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SURVEY OF FRUIT USE BY PRESERVE MANUFACTURERS



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U. S. DEPARTMENT OF AGRICULTURE
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For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 25 cents.

SUMMARY

The preserve industry used about 300 million pounds of fruit and berries (fresh weight equivalent) in the manufacture of jams, preserves, and jellies during 1953, including limited quantities used in making pie fillings and related products. About 46 percent of this amount was received in frozen form--41 percent as frozen fruits and berries and 5 percent as frozen juice. The second largest source of fruits was in the form of nonfrozen juices, which represented 29 percent of the total. This was followed by 15 percent fresh, 9 percent canned, and 1 percent dried fruits and berries.

Preservers located at a distance from fruit sources generally used frozen fruit, except for pineapple, peaches, and apricots. Large percentages of their purchases of these three fruits were of canned fruit. These preservers also tended to purchase juices, rather than fruit, for making jelly. The bulk of the fresh fruits and berries was used by preservers located near fruit sources.

During 1953 the preserve industry used almost 36 percent of the frozen fruits and berries packed in containers holding over 10 pounds. This was equivalent to 23.3 percent of the total 1953 commercial frozen fruit and berry pack. Preservers were a major outlet for all frozen fruits and berries except apples, cherries, and blueberries.

The preserve industry reported general satisfaction with the frozen fruits and berries received in recent years. The leading area in which improvements were suggested was in the development or utilization of better methods to control oxidation or "browning" of frozen light-fleshed fruits, such as peaches and apricots.

Commercial jam, preserve, and jelly production increased rapidly during the 6-year period 1948-53. In addition to meeting the increased demand resulting from a population growth rate of around 1.5 percent a year, production rose from about 2.98 pounds per person in 1948 to almost 3.66 pounds in 1953. Production per capita rose about 23 percent during this period.

This increase in per capita production of these preserves appeared to be closely associated with changes in personal disposable income. When average spendable income increased 1.1 percent, it tended to be accompanied by a 1-percent increase in preserve production. When income dropped in 1949, jam production also fell. These conclusions are based upon a direct comparison of these factors without adjustment for changes in other variables, such as price.

Basic relationships that prevailed in 1948 between consumption and family income indicate that further income rises may tend to increase demand for jams, preserves, and jellies, but at a diminishing rate. If these 1948 relationships hold, consumption of these products may be expected to increase to around 4 pounds per capita by 1975. During the next 20 years, population growth may play a relatively greater part than higher national income in increasing the overall market for jams, preserves, and jellies.

By 1975, it is estimated that commercial preserve production may rise to an amount within a range of 825 to 915 million pounds, or about 40 to 55 percent greater than 1953 production. Such a preserve pack would require from 410 to 460 million pounds of fruit (fresh weight equivalent).

If the relationship in volume of fruits received in frozen form to quantities received in nonfrozen form remains the same, 1975 usage of frozen fruits by the preserve industry should be between 190 and 210 million pounds. This would represent an increase from 1953 of about 50 to 70 million pounds of frozen fruits. Such increases would be equivalent to between 9 and 13 percent of the total 1953 frozen fruit pack, excluding frozen citrus juice concentrates.

SURVEY OF FRUIT USE BY PRESERVE MANUFACTURERS

By Robert B. Reese, agricultural economist

BACKGROUND OF THE STUDY

Increasing quantities of agricultural products are being marketed in frozen form. What is the present and potential impact of this change upon agricultural marketing? Prior to any such evaluation, it is necessary to determine the relative size and nature of the major market outlets for frozen foods.

More than 65 percent of the 1953 frozen fruit and berry pack, excluding frozen juice concentrates, was packed in the large containers used by food manufacturers and the institutional trade. The bulk of this pack was purchased by preservers, pie bakers, ice cream manufacturers, restaurants, and cafeterias.

