marketing Act of 1946. Cooperating agencies are the Texas Agricultural Experiment Station and the Bureau of Agricultural Economics, U. S. Department of Agriculture. Other agencies who are cooperating in the Southern citrus marketing research program are the Florida Agricultural Experiment Station, the Production and Marketing Administration and the Farm Credit Administration.

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# Citrus Preferences Among Customers of Selected Stores

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CITRUS IS ONE of the chief fruit crops of the United States. In terms of tonnage, oranges ranked first among the fruits and grapefruit fourth during the 1948-49 season. Citrus constituted 44 percent of the total tonnage of the important fruit crops for the period 1943-47. Citrus juices represented 60 percent of the total fruit and vegetable juice pack for the same period.

Production of citrus fruit nearly doubled in each decade from 1910 to 1940. It has increased since 1940, but at a slower rate. The present trend in national production should continue upward with the increases in age of citrus groves and new plantings.

The full effect of increased citrus production combined with a sharply reduced demand from the wartime level was demonstrated when prices paid to citrus growers became adjusted to prewar relationships in advance of most other agricultural commodities. Prices to growers fell to distress levels and remained there until the freeze in 1948. As a result supplies were reduced and prices rose. Freezing weather in Texas and a hurricane in Florida in 1949 sharply reduced the orange and grapefruit crops; prices and returns again increased. Adverse weather conditions in the producing areas, however, cannot be relied upon in the long run to eliminate burdensome supplies. Improvement in quality and merchandising will become more essential with a return to a normal production pattern.

The major objective of this study of consumers' preferences is to discover possible opportunities for expanding the market for citrus, both in fresh and processed forms. The citrus products investigated were fresh oranges and grapefruit, canned orange juice and orangeades, grapefruit juice and blends, and frozen orange juice concentrate.

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Consumers' likes and dislikes of available citrus products are extremely significant if retail sales are to be expanded in line with production. Since homemakers are the purchasers at the retail level, their reactions to quality, price and merchandising methods have a direct bearing on quantities sold.

The information obtained both from the homemakers and from the retail stores represents an adequate sample of the groups for the period studied. Undoubtedly, some differences may prevail among consumers shopping in retail stores in other parts of Houston and in other cities; likewise, consumer behavior may also differ under changed conditions of supply, quality, price and family income. For these reasons it is essential to expand consumer preference studies on a national level.

The information obtained through this type of research should provide a basis for effecting improvement in marketing practices and should serve as a basis for educational and promotional programs for consumers. If growers, shippers and retailers are aware of consumers' preferences in a given market, they can more intelligently supply the area with the type, size and quality of citrus which consumers desire and are willing to buy. Likewise, if the industry is aware of the competitive relationships existing among citrus products and non-citrus fruit and juices, they will be more adequately informed on opportunities of maintaining or improving their position against competitive products.

### Procedure

Houston was selected for this study as it is one of the major centers of consumer buying power in Texas.

A heavily populated area in the southwestern part of the city was selected as it is an isolated market area. This community is supplied largely by two supermarkets. These stores are located on the same side of the street in the major shopping district for the area. They are separated by a narrow side street and adjoining parking lots. Both outlets have large parking facilities. The area surrounding the stores from which the sample of homemakers was drawn includes approximately 5,900 dwelling units and is bounded on two sides by open land; a railroad bounds a third side, and the fourth side is partially bound by a large institution. Therefore, the area appears to be ideal for purposes of locating homemakers who patronize specific stores from which sales records could be obtained.

The purpose of the household survey was to obtain information on the extent of consumer knowledge of citrus products, the reasons for likes and dislikes, consumers' preferences among citrus products, consumption and purchasing practices and family income and composition.

The purpose of obtaining retail sales data from these two stores was to study the influence of the household characteristics upon the pattern of citrus sales. The quantity of weekly sales of citrus products was obtained from the two stores by the project leader. The sales were computed by the inventory method.

The household survey was planned by drawing a random sample of blocks in the area; the sampling rate was designed to yield approximately 300 homemakers who had shopped at each store within the 2 weeks prior to the interview. All dwelling units within each sample block were visited to locate these customers. The person interviewed was always the member of the household with the greatest responsibility for buying and preparing the food. This person is referred to in this report as the "homemaker." The Division of Special Surveys, Bureau of Agricultural Economics, selected and trained the enumerators in Houston. Most of these enumerators were women who specialized in part-time survey work. A trained supervisor from the Division assisted in the field work as a means of insuring dependable data. Replies obtained from the questionnaire are shown in the Appendix.

It should be noted that the persons interviewed were a sample of homemakers from a particular area who had shopped at one or both of the stores within a two-week period, not a sample of the entire list of homemakers who were customers of the two stores. Some of the latter customers came from outside the area from which the sample was drawn.

The families comprising the sample were of relatively high socio-economic status. The median family income per year was \$7,200 (half of the families had incomes from \$7,200 up and half had incomes below \$7,200) although incomes ranged up to \$23,400. Sixty percent of the heads of these households were either professionals, self-employed businessmen or managers. The household interviews were made from May 15 to June 15, 1949.

Price and sales data for the six citrus products and for tomato, pineapple, apple and prune juices were obtained weekly from the two retail stores supplying this area. This information was tabulated by U. S. grades, brands and sizes for the exact period during which the household survey was made. As a separate phase, similar data were also obtained from March 1 to June 1, 1949 for the same 2 stores and 10 other supermarkets in Houston. These stores were selected by location in high, medium and low income areas, with the aid of supervisors from the four major food chains. The two stores in the household survey area were a part of the four stores selected for high income areas. This provided a basis for comparing the pattern of citrus sales among high, medium and low income areas and a means of comparing the sales for the two stores in the household survey area with other stores in similar income areas.



The laboratory tests were made in the Fruit and Vegetable Laboratory, Department of Horticulture, at College Station. The samples of the processed citrus juices were selected at random from the stores in the household survey area. Samples of each of the brands were taken from the floor displays of both stores. The purpose of the laboratory work was to relate the physical characteristics of citrus juices available in retail stores to the statements made by consumers about these characteristics. Comparisons were made in the laboratory of the vitamin content of fresh and processed citrus; and the relative cost of fresh citrus, canned citrus juices and frozen orange juice concentrate.

A "taste test" panel was also conducted in the laboratory to compare the known physical differences in the samples of grapefruit juice with a taste rating on color, flavor and acceptability. The panel consisted of 8 to 16 people. The samples were tested at 10 a.m. and 3 p.m. only, on two separate days. The lot for each brand to be sampled was at room temperature and was composed of six 46-ounce cans of the same code number. The taste test and procedure consisted of setting up four samples, one of which is duplicated thus:

Sample A—1

Sample B—2

Sample C—3

Sample A—4

The requirement of the ballot (taste test ballot in appendix) necessitated the identification of the duplicate sample by the individual. If a person did not give the same scores on color, flavor and acceptability for the duplicates their results were eliminated from the summation of the scores for any given series of tests.

### Analysis of Sales in Retail Stores

Data obtained from the 12 retail stores provided a quantitative measurement of the relative importance of sales among fresh oranges, fresh grapefruit, canned orange juice, canned grapefruit juice, canned blends, frozen orange concentrate and canned juices other than citrus—tomato, pineapple, prune and apple. Information on sales by retail stores was obtained both in dollar value and in physical volume from March 1 to May 1, 1949. This period reflects the pattern of consumer purchases during the spring months. The quality of fresh citrus declined in the late spring while prices increased because of the limited supply remaining to be shipped from the producing area. Thus, this study provided some measurement of the kind and extent of substitutions which are made for citrus as quality declines or prices increase.

Consumers spent twice as much for fresh citrus as for either processed citrus juices or fruit juices other than citrus. The breakdown of the consumer dollar among the various groups of products was as follows: fresh citrus, 50 cents; processed

citrus juices, 24 cents; and non-citrus juices, 26 cents. Fresh citrus was equally as important in the consumption pattern in the medium and low-income areas as in the high-income area (Table 1).

Consumers spent four times as much for fresh oranges as for fresh grapefruit despite the fact that the cost of equivalent servings was the same. For this comparison, 6 ounces of fresh orange juice were considered to be equivalent to a serving of half a grapefruit. During May, the cost of fresh oranges necessary to yield 6 ounces of juice was 8 cents as compared with 7 cents for a half grapefruit (size 96).

Dollar sales for canned grapefruit juice and canned orange juice were about the same. Orange juice was priced higher per equivalent volume than grapefruit juice. It is evident that consumers were buying a relatively larger volume of grapefruit juice. Fewer dollars were spent for frozen orange juice and orange-grapefruit blend than for other processed citrus juices. Consumers spent their dollars for processed citrus juices as follows: canned orange juice, 33 cents; canned grapefruit juice, 29 cents; frozen orange juice, 19 cents; and blended juice, 19

Table 1. Distribution of consumer dollar between citrus and non-citrus products for selected stores, March 1-May 1, 1949\*

Form of product	High-income area, 2 stores in household survey area	High-income area, 4 stores	Medium- income area, 4 stores	Low-income area, 4 stores
	Cents	Cents	Cents	Cents
Fresh:				
oranges.....	42	40	39	43
grapefruit.....	12	12	11	5
Total.....	54	52	50	48
Canned:				
grapefruit juice.....	7	8	8	9
orange juice.....	6	8	8	13
blended juice.....	4	3	5	5
Total.....	17	19	21	27
Frozen orange juice concentrate.....	5	5	1†	1‡
Canned:				
tomato juice.....	9	10	11	9
pineapple juice.....	9	9	12	9
apple juice.....	3	2	2	4
prune juice.....	3	3	3	2
Total.....	24	24	28	24
Grand total.....	100	100	100	100

\*Sales data were obtained from four representative supermarkets in each of the income areas.

†More than 1 percent.

‡Less than 1 percent.



cents. Consumers spent as much for fruit juices other than citrus as for processed citrus juices. The two most important of these juices were tomato and pineapple.

#### Choice of Citrus Available

Consumer preferences must be evaluated by first considering the range of products readily available in a specific market. Texas is normally the source of fresh citrus for the Houston market. However, a severe freeze eliminated all fresh citrus from Texas after February 15, 1949. Fresh oranges were available from Florida and California. All fresh grapefruit came from Florida. The sources of canned citrus juice were Texas and Florida, while the frozen orange concentrate came from Florida and California.