This study of fruit use by preserve manufacturers is one of a series designed to measure the relative size and nature of each of the major users of frozen fruits and berries. The aim of this survey is to answer the following questions:

1. How much frozen fruit is used in preserve manufacturing?
2. How does this volume of frozen fruits compare with the quantities of fresh and canned fruits used?
3. What suggestions does the preserving industry offer for improving frozen fruits to meet its needs?
4. What is the outlook for future use of frozen fruits in preserve manufacture?

Information on fruit use was obtained from over 80 percent of the preserving firms in the United States by mail questionnaires and personal interviews. Regional estimates of jam, preserve, and jelly production, by fruit type, for a composite of nonrespondent firms were obtained from the U. S. Department of Commerce. ^{1/} Estimates as to total fruit usage by nonrespondents were developed on a regional basis by applying representative fruit-use ratios to these production estimates. The resulting quantities of fruits were allocated to nonrespondents by form--fresh, frozen, and canned--in the same ratios as these forms were used by firms reporting in the survey. The

^{1/} Regional production data were combined in a manner so as not to reveal identity or output of any single firm.

resultant total fruit use--actual and estimated--probably represents over 90 percent of all fruit usage by the preserve industry for the manufacture of jams, preserves, and jellies. 2/

Additional information was collected through personal interviews, secondary data, and trade sources with regard to characteristics of the preserve industry which influence fruit usage. These data were used to evaluate suggestions concerning frozen fruits and the outlook for their future use.

QUANTITIES OF FRUITS USED IN PRESERVE MANUFACTURE

It is estimated that about 300 million pounds of fruits and berries (fresh weight equivalent) were used in the manufacture of jams, preserves, and jellies during 1953. 2/

Table 1 shows estimated quantities of fruits used (fresh weight equivalent) in the manufacture of jams, preserves, and jellies during 1953. 3/ Five fruits--strawberries, grapes, apples, blackberries, and peaches--accounted for more than 70 percent of the fruits used. The next five fruits in importance--red and black raspberries, cherries, apricots, and pineapple--accounted for almost 20 percent more. Thus, 10 fruits represented more than 90 percent of the fruit used in jam, preserve, and jelly manufacturing during 1953.

Consumption of individual fruits and berries by the preserving industry varies widely between regions. This variation may reflect regional specializations in preserve production, differences in regional demand for preserves made from various fruits, delivered fruit-price relationships, and local availability of fruits. Table 2 gives the percentages of fruits used by the preserve industry in the Northeastern, North Central, Southern, and Western regions. 4/

2/ Estimate does not include any fruits used in the manufacture of marmalades or fruit butters; limited amounts used in pie fillings and related products are included.

3/ Includes limited quantities for pie fillings, punch bases, fruit toppings, and other products manufactured by preservers.

4/ Based upon Census regions.

Table 1.--Estimated quantities of fruits used in the commercial manufacture of jams, preserves, and jellies, 1953

Fruits and berries	Quantity of fruits used	
	Equivalent fresh weight	Percentage of total
	<u>1,000 pounds</u>	<u>Percent</u>
Strawberries	57,219	19.1
Grapes	58,226	19.5
Apples	55,859	18.7
Blackberries ^{1/}	21,722	7.3
Peaches	20,759	7.0
Red raspberries	13,677	4.6
Cherries	12,785	4.3
Pineapple	11,263	3.8
Apricots	10,772	3.6
Black raspberries	8,819	2.9
Currants	6,907	2.3
Red plums	5,463	1.8
Crabapples	5,082	1.7
Blueberries	2,757	0.9
Elderberries	2,342	0.8
Damson plums	1,519	0.5
Miscellaneous fruits and berries	3,558	1.2
Total or average	298,729	100.0

^{1/} Includes dewberries, boysenberries, youngberries, and loganberries.