Nearly half the homemakers who used fresh oranges or grapefruit thought that the "freeze" which occurred in Texas had affected these products, most saying that the fruit was of poorer quality. Inasmuch as the freeze had eliminated fresh citrus from Texas, it was apparent that many consumers did not know the source of the fruit.

Texas citrus usually is sold in Houston retail outlets in both consumer-packages and bulk. However, Florida citrus was sold only in bulk at the stores in the household survey area during the period of the study because of the high level of prices. The retail price of fresh oranges during the period of the household survey was 10 cents per pound. An 8-pound consumer size bag would have retailed for 80 cents. Such a large unit price on citrus in bags would have sharply curtailed sales; therefore, fruit was sold only in bulk. Fresh citrus was sold both by the pound and the count. The smaller sizes were sold by the count while the larger sizes were sold by the pound. This merchandising technique was followed as a means of presenting the lowest possible "unit" price to the shopper. The price per equivalent weight was similar for both pound and count selling.

Processed citrus juices were available in both the 46 and 18-ounce can. Grapefruit juice was also available in the 5 $\frac{3}{4}$ -ounce can, while frozen orange juice concentrate was available in 6-ounce cans. Nationally advertised, private and canners' brands of citrus juices were available in the stores.

Citrus juices were available in natural, sweetened and sugar-added forms. Sweetened grapefruit juice was 5 cents per unit higher than unsweetened, although orange juice in the various forms sold at approximately equal prices.

Multiple pricing, such as 2 cans for 21 cents, was practiced by both stores for processed citrus juices. However, this practice appeared more effective in sales of frozen orange juice than for other citrus juices.

## Comparison of Sales of Citrus Products

The comparison that follows was made to investigate the nature of the differences, if any, between the pattern of sales in stores in the household survey area and in selected stores in other income areas. Three types of income areas—high, medium and low—were selected. Selection of income areas was based upon census data, recent studies on rentals and family income made by Houston papers, and consultation with officials of the Chamber of Commerce and the chain stores. Sales data were obtained from four supermarkets in each of the income areas (Table 2).

Several significant points are noted when the pattern of purchases in the stores of the high-income areas is compared with the purchases in the stores in other income areas. The relative share of the consumer's citrus dollar spent for fresh oranges did not materially differ among stores located in the high, medium and low-income areas. Consumers spent about 54 cents of their "citrus dollar" for fresh oranges in the stores in the household survey area, and a similar amount in the stores in the high, medium and low-income areas. However, considerably less fresh grapefruit was purchased in the low-income areas. A striking difference also appears in the relative importance of frozen orange juice among the stores in the three income areas. Consumers spent 6 cents of their citrus dollar for frozen orange concentrate in the stores in the high-income area, but only 1 cent in the stores in the low-income area. Another difference was that consumers spent a larger share of

Table 2. Breakdown of consumer's citrus dollar for selected stores, by income area  
March 1-May 1, 1949

Form of product	High-income household survey area, 2 stores	High-income area, 4 stores	Medium-income area, 4 stores	Low-income area, 4 stores
	Cents	Cents	Cents	Cents
Fresh:				
oranges.....	55	54	53	57
grapefruit.....	16	15	15	6
Total.....	71	69	68	63
Canned:				
grapefruit juice.....	9	10	11	12
orange juice.....	8	10	11	17
blended juice.....	5	5	8	7
Total.....	22	25	30	36
Frozen orange juice concentrate.....	7	6	2	1
Grand total.....	100	100	100	100

their citrus dollar for canned orange juice and grapefruit juice in areas where the share for frozen orange concentrate was low.

The proportion of sales among fresh citrus, processed citrus, and non-citrus juices did not vary significantly between stores in different income areas (Table 1). However, the proportion of sales among individual citrus commodities did vary considerably among stores in different income areas (Table 2).

### Analysis of Household Survey

A large proportion of homemakers in the sample area shopped at the two stores and bought citrus products there. In addition, a considerable proportion of these homemakers bought other kinds of fresh and processed fruit at the two stores. Some citrus products, as well as other kinds of fresh and processed fruits, were bought at other stores.

During the 2 weeks before the interviews, 69 percent of the homemakers living in the sample area had shopped at one or both of the stores. (Unless otherwise specified the term "the stores" is used in the remainder of this bulletin to refer to the two stores located in the household survey area.) Among those who had shopped at "the stores," 86 percent bought some of the citrus products considered in this survey. This percentage was not materially affected by differences in family income or the number of years of formal schooling of the homemaker.

Seventy-one percent bought fresh oranges at the store; 31 percent, fresh grapefruit; 44 percent, canned grapefruit juice; 39 percent, canned orange juice; and 25 percent, canned blend. Frozen orange juice was bought by only 28 percent of the homemakers (Table 3).

Table 3. Products bought by homemakers who had purchased citrus products at the stores during the 2 weeks before the interviews

Products bought during 2 weeks prior to interviews	Percentage of homemakers buying some citrus					
	At stores only	At stores and else- where	Not at stores but else- where	Total buying a given product	Total not buying a given product	Total buying some citrus
Fresh:						
oranges.....	55	16	4	75	25	100
grapefruit.....	26	5	4	35	65	100
Canned:						
orange juice.....	33	6	3	42	58	100
grapefruit juice.....	40	4	2	46	54	100
orange and grapefruit blended juice.....	22	3	1	26	74	100
Frozen orange juice concentrate.....	24	4	2	30	70	100

Citrus products were also bought at other stores, outside the household survey area by some of these homemakers. Fresh oranges were purchased elsewhere by 20 percent of the homemakers; fresh grapefruit was bought by 9 percent at other places. Canned orange juice was bought elsewhere by 9 percent; canned grapefruit juice by 6 percent, and canned blends by 4 percent. Frozen orange juice concentrate was bought at other stores by 6 percent of the homemakers.

Ninety-seven percent of the homemakers who bought other fresh fruits, canned fruits, and canned juices, bought them at "the stores." Ninety percent of the homemakers who had bought some citrus products at "the stores" also purchased other kinds of fresh fruit during the 2 weeks before they were interviewed. The order of rank for the fresh fruits most frequently purchased was bananas, apples, berries, lemons, pineapple and cherries. Sixty-four percent bought canned fruit in addition to some citrus product. The order of rank for the canned fruit purchases of the more popular items was peaches, pears, pineapple and mixed fruit. About half the homemakers also bought some type of non-citrus juice. Tomato juice was more frequently mentioned; about 40 percent of the homemakers bought this item.

### General Use of Citrus Products

#### Extent of Use

Among the homemakers who had bought some citrus products at the stores during the 2 weeks before the interview, 95 percent said they used fresh oranges at some time, 93 percent used fresh grapefruit, 71 percent used canned grapefruit juice, 53 percent used canned orange juice, 45 percent used canned blends and 41 percent used frozen orange juice concentrate.

Only 26 percent of the homemakers who used frozen orange juice concentrate said they had done so for more than 6 months. Among the users of this product, 21 percent had started to use

Table 4. Consumption of citrus products during 2 weeks among families using the respective products

Products	Consumption	
	Per family	Per capita
Fresh (pounds):		
oranges.....	12.1	4.3
grapefruit.....	5.2	1.7
Canned (ounces):		
grapefruit juice.....	92.6	30.4
orange juice.....	91.8	28.0
blends.....	62.1	26.4
Frozen orange juice concentrate* (ounces).....	81.8	32.0

\*Converted to single-strength basis.

it within the last month, and about half had used it from 1 to 6 months.

### Consumption of Citrus Products

The amounts of citrus products consumed during the 2 weeks prior to the interviews by the families using the respective products are shown on a per-family and per-capita basis (Table 4).

### Family Characteristics and Use of Citrus Products

With the exception of frozen orange juice concentrate, there was no direct relation between family income and whether a given citrus product was consumed. In contrast, the amounts of the products consumed per family increased when the family income increased (Table 5). Forty-eight percent of the homemakers with incomes of more than \$7,200 used frozen orange juice concentrate; whereas, only 35 percent of those with incomes under \$7,200 used this product.

With the exception of fresh grapefruit, per capita consumption of a given product tended to decrease as the number of people in the families increased. The publication, "Citrus Preferences Among Household Consumers in Louisville and in Nelson County, Kentucky," USDA Agricultural Information Bulletin 2, 1949, reported that homemakers tend to have the habit of buying a given quantity—a dozen oranges or 46-ounce can of juice irrespective of family size. Per capita consumption of fresh grapefruit was lowest when the children in the families were 6 years of age or younger. No apparent relationship between

Table 5. Relation between annual family income and consumption of citrus products

Product	\$7,200 and under		Over \$7,200	
	Proportion of families using	Median amounts consumed per family*	Proportion of families using	Median amounts consumed per family*
	Percent	Pounds	Percent	Pounds
Fresh:				
oranges.....	95	10.2	96	12.2
grapefruit.....	92	4.8	94	5.6
		Ounces		Ounces
Canned:				
Orange juice.....	54	64.0	52	92.0
grapefruit juice.....	70	64.0	73	95.9
blends.....	41	50.2	47	91.4
Frozen orange juice concentrate†....	35	48.0	48	88.0

\*The amounts consumed per capita and per family are "median" amounts (half of the families use less than this amount, half used more).

†Converted to single-strength basis.



years of formal schooling of the homemaker and the consumption of citrus products was found.

### Reasons for Using Citrus Products

Health-promoting values and pleasing taste were the outstanding reasons given by homemakers for the general acceptance of citrus products. This was especially true for fresh oranges and fresh grapefruit. "Convenience" was an additional important reason given for canned citrus juices. Although health-promoting values and convenience were also important reasons for using frozen orange concentrate, "taste" was given as the outstanding reason.

The presence of vitamin C was specifically mentioned by many homemakers as their reason for using fresh citrus. The emphasis placed upon vitamin C raises a question as to the amount of this vitamin in the various orange products. This is especially important because homemakers make relatively large purchases of canned orangeades. Orangeade is offered for sale by the stores in the same type of container and on the same shelves with orange juice. Orangeade is also priced competitively with canned orange juices. The particular brand of orangeades investigated had a higher sugar content and a less satisfactory flavor than canned orange juice, frozen orange juice concentrate or fresh orange juice. The laboratory tests revealed that the orangeades had only a third as much vitamin C content as either fresh oranges or orange juices.