Table 2.--Regional differences in use of fruits and berries in the manufacture of jams, preserves, and jellies, 1953

Fruits and berries	Percentage of fruits used (equivalent fresh weight)				
	North- east	North Central 1/	South 2/	West 3/	United States
	: Percent	Percent	Percent	Percent	Percent
Strawberries	33.4	24.5	15.5	26.6	100.0
Grapes	42.9	28.5	17.8	10.8	100.0
Apples	17.5	42.0	31.5	9.0	100.0
Blackberries 4/	21.7	22.7	30.3	25.3	100.0
Peaches	21.9	21.0	40.3	16.8	100.0
Red raspberries	51.1	26.2	10.6	12.1	100.0
Cherries	43.1	31.4	16.1	9.4	100.0
Apricots	20.4	32.8	10.7	36.1	100.0
Black raspberries	42.0	46.7	8.9	2.4	100.0
Pineapple	62.7	17.9	17.8	1.6	100.0
Currants	47.9	21.5	3.6	27.0	100.0
Red plums	6.9	29.3	39.7	24.1	100.0
Crabapples	46.6	38.1	5.0	10.3	100.0
Blueberries	89.5	10.1	0.1	0.3	100.0
Elderberries	70.3	27.5	-	2.2	100.0
Damson plums	26.6	21.9	51.5	-	100.0
Miscellaneous					
fruits and berries .	24.6	23.9	44.3	7.2	100.0
Average	33.5	29.4	21.5	15.6	100.0

1/ Includes East North Central and West North Central States.

2/ Includes South Atlantic and South Central States.

3/ Includes Mountain and Pacific States.

4/ Includes dewberries, boysenberries, youngberries, and loganberries.

As shown in table 3, regional use of fruits in the manufacture of jams, preserves, and jellies generally followed the population pattern. This relationship was close in the North Central and Western regions. The proportion of fruits used in the Northeastern region exceeded the percentage of total population of this region. This was counterbalanced by a lower fruit-use population ratio found in the Southern States.

Table 3.--Percentage distribution of fruits and berries used in preserve manufacture, and of population, by regions, 1953

Region	Fruits used in preserve manufacture	Population
	Percent	Percent
Northeast	33.5	25.7
North Central	29.4	29.2
South	21.5	31.3
West	15.6	13.8
United States	100.0	100.0

Preservers in the Northeastern States used about one-third of all the fruits and berries used in preserve manufacture. They consumed more than half of the red raspberries, pineapple, blueberries, and elderberries. In addition, the Northeastern region was the leading regional market for strawberries, grapes, cherries, currants, and crabapples during 1953.

More than 29 percent of the fruits and berries was consumed in the North Central region. This region was the leading user of apples and black raspberries and was a heavy consumer of most of the other fruits and berries. The use of most fruits and berries tends to approach the average use of all fruits and berries more closely in the North Central than in any other region.

The South accounted for more than 21 percent of all fruits and berries used in preserve manufacture. More blackberries, peaches, red plums, damson plums, and miscellaneous fruits and berries were consumed in the South than in any other region. Large quantities of apples also were used.

Western preservers used less than 16 percent of all fruits and berries made into jams, preserves, and jellies. However, they led in the use of apricots, and were heavy consumers of strawberries, blackberries, currants, and red plums.

It would appear that preserve production in the South and West shows the greatest specialization by type of fruit. The least specialization was indicated for the North Central region. No data are available as to regional demand for preserves of different types of fruit or as to the interregional movement of these products. Therefore, only a limited evaluation may be made as to the effect of the regional differences in fruit use patterns.

FORM OF FRUITS USED IN PRESERVE MANUFACTURE

About 66 percent of the fruits and juices (fresh weight equivalent) used in jam, preserve, and jelly manufacture was received in fruit form--more than 41 percent as frozen fruit, almost 15 percent as fresh fruit, 9 percent as canned fruit, and more than 1 percent, dried. The remaining 34 percent included nonfrozen juices (about 29 percent) and frozen juices (5 percent). Table 4 shows the proportions of individual fruits and berries received in the various fruit forms. Frozen fruits represented over 61 percent of the entire quantity received as fruits--excluding juices. This provides an indication of the relative importance of frozen fruits and berries to the preserve industry.

Table 4.--Relative importance of form of fruit purchased for the manufacture of jams, preserves, and jellies, 1953

Fruits and berries	: Fruits purchased (fresh weight equivalent)						
	: In form of fruit				: In juice form		
	: Frozen	: Fresh	: Canned	: Dried	: Frozen	: Non-frozen	: Total
	: Pct.	: Pct.	: Pct.	: Pct.	: Pct.	: Pct.	: Pct.
Strawberries	: 81.8	14.7	-	-	1.8	1.7	100.0
Grapes	: 16.8	24.5	4.7	1.2	15.0	37.8	100.0
Apples	: 1.7	16.6	.3	2.0	.6	78.8	100.0
Blackberries ^{2/}	: 74.7	9.1	.1	-	4.4	11.7	100.0
Peaches	: 29.8	17.6	52.6	-	-	-	100.0
Red raspberries	: 90.2	1.5	-	-	7.3	1.0	100.0
Cherries	: 74.1	7.6	.6	-	9.7	8.0	100.0
Apricots	: 39.4	14.5	35.3	10.8	-	-	100.0
Black raspberries	: 68.0	2.8	.3	.2	8.6	20.1	100.0
Pineapple	: -	-	79.3	-	-	20.7	100.0
Currants	: 30.1	1.5	.4	1.1	19.5	47.4	100.0
Red plums	: 73.1	23.9	.3	-	.2	2.5	100.0
Crabapples	: 2.7	4.1	-	-	4.0	89.2	100.0
Blueberries	: 94.0	6.0	-	-	-	-	100.0
Elderberries	: 15.8	28.0	-	-	-	56.2	100.0
Damson plums	: 37.2	49.7	-	-	-	13.1	100.0
Miscellaneous	:						
fruits and berries	: 5.9	27.8	10.9	19.5	-	35.9	100.0
Average	: 40.8	15.0	9.1	1.3	5.2	28.6	100.0

^{1/} Includes some items used in manufacture of pie fillings and related products.

^{2/} Includes dewberries, boysenberries, youngberries, and loganberries.

More strawberries, blackberries, red and black raspberries, cherries, apricots, red plums, and blueberries were received as frozen fruit than in any other form. With the exception of apricots, the frozen product accounted for

more than 50 percent of the total quantity of these fruits used in all forms.

Only damson plums were received primarily as fresh fruit. The canned form was predominant for peaches and pineapple. Nonfrozen juice was the leading form in which grapes, apples, currants, crabapples, elderberries, and miscellaneous fruits and berries were received. The bulk of nonfrozen apple juice was in concentrates. It is estimated that almost 600,000 gallons of concentrated apple juice were used by the preserve industry during 1953.

The relative importance of the form in which fruits and berries were purchased by preservers in the different regions is shown in table 5. These figures are averages for all fruits used. Detailed regional information on the form in which individual fruits were received is contained in appendix table 14.

Table 5.--Percentage distribution of form of fruits and berries purchased for manufacture of jams, preserves, and jellies, by regions, 1953 ^{1/}

Region	Fruit				All juices
	Frozen	Fresh	Canned	Dried	
	Percent	Percent	Percent	Percent	Percent
Northeast	42.7	7.9	11.5	-	37.9
East North Central	44.4	14.6	5.9	4.3	30.8
West North Central	71.4	0.4	5.7	-	22.5
South Atlantic	21.0	33.3	6.3	-	39.4
South Central	29.7	11.0	18.0	-	41.3
West	45.3	29.1	2.4	0.6	22.6
United States	40.8	15.0	9.1	1.3	33.8

^{1/} Fresh weight equivalents. Includes some products used in manufacture of pie fillings and related products.

From table 5 it is apparent that wide regional differences exist in the form in which fruits are obtained. Whereas frozen fruits represented over 71 percent of all fruits (including juices) used in preserve manufacture in the West North Central States, they were equivalent to only 21 percent in the South Atlantic States. The converse was found in the use of fresh fruits. Preservers in the South Atlantic area consumed about one-third of their total fruits in fresh form, whereas firms in the West North Central area handled negligible quantities of fresh fruits. The South Central and Northeastern States were the heaviest users of canned fruits and berries. Juices in frozen and nonfrozen form were the most important single fruit source in the South Central and South Atlantic areas.