Consumers thought that fresh citrus was particularly good for children as a means of preventing colds. Fresh citrus was considered more healthful than either canned or frozen citrus juice, as shown by the frequency of reasons given for using each product.

Taste, as well as health-promoting values, is one of the important attributes of citrus products. However, not all citrus products are equal in terms of taste acceptance. The method of "paired comparisons" was used in the household survey to establish the order of taste preference for the six items. This method permits not only the establishment of an order of rank, but also indicates the relative "preference differences" between the items insofar as people's judgments of these items are concerned (Appendix).

From the point of view of taste, fresh oranges were preferred and they were assigned a scale value of 40.00. Fresh grapefruit was second in preference, with a scale value of 35.93. Thus, the difference in taste acceptance between fresh oranges and fresh grapefruit is represented by 4.07. The third item in rank was frozen orange juice concentrate, with a scale value of 22.15. Apparently the "preference difference" between fresh grapefruit and frozen orange juice concentrate (13.78) is con-

siderably greater than between fresh oranges and fresh grapefruit (4.07). Figure 1 presents the six items in order of rank and indicates the relative "preference difference" among the respective items. It is apparent that the intensity of taste preferences among the fresh and processed items differed considerably, and that among the processed items frozen orange juice concentrate was preferred. Canned citrus blends were least

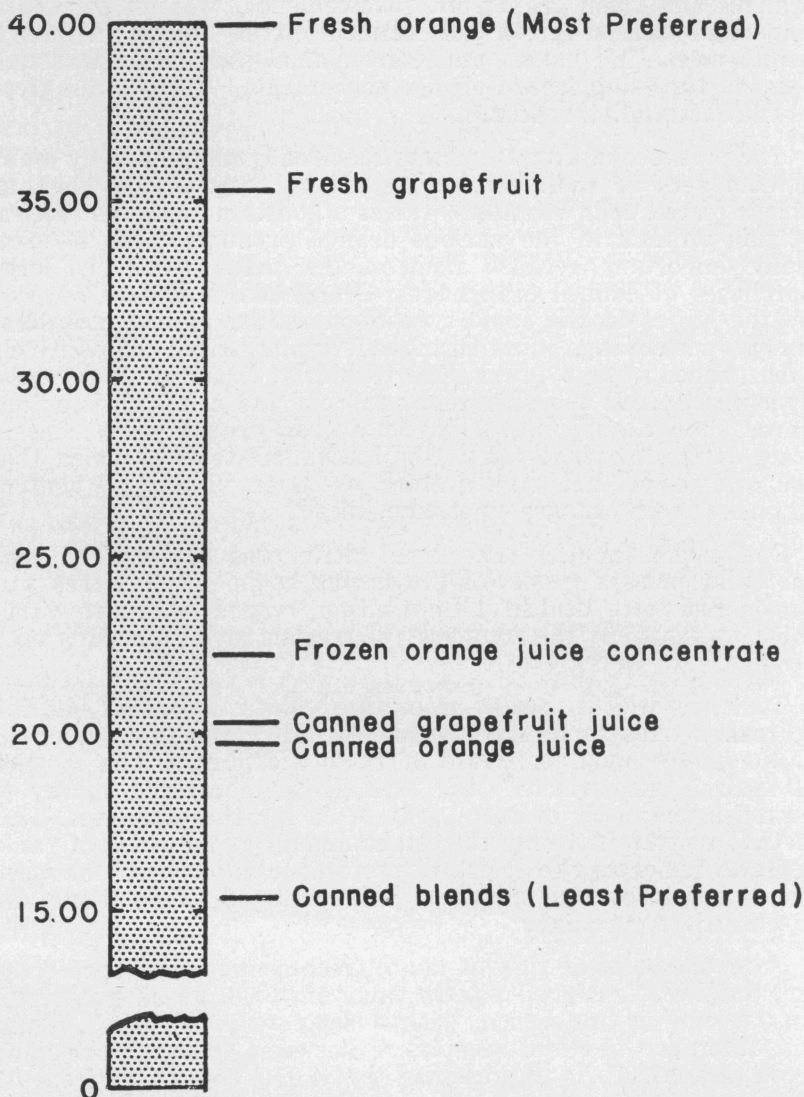


Figure 1. Order of taste preference for six citrus products. Numerical scale of values were assigned on the basis of scale separations obtained by the method of paired comparisons.



preferred. This is borne out in general by the retail store data (Table 2).

### Reasons for Not Using Citrus Products

It should be noted that only 5 percent of the homemakers said they did not use fresh oranges. This minority stated it was too much trouble to prepare this product. A few said that they did not use fresh oranges because of doctors' orders; others said they did not like the taste of the product.

A small percent of the homemakers did not use fresh grapefruit; the most outstanding reason was dislike of its taste. The unsatisfactory taste qualities usually were expressed in terms of "bitter," "acid" and "sour." Several of these particular homemakers said that fresh grapefruit was too much trouble to prepare and some said they did not use the product for health reasons.

Among those homemakers who did not use the various canned citrus juices, the overwhelming objection was to the taste. Approximately 95 percent of those who did not use canned orange juice and canned grapefruit juice said that they disliked the taste of these items. Of the group that did not use canned blends, 82 percent disliked the taste. This dislike of the canned juices was expressed most often in terms of "tinny" or "artificial," although many objected to a bitter taste in these products. Consumers' reasons for disliking the "taste" are extremely significant since they are directly reflected in the amount of use of a given item. Disliking the taste of citrus products also becomes a direct cause of substitution in the purchases of non-citrus juices.

As a means of evaluating consumers' likes and dislikes, samples of the various brands of grapefruit juice sold in "the stores" were analyzed in the laboratory. The purpose was to discover the factors that might influence consumers' purchasing practices and to determine to what extent these stated "undesirable flavors" actually existed in the canned citrus juice. These brands were examined on the following points: color, percent pulp, brix, percent acid, brix-acid ratio, ascorbic acid (vitamin C) and percent volatile oil.

As the household survey had revealed, some of the canned juices were objectionable because of a "tinny" taste. Previous studies revealed that this undesirable flavor in canned citrus juices may result from high temperature during storage. These studies also showed that storage of the juice beyond a certain length of time at certain temperatures can also cause a "tinny" or off-flavored product (Table 6).

The ages of the four brands of grapefruit juice were investigated to compare length of storage to the consumer panel ratings on flavor, color and acceptability. This was done by ob-

Table 6. Laboratory tests of grapefruit juice

Brands	A	B	C	D
Date of processing.....	Feb. 1949	Dec. 1948	Jan. 1947	Jan. 1949
Color (20 points perfect).....	17.00	18.00	16.00	19.00
Percent pulp.....	8.00	6.00	10.00	7.00
Brix.....	11.70	11.50	11.00	12.20
Percent acid.....	1.03	1.04	1.01	1.02
Brix-acid ratio.....	11.58	11.05	10.89	11.96
Ascorbic-acid, mgs. per 100 c.c.....	32.41	30.62	26.16	34.24
Percent volatile oil.....	0.0087	0.0025	0.0036	0.0087

## Consumer panel taste test scores

Brands	A	B	C	D
Color level.....	7.48	6.28	5.80	8.57
Flavor level.....	6.81	7.88	4.12	8.20
Acceptability level.....	7.20	8.00	4.56	8.38
Average quality.....	7.16	8.05	4.82	8.38

Word description of taste test levels are:

10—ideal

8—very good

6—fairly good

4—fair

9—excellent

7—good

5—acceptable

taining the code number on the cans of juice used in the test. The canner of each brand of juice was asked to provide the date of production of his code number. The canners were not aware of the laboratory tests being made.

Brand C grapefruit juice was over a year older than the other brands being sold in the stores in the household survey area. It is interesting that many consumers made strong criticism of this brand of grapefruit juice to the manager of the store at the time of the laboratory tests. The content of vitamin C was also much lower in this older juice than in the other brands. In addition, the consumer panel rated this juice very low in flavor, color and acceptability in comparison with the other samples of grapefruit juice (Table 6).

Table 7. Relative costs in sample stores of citrus products

	Cost per ounce single-strength basis for canned juices	Cost for 46 ounces
Fresh oranges.....	Cents 1.30	Cents 60.00
Frozen orange juice concentrate.....	1.17	54.00
Canned:		
orange juice.....	0.65	30.00
orangeade.....	0.63	29.00
orange and grapefruit blended juice...	0.54	25.00
grapefruit juice.....	0.46	21.00

Samples of fresh Florida oranges were juiced in the laboratory and used for this comparison. The oranges were size 176-200 and were priced at 4 pounds for 39 cents.

Sixty percent of the homemakers did not use frozen orange juice concentrate. Conservatism in accepting a new product ("I just haven't used it.") apparently accounted for most of this group (4 of 6 of those who had not used the product). About 20 percent of the homemakers who did not use the item stated it was too expensive.

To make a factual determination as to the relative costs, samples of all citrus products (both fresh and processed) were purchased from the stores in the household survey area and taken to the laboratory. The fresh oranges were carefully juiced and the cost per ounce of juice was determined. Results indicated that at the time of the survey consumers were mistaken in considering frozen orange juice more expensive than fresh oranges. At that time frozen orange juice was selling for 28 cents per 6-ounce can (equivalent to 24 ounces single strength), while the quantity of fresh oranges required for an equivalent amount of juice cost 31 cents (Table 7).

### Competition between Citrus and Other Fruits and Their Juices

To what extent do sales of processed citrus juice compete with sales of fresh citrus? A satisfactory answer to this question cannot be given, but from the seasonal pattern of use as shown by both retail store sales and the household survey, it appears that some competitive relationship exists between the fresh and processed citrus items. Consumers said they used more fresh citrus in winter and more processed citrus juices during the summer when fresh citrus was out of season. The sales from retail stores from March 1 to June 1, 1949, tend to confirm this relationship (Table 8). As a reason for this, homemakers emphasized the fact that as the quality of fresh oranges and

Table 8. Comparison of breakdown of consumer's citrus dollar from March 1 to May 1 and May 1 to June 1, 1949

Form of product	March 1 to May 1      May 1 to June 1	
	Cents	Cents
Fresh:		
oranges.....	55	49
grapefruit.....	16	9
Total.....	71	58
Canned:		
grapefruit juice.....	9	11
orange juice.....	8	17
blended juice.....	5	8
Total.....	22	36
Frozen orange juice concentrate.....	7	6
Grand total.....	100	100

grapefruit declines they tend to shift to the processed items. Also, about 10 percent of the homemakers who reported using more of a given processed item at the time of the survey attributed this to the relative low cost of the product. Therefore, when the quality of fresh citrus declines, or prices of fresh oranges and grapefruit become high relative to processed citrus juices, consumers shift some of their purchases of fresh citrus to processed citrus juices.

Retail store sales from March 1 to June 1 showed that the total money spent for all citrus products was relatively stable for each of the 3 months. A significant change in the pattern of consumption was a decline in the proportion of citrus dollars spent for fresh oranges and grapefruit in May. The records of retail sales show that apparently consumers shifted to canned orange juice, blended juice and grapefruit juice when they decreased their purchases of fresh citrus. However, the proportions of citrus dollars spent for frozen orange juice concentrate remained fairly constant during the 3 months. This could be expected as the household survey revealed that most people considered the price of frozen orange juice relatively high.

It would be erroneous to leave the impression that as homemakers decrease the amounts of fresh oranges or grapefruit used in their households they shift only to processed citrus juices. A shift away from fresh citrus meant also a shift to non-citrus fruit, other canned fruit and juices and canned vegetable juices. A few homemakers said they made no substitution for fresh citrus.

The retail store data and the household survey data may appear inconsistent because the total store sales for all citrus products remained relatively stable even though the sales of fresh citrus declined to some extent, whereas the homemakers reported that they shifted to non-citrus fruit and other canned fruit and juices when their purchases of fresh citrus declined. However, the retail store data cover only March, April and May during which the supply of competing non-citrus fruit was not abundant. Also, during this period Florida oranges were still plentiful; whereas, later in the summer they are not readily available. The major shift from fresh citrus occurs during the summer when homemakers shift their purchases to non-citrus fruit, other canned fruit and juices and canned vegetable juices, as well as to processed citrus juices.

Reasons given for selection of the specific substitutes during the period of decreased consumption of fresh oranges or grapefruit again reflect the importance of seasonal variation in quality of fresh citrus during the period when other fresh fruit is coming into season. The comparative prices of the fresh citrus and their substitutes were also factors in this shift.

Approximately 20 percent of the homemakers who made



substitutions when using fewer fresh oranges or grapefruit mentioned cost. These homemakers were asked, "About how much do fresh oranges and fresh grapefruit have to cost for you to make a change?" From the replies, the average price at which a substitution for fresh oranges would be made was 10 cents a pound, while substitution for grapefruit would occur at about 14 cents a pound.

The average price of the last purchase of oranges reported by the homemakers was about 10 cents a pound. The reported average price of the last purchase of grapefruit was 13 cents a pound. Apparently prices of both items were either at or approaching the level at which this factor operates to cause many of the homemakers to decrease their purchases because of cost.

Average retail prices charged for fresh citrus and volume of sales by the stores are shown in Table 9. These prices did not exceed the prices consumers reported they were willing to pay before substituting other purchases for fresh citrus.

At the time of the household survey, the homemakers were buying non-citrus fruit as well as citrus products. Furthermore, homemakers reported that during a seasonal decline in purchases of fresh citrus they shift to non-citrus as well as processed citrus juices. This indicates that citrus fruit needs to be studied within the framework of the homemakers' general fruit purchases. The question immediately arises: Do homemakers view citrus products as a distinct class within all fruit or do they have simply a broad concept of fruit, within which citrus products are merely additional items?

If homemakers tend to think of citrus products merely as more items within the general class of fruits, they will probably be relatively susceptible to shifting their purchases from citrus to other fruit in response to changes in quality and price. But, if homemakers view citrus as a separate category of fruit, they might be expected to resist a shift from purchases of citrus in response to changes in quality and in price.

Of the homemakers interviewed, 70 percent said they made it a point to include citrus in their menus, as distinct from merely including some kind of fruit. These homemakers apparently regarded citrus products as a separate entity within the general class of fruit and this attitude affected their purchases. Of those who made it a point to include citrus with their

Table 9. Monthly sales of fresh citrus in sample stores in relation to prices

Month	Oranges	Average price	Grapefruit	Average price
	Boxes	Cents per pound	Boxes	Cents per pound
March.....	374	7.7	182	7.5
April.....	405	8.5	130	10.4
May.....	341	10.2	66	12.0

meals, 65 percent said they decided upon the kind of citrus product they wanted before going to the store. This would appear to indicate a relatively strong resistance to substitution for the citrus product preferred. However, 51 percent of those who decided upon the kind of citrus desired before going to the store said that poor quality or undesirable appearance of the fruit might alter their purchases. Another 20 percent indicated that the price of the fruit could change their plan of purchasing. Thirty-two percent said they did not change their minds.

The supposition that those homemakers who consider citrus within the general class of fruits will shift their purchases more readily from citrus in response to poorer quality or higher prices than would those who view citrus as a separate category of fruit is substantiated by the following data. Among homemakers who considered citrus as a general class of fruit and who usually planned their purchases before going to the store, 68 percent said the quality and appearance of the fruit could make them change their minds, whereas 51 percent of the homemakers who viewed citrus as a separate category of fruit and who planned their purchases before going to the store said that quality and appearance of the fruit could make them alter their plans. In the first group, 29 percent said that price could make them change their minds; in the latter group, 20 percent said that price could make them change their plans.

### Specific Citrus Preferences

#### Size of Can

In their buying of canned citrus juices, most consumers were price conscious, as indicated by their preference for the 46-ounce can because it was the most economical purchase. About 65 percent of the homemakers who had used the various canned citrus juices said they preferred the large cans. For those who preferred the 18-ounce can, the chief reason was the adequacy of this size for single servings. Here again, economy of purchase in relation to use was the major reason. The relationship in price between citrus juices retailed through the 46-ounce can and the 18-ounce can is illustrated in Table 10.

Table 10. Relation of purchases of large-sized can to price advantage, May 1-June 1, 1949 (stores in household survey area)

Item	Percent of total volume of each juice purchased in 46-ounce cans	Price advantage 46-ounce over 18-ounce cans*
	Percent	Cents
Blended juice.....	54	2.9
Grapefruit juice.....	66	3.7
Orange juice.....	83	7.0

\*The price advantage was computed by comparing the cost of purchasing 46 ounces of juice in 18-ounce cans with the cost of 46-ounce cans.

Relationship appears to be close between the degree of price advantage of the large over the small-sized cans and the volume of store sales according to size of container. The greater the price advantage of juice bought through 46-ounce cans the greater the relative volume of sales of the larger size.

#### **Sweetened and Unsweetened**

Among the users of the respective canned juices—orange juice, grapefruit juice and blend—a greater number of homemakers preferred the unsweetened types to the sweetened. Preference for the unsweetened juices was greatest among the homemakers who used canned grapefruit juice. In explaining their preference for an unsweetened canned citrus juice, most homemakers said that the unsweetened has a “natural” flavor. Many of the homemakers who preferred unsweetened citrus juice objected to the sugar content of the sweetened types for health reasons. In the groups of homemakers who preferred the sweetened brands of these canned citrus juices, some maintained that this was the “natural” flavor. Several of the homemakers in these groups said that buying the sweetened juices saved sugar. Still others stated that the unsweetened juices were bitter and had an artificial taste.

The fact that most of the brands of grapefruit juice offered for sale in the two stores in the household survey area was unsweetened undoubtedly affected the consumer's purchases. In addition, sweetened grapefruit juices retailed 5 cents higher in unit price. Data on purchases cannot be used to measure preference in this case because of the difference in price of sweetened and unsweetened juices and the difference in display space given to each type of juice in the stores.

#### **Fresh Citrus—Packaged and Loose**

Seventy-six percent of the users of fresh oranges and 81 percent of the users of fresh grapefruit preferred to buy the fruit in bulk rather than in bags. Approximately 10 percent of the users of these products preferred to buy them packaged. The main reason for preferring the fresh citrus in bulk was the opportunity to select fruit of better quality. Other main factors were the desire to select the size and number of fruit needed. The desire to be free to select the number needed was given by a greater proportion of users of fresh grapefruit than of fresh oranges. Among the homemakers who preferred to buy either fresh oranges or fresh grapefruit packaged, the reason given more frequently was that the packaged fruit was less expensive. Many of the homemakers with this preference said this method of selling made the fruit easier to handle. Only 20 percent of this group of homemakers said that the packaged fruit was of better quality.

Some consumers reported a preference at the beginning of



the season for fresh citrus sold in bags. Later in the season they preferred fresh oranges and grapefruit sold in bulk as a means of selecting fruit free from poor keeping qualities, dryness, seediness and shrunken appearance. The majority of homemakers who favored packaged fresh oranges and grapefruit preferred the fruit in five-pound bags.

#### Pricing by the Pound versus Count

Sixty percent of the homemakers using fresh oranges and grapefruit preferred pricing by the count rather than by the pound, 10 percent preferred pricing by the pound and 30 percent were indifferent. The major reason for wanting these products priced by count was the homemaker's wish to select an exact number of either oranges or grapefruit. This point seemed to be more important with respect to fresh grapefruit; 65 percent of those who preferred this product priced by the count gave that reason, while the same reason was given by only 48 percent of the comparable group of users of fresh oranges. Twenty-five percent of the homemakers who preferred either fresh oranges or grapefruit priced by the count said that this was more convenient and took less time than weighing their selection. Among those who preferred to have either of these fresh citrus products priced by the pound, the primary reason given was that this method was less expensive.

The extent to which the desire (or the habit) to select fresh oranges or grapefruit by the count rather than by weight was ingrained in homemakers was seen in their actual behavior when these products were sold by the latter method. Nearly 90 percent of the homemakers who purchased these products said that when the pricing method is by weight they still select the number of fruit they want. Preferences in this case do not indicate whether consumers would buy a greater quantity of oranges or of grapefruit if they were sold by the count.