The regional differences in total fruit use, by form, reflect variations occurring in the use of each individual fruit or berry. Analysis of these products indicates that a pattern exists. The bulk of fresh fruits and berries used in preserving is consumed by firms located in the regions where

these fruits are grown. It would appear that relatively little fresh fruit was shipped outside a producing region for use in preserve manufacture. Preservers located at a distance from fruit sources generally used frozen fruits, with the major exceptions of pineapple, peaches, and, to a lesser extent, apricots. Of these commodities, important volumes of the canned product were utilized. Preservers located at a distance from fruit-producing areas tended to purchase juices, pasteurized or frozen, for the manufacture of jellies.

This pattern is illustrated in table 6, which shows the form in which strawberries and peaches were purchased, by regions, for preserve manufacture. This table also shows the necessity for dealing with individual fruits rather than with overall averages for some purposes. Similar information on other fruits and berries may be obtained from table 14.

Table 6.--Strawberries and peaches: Form of fruit purchased for manufacture of jams, jellies, and preserves, by regions, 1953

Fruit and form	East	West			South	West	United
	North- east	North Central	North Central	Atlantic	South Central	West Central	States
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
<u>Strawberries</u>							
Frozen	92.2	95.8	97.3	100.0	95.9	47.0	81.8
Fresh	2.2	0.2	-	-	-	52.5	14.7
Canned	-	-	-	-	-	-	-
Juices (frozen and nonfrozen).	5.6	4.0	2.7	-	4.1	0.5	3.5
Total ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>Peaches</u>							
Frozen	36.0	50.8	43.0	6.8	2.3	57.3	29.8
Fresh	0.1	-	-	74.9	-	32.4	17.6
Canned	63.9	49.2	57.0	18.3	97.7	10.3	52.6
Total ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0

THE PRESERVE INDUSTRY AS A CONSUMER OF FROZEN FRUITS AND BERRIES

Table 7 shows estimated quantities of frozen fruits used in the manufacture of jams, preserves, and jellies during 1953, the total commercial frozen fruit pack, and the total pack in 1953 in containers holding more than 10 pounds. This comparison provides a working indicator as to the importance of the preserve industry as a market for frozen fruits and berries. It is not an absolute measure because part of the fruit used by preservers in 1953 came out of earlier frozen fruit packs. Also, some frozen fruits used by the preservers may not have been reported in the statistics of the commercial frozen fruit pack.

Table 7.--Frozen fruits and berries: Commercial pack and quantity and percentage of pack used by the preserve industry, by kinds of fruit, 1953

Fruits and berries	Frozen fruit					
	Commercial pack			Used by preserve industry		
	Total	In large containers	1/	Total	As percentage of--	
					commercial pack	large containers
1,000 lb.	1,000 lb.	1,000 lb.	Percent	Percent		
3/	3/	3/				
Strawberries	225,963	104,008	57,794	25.6	55.6	
Cherries <u>4/</u>	116,981	113,563	9,739	8.3	8.6	
Apples	42,356	41,502	554	1.3	1.3	
Peaches	32,171	13,553	5,513	17.1	40.7	
Blackberries <u>5/</u>	29,975	27,926	15,450	51.5	55.3	
Red raspberries	24,895	12,118	11,753	47.2	97.0	
Blueberries	13,988	11,692	2,316	16.6	19.8	
Grapes	10,110	10,110	8,266	81.8	81.8	
Black raspberries	8,975	8,975	5,709	63.6	63.6	
Apricots	3,962	3,962	<u>2/4,427</u>	<u>2/111.7</u>	<u>2/111.7</u>	
Currants	3,794	3,794	1,916	50.5	50.5	
Red plums	(6)	(6)	3,386	(6)	(6)	
Crabapples	(6)	(6)	83	(6)	(6)	
Elderberries	(6)	(6)	351	(6)	(6)	
Damson plums	(6)	(6)	479	(6)	(6)	
Miscellaneous fruits and berries ...	28,791	11,095	200	15.6	40.6	
Total or average ..	541,961	362,298	127,936	23.6	35.3	

1/ Containers holding 10 pounds and over.