#### Color of Grapefruit

Of the homemakers who used fresh grapefruit, 63 percent said they preferred the "pink and red type" fruit, 26 percent preferred white and 11 percent had no preference. Regardless of the color preference, reasons given for the choice usually referred to flavor. These reasons were especially prominent in explaining the preference for pink and red grapefruit. Most of the homemakers who preferred one or the other of these colored grapefruit said they were sweeter. In each instance, about a third of those who liked the colored grapefruit said that the color made the fruit more appetizing, also 25 percent of the homemakers who expressed such a preference said that it was because of better quality.

Although 90 percent of the homemakers who preferred either pink or red grapefruit gave reasons of taste for their choice,

only 46 percent of those who preferred white grapefruit gave similar reasons. Of the homemakers who preferred white grapefruit, 36 percent said they did so because it was less expensive, while 33 percent stated that the white grapefruit was of better quality.

### Color of Grapefruit Juice

Sixty percent of the homemakers who used canned grapefruit juice said they preferred the juice from white grapefruit rather than from the pink fruit. Thirty percent of the group had no preference in the matter and only 8 percent preferred juice from the pink type fruit. In judging the reliability of these stated preferences, it should be noted that nearly 70 percent of those who preferred white grapefruit juice said they had never used the juice from pink grapefruit, many saying they had never seen it. Among the small group who preferred pink grapefruit juice, most said they preferred the product because it was sweeter.

## Decision-making in Purchasing Citrus Products

### Convenience

Factors contributing to convenience, so long as the quality and price of products are similar, are quite important in the selection of where the shopping is done. Convenience may be viewed in at least three ways: *geographical*—proximity to residence; *location of stores within a general shopping area*—proximity to banking facilities, post office, clothing store and theater; *services offered by the store*—adequate parking facilities, large number of checkout counters, extensive range of products offered, air conditioning, restaurant, service for paying utility bills such as gas, light and water, store hours extended into evening, store facilities such as bakery, hardware and drug department in addition to grocery, meats and produce. Distinction among the different types of conveniences was not made. Of the homemakers who shopped at the sample stores but bought citrus products elsewhere, 81 percent said they did so because of convenience.

### Advertising

The total number of bargain sales listed in local newspapers often is the deciding factor as to the store in which the housewife does her shopping when competing stores are conveniently located. Of the homemakers who reported shopping at both stores in the household survey area, 61 percent said they usually followed advertisements of both stores. Of this group, 83 percent said they decided in which store to shop on the basis of the advertisements. The stores are located so near each other and the services are so similar that the factor of convenience should not affect patronage so far as these two stores are concerned.

Half of the homemakers who usually follow advertisements of one or both stores decide what citrus product to buy on the basis of the advertisements. Prices are the chief reason given by those persons who decided at which of the two stores to shop or what citrus product to buy on the basis of the advertisements. Specials on the products and favorable prices mentioned in the advertisements, therefore, appear to be a vital factor in the decision of the homemaker as to where to shop and what to buy. The advertisement also informs the homemaker of the types and brands of citrus products available at the stores.

A few consumers volunteered the information that price, quality and selection of meats sometimes determine the store in which all shopping is done.

"Word-of-mouth" advertising was a factor in introducing homemakers to frozen orange juice concentrate—42 percent of the users of this product said they had been told about it by friends and neighbors. Thirty-nine percent said they began their use of the item as a result of hearing or reading about it in advertisements or watching store demonstrations. Only 4 percent of this group said they started using frozen orange juice concentrate because fresh oranges were too expensive.

#### **Determination of Amount to Be Bought**

Several factors are considered when a homemaker determines the amount of fresh oranges or grapefruit to be purchased. Forty-two percent of those who use fresh oranges said they determined their needs from the frequency with which the fruit is to be served. This reason was also given by 53 percent of the homemakers in determining the quantity of fresh grapefruit to buy, although 25 percent of the persons said the amount of each fresh citrus product they bought was influenced by the frequency of their shopping. About the same proportion mentioned size of family as a factor in determining the amount of each fresh product to be bought. Habit, or custom, the fact that the homemaker consistently bought a certain amount of the fruit when she shopped, was given as a reason by a smaller proportion. Still other reasons given as helping to decide the amount of fresh oranges or fresh grapefruit to be bought included quality of the fruit in the stores, price and the use to be made of it.

#### **Factors Causing Change in Buying Plans**

"Impulse buying" or buying after a visual check of the quality and appearance of produce is the chief determinant of homemakers in purchasing citrus. Eighty-five percent of the homemakers followed this principle, regardless of whether they decided what kind of fruit they wanted to buy before or after reaching the store. Prices of the products available were also mentioned by many of these groups. The proportion mentioning

price was somewhat higher among those who decided which citrus product to buy after reaching the store. Desire for variety was also given as a reason by 24 percent of those who decided what fruit to buy after arriving at the stores.

### Summary and Conclusions

The study upon which this report is based shows that practically all homemakers use some citrus products. At the prevailing level of prices for citrus and competing products (May 15-June 15, 1949), consumers were more sensitive to changes in quality of citrus products than to changes in price.

Consumers, both in their buying behavior, as revealed by the retail store sales, and in their stated preferences, as obtained from the household survey, make a distinction in their evaluation of the various citrus products. The primary distinction is between fresh citrus and processed citrus juices. Consumers apparently are convinced that fresh citrus excels in health and taste properties. Twice as much was spent for fresh citrus as for either processed citrus juices or fruit juices other than citrus.

According to the household survey, about 95 percent of all homemakers reported using both fresh oranges and fresh grapefruit. However, the retail store data show that they spent approximately four times as much for fresh oranges as they did for fresh grapefruit.

The proportion of sales among fresh citrus, processed citrus juice and non-citrus juices did not vary greatly between low, medium and high income areas. Sales of fresh grapefruit were relatively less in low-income areas than in the medium and high-income areas, while sales of canned orange juice were relatively more important. Sales of frozen orange juice were relatively greater in the high-income stores than in the medium and low-income stores.

Frozen orange concentrate is preferred over canned citrus juice, primarily because of taste, by those who have used both products; however, many homemakers have never used frozen orange concentrate.

Citrus is a separate class of fruit to most consumers. Because of this, many indicate some reluctance to shift their purchases to competing fruits and non-citrus juices. The retail store data show that during May when the quality of fresh citrus declines, fresh citrus sales also decline, while sales of processed citrus juices increase and sales of non-citrus juices do not change. The household survey indicated that shifts are also made from citrus and non-citrus products when other fresh fruits are in season.

Homemakers prefer pink grapefruit over the white or red; white grapefruit juice over pink; unsweetened juices over



sweetened; large-sized cans of juice over small; bulk fresh citrus over packaged and pricing by count over pricing by the pound.

Consumers are constantly seeking high quality fresh citrus. If citrus growers are to expand their sales of fresh citrus they must first provide consumers with the qualities desired. The maintenance of quality is important as expansion of sales must come largely through increased sales to consumers who already use fresh citrus but who now consume it on a limited scale. Grapefruit "sweeter and less bitter" in taste was the quality most desired. This should be considered when growers and shippers are inclined to market early shipments of immature fruit which may be lacking in the desired taste attributes. This fact should be of particular importance to citrus growers in Texas because of their specialization in grapefruit production.

Undesirable taste is the major objection to canned citrus juices. This may explain why approximately half the homemakers do not use canned orange juice and canned blends. This large proportion of non-purchasers is significant because the expansion in sales of citrus juice must come largely from the homemakers who are now not purchasing processed citrus juices.

Consumers in all income levels are "fresh-citrus" conscious during the spring and winter months. This is clearly supported by the large share of the consumers' citrus dollar which is spent for fresh citrus in all income groups. The household survey also corroborates the retail-store findings. Homemakers emphasized fresh citrus as an important health-promoting item from the points of view of vitamins and prevention of colds.

The share of the consumer's citrus dollar spent for canned juices and frozen orange concentrate was very stable on a monthly basis. Thus, it appears that if consumers buy a larger quantity at one time during the spring, they will reduce their subsequent purchases. During the period of this survey, many of the stores included in the study sponsored "special sales" for canned citrus juices and frozen orange concentrate. Such sales may prove conducive to increase "traffic" to a specific store, but it appears doubtful whether they sustain purchases of canned citrus juices over a period of time.

The summer months are preferred periods for promoting consumption of canned citrus juices and frozen orange concentrate. From this study, it appears desirable to concentrate sales efforts of fresh citrus during the fall, winter and spring when these fruits are in large supply.

Appearance of fresh produce in the store is also an important factor in promoting customers' purchases. This reflects the consumer's desire for high quality products. In addition, retailers should beware of obtaining processed citrus products which have been stored at high temperature or have reached an age of deterioration.

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### Appendix

The appendix has three parts: (I) summary of replies to questions asked the homemakers; (II) description of the taste preference comparison and the procedure used in determining the taste preference scale, and (III) the taste test ballot which was used in the laboratory analysis of the brands of grapefruit juice.

It should be noted that the taste preference scale (Figure I) was derived from the household survey phase.

#### I. Summary of Replies to Questions Asked Homemakers

Table 11. General use of fresh oranges and fresh grapefruit<sup>1</sup>

Extent of use	Fresh oranges		Fresh grapefruit	
	Percent		Percent	
Use:	95		93	
less now.....		48		74
more now.....		8		4
same amount all year.....		39		15
Do not use.....	5	5	7	7
Total.....	100	100	100	100

<sup>1</sup>Replies to the question, "Now would you say that the amount of — you are using at this time of the year is more, less, or about the same as that you use all the year round?" Data obtained from 388 homemakers.

Table 12. General use of canned citrus fruit juices and frozen orange juice concentrate<sup>1</sup>

Type of use	Canned grapefruit juice		Canned orange juice		Canned blended juice		Frozen orange juice concentrate	
	Percent		Percent		Percent		Percent	
Use:.....	71		53		45		41	
more now.....		33		28		20		18
less now.....		7		5		3		4
same amount all year.....		31		20		22		19
Do not use.....	29	29	47	47	55	55	59	59
Total.....	100	100	100	100	100	100	100	100

<sup>1</sup>Replies to the question, "Now would you say that the amount of ——— you are using at this time of the year is more, less, or about the same as that you use all year round?" Data obtained from 388 homemakers.

Table 13. Replies to the question, "Why do you use fresh oranges or fresh grapefruit?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Have vitamins, minerals, etc.....	71	52
Good for children.....	18	4
Good for the body; build bones, teeth, etc.	12	5
Aids digestion; acts as a laxative.....	11	15
Because of doctor's orders.....	11	4
Helps make a balanced diet.....	8	6
Contains food value.....	5	5
Good for you; need them for health.....	4	4
Nutritious, but not fattening; good for reducing.....	2	4
Counteract acidity; produces alkaline reaction.....	2	2
Percent giving health reasons.....	89	75
Family like the taste.....	24	15
Like the tangy taste.....	..	11
Like the sweet taste.....	6	..
Good in combination with other foods...	4	10
Like the refreshing, invigorating taste...	4	3
Taste better than canned orange juice...	4	..
Good as an appetizer.....	3	7
Like to have taste variety.....	..	2
Percent giving taste reasons.....	43	55
Variety; "We like to change".....	..	11
They are good in cold (cool) weather....	..	7
Have used them, but dislike.....	3	4
Habit; "We always have them".....	2	..
Substitute them for other citrus fruit....	..	2
Miscellaneous other reasons.....	5	8
Percent giving other reasons.....	9	30

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.

<sup>2</sup>Data on reasons for using fresh oranges obtained from 370 homemakers.

<sup>3</sup>Data on fresh grapefruit obtained from 361 homemakers.



Table 14. Replies to the question, "Why don't you use fresh oranges and grapefruit?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Because of doctor's orders.....	14	3
Don't agree with me.....	9	7
Miscellaneous.....	5	3
Percent giving health reasons.....	27	13
Too acid or sour.....	..	27
Too bitter.....	..	27
Don't taste good.....	14	7
Are too tart.....	5	3
Don't taste as good as other non-citrus fruit.....	5	3
Don't have any taste.....	..	3
Are too sweet.....	..	3
Percent giving taste reasons.....	23	67
Are too expensive.....	5	..
Percent giving price reasons.....	5	..
Are too much trouble to prepare.....	41	23
Got tired of using this citrus product....	5	..
Prefer fresh non-citrus fruit.....	5	..
Prefer other canned citrus fruit.....	..	3
Prefer other fresh citrus fruit.....	..	3
Percent giving other reasons.....	45	27

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 22 homemakers.<sup>3</sup>Data obtained from 30 homemakers.

Table 15. Replies to the questions, "Why do you use canned orange juice, grapefruit juice, blended juice and frozen orange juice concentrate?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>			
	Orange juice <sup>2</sup>	Grapefruit juice <sup>3</sup>	Blended juice <sup>4</sup>	Frozen orange juice concentrate <sup>5</sup>
Has vitamins, minerals, etc. ....	32	26	22	33
Aids digestion; acts as laxative. ....	7	9	2	...
Good for body; builds bones, teeth etc. ....	5	9	3	2
Nutritious, good for reducing. ....	3	5	2	...
Contains food value. ....	3	5	3	6
Because of doctor's orders. ....	3	4	...	...
Counteracts acidity. ....	...	3	...	...
Good for you; need it for health. ....	...	3	2	...
Good for children. ....	4	...	...	2
Helps make a balanced diet. ....	2	...	2	...
Miscellaneous health reasons. ....	...	...	...	7
Percent giving health reasons. ....	48	52	36	46
Family like the taste. ....	12	8	11	13
Tastes like other citrus fruit. ....	2	3	2	41
Like the refreshing, invigorating taste. ....	6	9	9	6
Like the tangy taste. ....	...	8	7	...
Good in combination with other foods. ....	3	5	7	...
Good as an appetizer. ....	...	4	...	3
Like to have taste variety. ....	...	3	7	...
Like sweet taste. ....	3	...	5	2
Tastes better than canned grapefruit juice. ....	...	...	2	...
Tastes better than canned orange juice. ....	...	...	...	2
Tastes better than fresh oranges. ....	3	...	...	2
Other taste reasons. ....	4	...	9	...
Percent giving taste reasons. ....	31	40	52	26
Easy to prepare; convenient. ....	45	27	14	42
Substitute it for other citrus fruits. ....	22	22	10	10
Have used it, but dislike. ....	8	10	7	12
Variety: "We like to change". ....	4	9	33	2
Inexpensive. ....	4	5	5	7
Good in hot (warm) weather. ....	6	5	11	...
Percent giving other reasons. ....	71	65	71	70

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 207 homemakers.<sup>3</sup>Data obtained from 277 homemakers.<sup>4</sup>Data obtained from 174 homemakers.<sup>5</sup>Data obtained from 162 homemakers.

Table 16. Replies to the question, "Why don't you use canned orange juice, grapefruit juice, blends or frozen orange juice concentrate?"

Reasons given	Percent of homemakers giving reasons <sup>1</sup>			
	Orange juice <sup>2</sup>	Grapefruit juice <sup>3</sup>	Blended juice <sup>4</sup>	Frozen orange juice concentrate <sup>5</sup>
Too "tinny", "artificial".....	56	43	34	4
Too bitter.....	23	41	23	2
Doesn't taste as good as fresh citrus.....	18	12	8	4
Doesn't taste good.....	6	6	12	3
Too acid.....	4	13	4	....
Too tart.....	...	9	2	....
Too sweet.....	2	....	2	....
Too sour.....	...	4	2	....
Doesn't have any taste.....	...	....	3	....
Doesn't taste as good as other canned citrus products.....	...	....	2	....
Other taste reasons.....	...	....	...	3
Percent giving taste reasons.....	93	95	82	14
Doesn't have the food value of the fresh product.....	9	9	4	6
Doesn't agree with me.....	2	4	2	2
Other health reasons.....	1	4	1	2
Percent giving health reasons.....	12	17	7	9
Doesn't keep well.....	...	....	...	2
Dislike poor quality of product.....	3	2	4	1
Percent giving quality reasons.....	3	2	4	3
Too expensive.....	1	2	1	19
Other price reasons.....	...	....	...	2
Percent giving price reasons.....	1	2	1	21
Prefer fresh citrus fruits.....	6	3	3	11
Habit; "Just haven't used it;" never bought it.....	...	....	9	41
Prefer other canned citrus fruit.....	...	....	3	2
Never heard of it.....	...	....	...	11
Miscellaneous.....	3	2	3	6
Percent giving other reasons.....	9	4	17	67

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 181 homemakers.<sup>3</sup>Data obtained from 112 homemakers.<sup>4</sup>Data obtained from 213 homemakers.<sup>5</sup>Data obtained from 227 homemakers.

Table 17. Reasons for using less fresh oranges or fresh grapefruit now than at some other time of year

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Quality is poor now.....	70	74
Too expensive now.....	28	23
Is out of season now.....	19	20
Is less available now.....	8	9
Less of product used in warm weather...	7	5
Miscellaneous reasons.....	16	13

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 187 homemakers.<sup>3</sup>Data obtained from 288 homemakers.

Table 18. Type and importance of products substituted when homemakers use less fresh oranges or fresh grapefruit now than at some other time of the year

Products substituted	Percentage of homemakers making substitutions <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Fresh fruit (non-citrus).....	29	22
Canned orange juice.....	19	13
Frozen orange juice concentrate.....	19	7
Canned grapefruit juice.....	11	27
Canned vegetable juice.....	7	7
Canned fruit juices (non-citrus).....	6	7
Canned blends.....	4	4
Fresh grapefruit.....	2	.....
Fresh oranges.....	.....	18
Other citrus.....	6	5
Other canned juices.....	7	6
None.....	17	24

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data on substitution for oranges obtained from 219 homemakers.<sup>3</sup>Data on substitution for grapefruit obtained from 303 homemakers.

**Table 19. Homemakers' reasons for making substitutions for fresh oranges or fresh grapefruit**

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Poor quality.....	30	19
Substitute product in season.....	12	7
Not in season.....	8	10
More of substitute product used in warm weather.....	6	3
Miscellaneous.....	6	11
Percent giving seasonal or quality reasons.....	59	48
Expense.....	13	12
Substitute product less expensive.....	10	5
Miscellaneous.....	.....	3
Percent giving expense reasons.....	23	20
Substitute product (s) as high in food value.....	45	31
For variety.....	22	19
Substitute more convenient to use.....	7	5
Doctor's orders.....	4	3
Miscellaneous.....	11	13
Percent giving other reasons.....	69	57

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 153 homemakers.<sup>3</sup>Data obtained from 229 homemakers.**Table 20. Reasons given for using more canned orange juice, grapefruit juice, blends or frozen orange juice concentrate now than at some other time of year<sup>1</sup>**

Reasons given	Percentage of homemakers giving reasons <sup>2</sup>			
	Canned orange juice <sup>3</sup>	Canned grapefruit juice <sup>4</sup>	Canned blended juice <sup>5</sup>	Frozen orange juice concentrate <sup>6</sup>
More used in warm weather.....	57	49	65	32
Quality of same fresh fruit poor.....	17	24	17	13
Fresh fruit out of season now.....	9	12	12	11
Same product fresh not available.....	5	11	3	13
Quality of product good.....	5	2	...	3
Miscellaneous.....	5	4	8	7
Percent giving seasonal and quality reasons.....	86	98	91	72
High in food value.....	19	17	12	14
Relatively inexpensive now.....	16	9	10	15
More convenient to use.....	6	5	3	8
For variety.....	2	2	12	1
Recently started using.....	...	...	...	14
Miscellaneous.....	8	5	6	7
Percent giving other reasons.....	43	25	37	54

<sup>1</sup>The data for fresh oranges and fresh grapefruit are not presented because of the small number of homemakers who were using more of these products at the time of the interview.<sup>2</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>3</sup>Data obtained from 109 homemakers.<sup>4</sup>Data obtained from 128 homemakers.<sup>5</sup>Data obtained from 78 homemakers.<sup>6</sup>Data obtained from 71 homemakers.



**Table 21. Occupational distribution of heads of households among homemakers from the sample area who shopped at the stores during the 2 weeks prior to interview<sup>1</sup>**

Occupation of head of household	Percentage of homemakers from the sample area who shopped at the stores
	Percent
Self-employed.....	37
Salesman, clerk.....	26
Professional.....	23
Skilled or semi-skilled worker.....	7
Retired, student, unemployed.....	5
Unskilled worker.....	1
Housewife.....	1
Total.....	100

<sup>1</sup>Data obtained from 446 households.

**Table 22. Relationship between family income and general use of citrus products**

Products	Families consuming citrus by amount of income					
	\$7,200 and under <sup>1</sup>			Over \$7,200 <sup>2</sup>		
	Percent of families			Percent of families		
	Using	Not using	Total	Using	Not using	Total
Fresh:						
oranges.....	95	5	100	96	4	100
grapefruit.....	92	8	100	94	6	100
Canned:						
orange juice.....	54	46	100	52	48	100
grapefruit juice.....	70	30	100	73	27	100
blended juice.....	41	59	100	47	53	100
Frozen orange juice concentrate.....	35	65	100	48	52	100

<sup>1</sup>Data obtained from 185 families.

<sup>2</sup>Data obtained from 194 families.

Table 23. Relationship between family income and amount of citrus products used per family in 2 weeks prior to interview

Products	Median amounts used in 2 weeks prior to interview			
	\$7,200 and under		Over \$7,200	
	Number families using	Per family, pounds	Number families using	Per family, pounds
Fresh:				
oranges.....	132	10.2	158	12.2
grapefruit.....	64	4.8	72	5.6
		Ounces		Ounces
Canned:				
orange juice.....	78	64.0	82	92.0
grapefruit juice.....	85	64.0	91	95.9
blended juice.....	43	50.2	49	91.4
Frozen orange juice concentrate <sup>1</sup> ....	42	48.0	74	88.0
Median size of family...	3.5		4.0	

<sup>1</sup>Single-strength basis.

Table 24. Relationship between family income and per capita consumption of citrus products during the 2 weeks prior to interview

Products	Median amounts used in 2 weeks prior to interview			
	\$7,200 and under		Over \$7,200	
	Number people using	Per capita pounds	Number people using	Per capita pounds
Fresh:				
oranges.....	418	3.7	560	4.4
grapefruit.....	199	1.5	246	1.9
		Ounces		Ounces
Canned:				
orange juice.....	253	26.4	283	28.3
grapefruit juice.....	268	29.8	321	31.3
blended juice.....	136	22.7	176	26.9
Frozen orange juice concentrate <sup>1</sup> ....	139	30.8	268	33.2

<sup>1</sup>Single-strength basis.

Table 25. Relationship between education of homemakers and buying citrus products at the stores

Replies given	Education of homemakers who shopped at the stores			
	Some high school or less <sup>1</sup>	Finished high school <sup>2</sup>	Some college <sup>3</sup>	Finished college <sup>4</sup>
	Percent	Percent	Percent	Percent
Bought some citrus product at the stores.....	88	86	87	88
Did not buy any citrus product at the stores.....	12	14	13	12
Total.....	100	100	100	100

<sup>1</sup>Data obtained from 25 homemakers.<sup>2</sup>Data obtained from 146 homemakers.<sup>3</sup>Data obtained from 165 homemakers.<sup>4</sup>Data obtained from 102 homemakers.

Table 26. Relationship between family composition and per capita consumption of citrus products during the 2 weeks prior to interviewing

Products	Family composition and per capita consumption							
	Type 1		Type 2		Type 3		Type 4	
	Adults only		Adults with children 6 years and under only		Adults with children 7-19 years only		Adults with children in both age groups	
	Number consumers	Per capita consumption, pounds	Number consumers	Per capita consumption, pounds	Number consumers	Per capita consumption, pounds	Number consumers	Per capita consumption, pounds
<b>Fresh:</b>								
oranges.....	248	4.9	254	3.9	327	3.8	163	3.9
grapefruit.....	154	1.9	94	1.4	149	2.0	1	.....
		Ounces		Ounces		Ounces		Ounces
<b>Canned:</b>								
orange juice.....	152	34.5	113	22.4	185	27.1	1	.....
grapefruit juice.....	178	44.1	117	29.3	198	27.8	1	.....
blended juice.....	90	35.3	1	.....	105	24.7	1	.....
<b>Frozen orange juice concentrate<sup>2</sup>..</b>	79	51.6	94	28.8	118	25.2	115	28.8

<sup>1</sup>These data not reported because of the small number of families in the particular types using the given products.<sup>2</sup>Single-strength basis.

Table 27. Median amounts of citrus products consumed per family during the 2 weeks prior to interviewing

Form of product	Amount	Number of families	Percent of families using
Fresh:	Pounds		
oranges.....	12.1 <sup>1</sup>	298	77
grapefruit.....	5.2 <sup>2</sup>	140	36
	Ounces		
Canned:			
grapefruit juice.....	92.6	181	47
orange juice.....	91.8	165	43
blends.....	62.1	96	25
Frozen orange juice concentrate <sup>3</sup> ...	81.8	117	30

<sup>1</sup>Conversion ratio: 1 dozen oranges = 6 lbs.<sup>2</sup>Conversion ratio: 1 grapefruit = 0.8 lb.<sup>3</sup>Single-strength basis.

Table 28. Per capita consumption among families using citrus products during 2 weeks prior to interview

Products	Amount	Number of people using
Fresh:	Pounds	
oranges.....	4.3	1000
grapefruit.....	1.7	458
	Ounces	
Canned:		
grapefruit juice.....	30.4	599
orange juice.....	28.0	544
blended juice.....	26.4	325
Frozen orange juice concentrate <sup>1</sup> .....	32.0	409

<sup>1</sup>Single-strength basis.

**Table 29. Replies to the question, "Have you bought other kinds of fresh fruit during the last 2 weeks? If so, what kind?"<sup>1</sup>**

Replies	Proportion of homemakers		
	Buying	Not buying	Total, percent
Other fresh fruits .....	93	7	100
Bananas.....	64	36	100
Apples.....	51	49	100
Berries (in season).....	40	60	100
Lemons.....	30	70	100
Pineapples.....	21	79	100
Cherries.....	16	84	100
Plums.....	8	92	100
Cantaloupes.....	6	94	100
Limes.....	6	94	100
Pears.....	6	94	100
Grapes.....	3	97	100
Melons (other than watermelons).....	2	98	100
Avocados.....	1	99	100
Peaches.....	1	99	100
Tangerines.....	<sup>2</sup>	<sup>2</sup>	<sup>2</sup>
Miscellaneous fruits.....	3	97	100

<sup>1</sup>Data obtained from 388 homemakers.<sup>2</sup>Less than  $\frac{1}{2}$  of 1 percent.**Table 30. Replies to the question, "Have you bought any other kinds of canned juices during the last 2 weeks? If so, what kind?"<sup>1</sup>**

Replies	Proportion of homemakers		
	Buying	Not buying	Total, percent
Other canned juices.....	51	49	100
Tomato.....	39	61	100
Pineapple.....	12	88	100
Apple.....	6	94	100
Apricot.....	6	94	100
Vegetable juice; V-8.....	5	95	100
Grape.....	3	97	100
Prune.....	3	97	100
Lemon.....	1	99	100
Miscellaneous canned juices.....	4	96	100

<sup>1</sup>Data obtained from 388 homemakers.



Table 31. Replies to the question, "Have you bought any canned fruit during the last 2 weeks? If so, what kind?"<sup>1</sup>

Replies	Proportion of homemakers		
	Buying	Not buying	Total, percent
Bought canned fruit. . . . .	64	36	100
Peaches. . . . .	44	56	100
Pears. . . . .	23	77	100
Pineapple. . . . .	23	77	100
Mixed (fruit cocktail). . . . .	16	84	100
Apples (including applesauce). . . . .	6	94	100
Cherries. . . . .	6	94	100
Prunes. . . . .	3	97	100
Berries (general). . . . .	2	98	100
Grapefruit segments. . . . .	2	98	100
Plums. . . . .	2	98	100
Figs. . . . .	1	99	100
Miscellaneous canned fruits. . . . .	15	85	100

<sup>1</sup>Data obtained from 388 homemakers.

Table 32. Replies to the question, "Why do you prefer white grapefruit or pink grapefruit?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	White grapefruit <sup>2</sup>	Pink grapefruit <sup>3</sup>
More tart; less sweet. . . . .	20	...
Have better flavor. . . . .	13	5
Sweeter; less bitter. . . . .	10	85
Have a natural flavor. . . . .	7	...
Other reasons. . . . .	...	2
Percent giving flavor reasons. . . . .	46	91
More juice; heavier. . . . .	13	12
Better texture; less seeds. . . . .	13	8
Better quality; general. . . . .	4	2
Have the same food value as other types of grapefruit. . . . .	3	...
Larger sections. . . . .	...	2
Percent giving quality reasons. . . . .	33	23
Color is appetizing; pretty. . . . .	...	26
Children like the color. . . . .	...	5
Like the color. . . . .	3	2
Percent giving color reasons. . . . .	3	33
Less expensive. . . . .	36	...
Habit; "We always buy it". . . . .	3	...
More available. . . . .	2	...
Miscellaneous other reasons. . . . .	10	2
Percent giving other reasons. . . . .	40	2

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 92 homemakers.<sup>3</sup>Data obtained from 175 homemakers.

**Table 33. Replies to the question, "Which do you like best—the pink, the red or the white grapefruit?"<sup>1</sup>**

Preference	Percentage of homemakers who use fresh grapefruit
Pink.....	48
White.....	26
Red.....	13
No preference.....	13
Total.....	100

<sup>1</sup>Data obtained from 361 homemakers.**Table 34. Replies to the question, "When you buy fresh oranges or fresh grapefruit, do you prefer buying them loose out of a bin or those that are already sacked or bagged?"**

Preferences	Percentage of homemakers who use	
	Fresh oranges <sup>1</sup>	Fresh grapefruit <sup>2</sup>
Buy them loose.....	76	81
Buy them sacked.....	14	10
Loose sometimes and sacked other times <sup>3</sup> .....	3	3
No preference.....	7	6
Total.....	100	100

<sup>1</sup>Data obtained from 370 homemakers.<sup>2</sup>Data obtained from 361 homemakers.<sup>3</sup>Some homemakers said they preferred to buy sacked fruit in season and loose fruit out of season.**Table 35. Replies to the question, "Why do you prefer buying fresh oranges or fresh grapefruit loose?"**

Preferences	Percentage of homemakers who prefer buying loose fruit <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Can select for better quality.....	92	77
Can select according to the number desired.....	14	32
Can select for the size desired.....	11	10
Less expensive than sacked fruit.....	3	1
Habit, custom; "Have always bought them".....	1	1

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 294 homemakers.<sup>3</sup>Data obtained from 302 homemakers.

Table 36. Replies to the question, "What size sack of fresh oranges or fresh grapefruit do you like best?"

Size of sack, pounds	Percentage of homemakers who prefer buying sacked fruit	
	Fresh oranges <sup>1</sup>	Fresh grapefruit <sup>2</sup>
2.....	2	.....
5.....	61	58
8.....	11	8
10.....	17	21
50.....	.....	2
Not ascertained.....	9	11
Total.....	100	100

<sup>1</sup>Data obtained from 64 homemakers.<sup>2</sup>Data obtained from 48 homemakers.

Table 37. Replies to the question, "When you buy fresh oranges or fresh grapefruit, do you prefer having them priced by the dozen (count) or by the pound?"

Preference	Percentage of homemakers buying	
	Fresh oranges <sup>1</sup>	Fresh grapefruit <sup>2</sup>
Priced by the dozen (count).....	60	60
Priced by the pound.....	11	10
No preference.....	29	30
Total.....	100	100

<sup>1</sup>Data obtained from 370 homemakers.<sup>2</sup>Data obtained from 361 homemakers.

Table 38. Replies to the question, "Why do you prefer having fresh oranges or fresh grapefruit priced by the dozen (count)?"

Reasons given	Percentage of homemakers who prefer buying fruit by the count <sup>1</sup>	
	Fresh oranges <sup>2</sup>	Fresh grapefruit <sup>3</sup>
Can select the exact number needed; easier to determine needs.....	48	65
Less expensive; know what they pay for.	30	24
More convenient; takes less time than weighing.....	28	24
Habit, custom; "Have always bought that way".....	16	10

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.<sup>2</sup>Data obtained from 223 homemakers.<sup>3</sup>Data obtained from 217 homemakers.

**Table 39. Replies to the question, "When loose oranges or grapefruit are priced by the pound, do you count the number that you want or do you select what you think will weigh a certain amount?"**

Preference	Percentage of homemakers using	
	Fresh oranges <sup>1</sup>	Fresh grapefruit <sup>2</sup>
Select by number.....	86	89
Select by weight.....	12	10
Don't remember.....	1	1
Not ascertained.....	1	.....
Total.....	100	100

<sup>1</sup>Data obtained from 370 homemakers.

<sup>2</sup>Data obtained from 361 homemakers.

**Table 40. Homemakers' preferences for size of can of citrus juices.<sup>1</sup>**

Preferences	Percentage of homemakers using canned		
	Orange juice <sup>2</sup>	Grapefruit juice <sup>3</sup>	Blended juice <sup>4</sup>
Large (46 oz.).....	67	62	61
Small (18 oz.).....	31	34	35
None.....	2	4	4
Total.....	100	100	100

<sup>1</sup>Replies to the question, "What size can of each of these three products do you prefer (canned orange juice, canned grapefruit juice and canned blends)?"

<sup>2</sup>Data obtained from 207 homemakers.

<sup>3</sup>Data obtained from 277 homemakers.

<sup>4</sup>Data obtained from 174 homemakers.

**Table 41. Replies to the question, "Which do you prefer, the sweetened or unsweetened canned orange juice, grapefruit juice and blended juice?"**

Preference	Percentage of homemakers using canned		
	Orange juice <sup>1</sup>	Grapefruit juice <sup>2</sup>	Blended juice <sup>3</sup>
Unsweetened.....	55	73	58
Sweetened.....	34	16	21
None.....	11	11	21
Total.....	100	100	100

<sup>1</sup>Data obtained from 207 homemakers.

<sup>2</sup>Data obtained from 277 homemakers.

<sup>3</sup>Data obtained from 174 homemakers.

**Table 42. Length of time homemakers had been using frozen orange juice concentrate<sup>1</sup>**

Length of time	Percentage of homemakers who use frozen orange juice concentrate
Less than 1 month.....	21
One to 6 months.....	53
Seven to 12 months.....	21
More than a year.....	5
Total.....	100

<sup>1</sup>Data obtained from 162 homemakers.**Table 43. Replies to the question, "How did you happen to start using frozen orange juice concentrate?"<sup>1</sup>**

Reasons given	Percentage of homemakers giving reasons <sup>2</sup>
Told about it by friends, neighbors.....	42
Heard or read about it through advertisements (including store demonstrations).....	39
Wanted to experiment.....	19
Fresh oranges were too expensive.....	4
Other reasons.....	4

<sup>1</sup>Data obtained from 162 homemakers.<sup>2</sup>Percentages total more than 100 since many homemakers gave more than one reason.**Table 44. Replies to the question, "When you think about the food you are going to serve, do you usually try to include some kind of fruit, of which citrus may or may not be one, or do you make it a point to have some kind of citrus fruit?"<sup>1</sup>**

Replies given	Percentage of homemakers who had bought some kind of fruit at the stores
Usually try to include: some kind of citrus.....	70
some kind of fruit, of which citrus may or may not be one.....	28
Do not make it a point to include any kind of fruit.....	2
Total.....	100

<sup>1</sup>Data obtained from 388 homemakers.



**Table 45.** Replies to the question, "Why do you include some kind of fruit, of which citrus may or may not be one, when you think about the food you are going to serve?"

Reasons given	Percentage of homemakers giving reasons including <sup>1</sup>	
	Citrus fruit <sup>2</sup>	Some kind of fruit <sup>3</sup>
Contains vitamins, minerals, etc.....	63	43
Helps balance the meal.....	12	18
Acts as a laxative.....	11	17
Health.....	9	11
Necessary part of the diet.....	5	10
Because of doctor's orders.....	7	3
Percent giving health reasons.....	88	76
Family likes it, refreshing, tastes good...	18	15
Adds flavor, taste, to the meal.....	.....	6
Use in salads and desserts.....	4	6
Use as an appetizer during meals.....	.....	5
Use as a snack, eaten between meals....	2	5
Percent giving taste reasons.....	24	32
Habit, custom; "Always include some fruit".....	10	3
Percent giving other reasons.....	10	3

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.

<sup>2</sup>Data obtained from 273 homemakers.

<sup>3</sup>Data obtained from 109 homemakers.

**Table 46.** Replies to the question, "What sort of things help you make up your mind after you get to the store?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Group A <sup>2</sup>	Group B <sup>3</sup>
Quality and appearance of the fruit.....	84	86
Price of the fruit.....	25	47
Desire for variety.....	24	5

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.

<sup>2</sup>Group A—75 homemakers who intend to purchase some kind of fruit, not necessarily citrus, and decide what kind after arriving at the store.

<sup>3</sup>Group B—96 homemakers who intended to purchase some kind of citrus fruit and decide what kind after arriving at the store.

Table 47. Replies to the question, "I suppose there are times when you change your mind and don't buy what you planned to buy. What sort of things make you change your mind?"

Reasons given	Percentage of homemakers giving reasons <sup>1</sup>	
	Group C <sup>2</sup>	Group D <sup>3</sup>
Quality and appearance of the fruit.....	68	51
Price of the fruit.....	29	20
Availability.....	26	10
Do not change their minds.....	12	32

<sup>1</sup>Percentage total more than 100 since many homemakers gave more than one reason.

<sup>2</sup>Group C—34 homemakers who intend to purchase some kind of fruit, not necessarily citrus, and decide what kind before going to the store.

<sup>3</sup>Group D—177 homemakers who intend to purchase some kind of citrus fruit and decide what kind before going to the store.

## II. Paired Comparisons of Taste Preference

Taste preference comparisons used were:

- |  |  |
|--|--|
| 1. Fresh oranges<br>or<br>Fresh grapefruit           | 9. Fresh grapefruit<br>or<br>Frozen orange juice         |
| 2. Fresh oranges<br>or<br>Canned orange juice        | 10. Canned orange juice<br>or<br>Canned grapefruit juice |
| 3. Fresh oranges<br>or<br>Canned grapefruit juice    | 11. Canned orange juice<br>or<br>Canned blends           |
| 4. Fresh oranges<br>or<br>Canned blends              | 12. Canned orange juice<br>or<br>Frozen orange juice     |
| 5. Fresh oranges<br>or<br>Frozen orange juice        | 13. Canned grapefruit juice<br>or<br>Canned blends       |
| 6. Fresh grapefruit<br>or<br>Canned orange juice     | 14. Canned grapefruit juice<br>or<br>Frozen orange juice |
| 7. Fresh grapefruit<br>or<br>Canned grapefruit juice | 15. Canned blends<br>or<br>Frozen orange juice           |
| 8. Fresh grapefruit<br>or<br>Canned blends           |  |

The six citrus products which were evaluated in this study were fresh oranges, fresh grapefruit, frozen orange juice, canned grapefruit juice, canned orange juice and canned blended juice. One of the objectives of this study was to determine the taste preferences (degree of popularity) for the more important citrus products.

Each homemaker was asked to give preference judgments in terms of comparing each citrus item independently with every other item. As an example the homemaker was asked to state her preference of fresh oranges compared with fresh grapefruit, fresh oranges compared with frozen orange juice and so on. This procedure is termed the method of paired comparisons. The proportion of times that each product was preferred to every other product was determined. The proportion for each product compared with itself was assumed to be .50. Each column was totaled and the columns were arranged in descending order from left to right. This gave order of rank for the taste preferences. Other statistical analysis established the degree of difference between taste preferences for the six products.

The use of the method of paired comparisons is particularly applicable to the problem of consumer reactions to citrus products. For one thing, we can determine the nature of the scale in different groups within the population, upper-income families vs. low-income families, for example. Since frozen orange concentrate is a relatively new product, a time series could be established which would indicate how this product changes in terms of psychological acceptance among consumers. At the same time such a time series would show how a change in acceptance of frozen orange concentrate affects the psychological position of other citrus products.

A detailed description of the statistical technique used in this method of paired comparisons may be obtained from the Department of Agricultural Economics and Sociology, College Station, Texas.

III. Taste Test Ballot

Test number.....  
Date..... Product..... Tester.....

Sample	Score			Comments

- Score:
- 10 - ideal  
9 - excellent  
8 - very good  
7 - good

6 - fairly good  
5 - acceptable  
4 - fair  
3 - poorly fair

2 - poor  
1 - very poor  
0 - repulsive

The numbers from 0 to 10 indicate quality. Give word description of sample under "Comments."