2/ Frozen fruit used by preservers includes some fruit frozen by preservers and not reported in commercial pack statistics.

3/ Frozen weight.

4/ Red tart and sweet varieties.

5/ Also dewberries, boysenberries, loganberries, and youngberries.

6/ Reported under Miscellaneous fruits and berries.

Frozen fruit used by preservers in 1953 was equivalent to 23.6 percent of the total 1953 commercial frozen fruit pack, and 35.3 percent of the quantity of frozen fruits and berries packed in containers holding more than 10 pounds. During 1953, preservers used more than 50 percent of the frozen strawberries, grapes and pulp, blackberries, peaches, red and black raspberries, apricots, and miscellaneous fruits and berries packed commercially in large containers. The preserve industry is a major outlet for the marketing of all frozen fruits and berries except apples, cherries, and, to a lesser extent, blueberries.

TRENDS IN FRUIT USE BY THE INDUSTRY

The overall demand for fruits by the preserve industry, as reflected in total production of jam, preserves, and jelly has increased steadily from 1948-49 levels. Output in 1953 was at a peacetime peak (up to that date) and more than 30 percent greater than production in 1948 or 1949.

Fruit spread reports of the U. S. Department of Commerce indicate that only two categories of fruit preserve production--strawberries and "miscellaneous" ^{5/}--have shown a continuous increase since 1949. Production increases in these two items accounted for an equivalent of more than 80 percent of the total increase in jam, preserve, and jelly production during the years 1949 through 1953. Production of grape, apple, blackberry, peach, currant, crab-apple, and cherry products showed smaller increases or remained fairly steady. **Only** red raspberry preserves showed a trend toward lower production levels during this 5-year period. In general, production of the kinds of preserves made in large quantities tended to fluctuate less yearly (percentagewise) than production of the kinds made in smaller quantities. National figures show less fluctuation than regional figures.

Regional Trends

As shown in table 8, total production ^{6/} of fruit spreads in the Northeast has remained relatively stable during the period 1948 to 1953, fluctuating around 200 million pounds annually. Production of fruit spreads in the South has remained at 170 to 180 million pounds since 1950. However, in the North Central region, fruit-spread production has risen rapidly since 1948, and in 1953 stood at 216.7 million pounds. Sizable increases from earlier levels were noted for each year except 1949. Western output has been increasing at a more spasmodic rate.

Use of individual fruits has varied widely between regions and from year to year within the same region. Detailed data in appendix table 14 show the regional and national percentage breakdown, by fruit type, of jam, preserve, and jelly production from 1949 to 1953. From these data it would appear that the national production pattern of preserves of specific fruit types is a composite of wider, and often counterbalancing, fluctuations taking place within the regions. No close correlation appears between the year-to-year changes in the use of individual fruits in any two regions during the period 1949 through 1953.

^{5/} Includes pineapple, apricot, black raspberry, plum, elderberry, and miscellaneous fruits and berries.

^{6/} Includes production of fruit butters and marmalades.

Table 8.--Estimated production of fruit spreads, by regions, 1948-53 1/

Year	:North- : east	: North : Central	: South	: West	: United : States
	: :Million :pounds	Million pounds	Million pounds	Million pounds	Million pounds
1948	208.8	151.5	106.7	69.8	536.8
1949	182.9	143.7	144.6	65.2	536.4
1950	208.8	162.3	180.0	73.1	624.2
1951	196.2	171.0	173.2	84.2	624.6
1952	202.0	194.9	180.0	71.3	648.2
1953	200.4	216.7	181.8	92.9	691.8

1/ Includes marmalades and fruit butters.

Compiled from reports of the U. S. Department of Commerce.

Although subject to considerable variation, fruit use patterns in the Northeast and North Central appear to bear a closer relationship than those of the other regions. This relationship indicates the possibility that these areas tend to draw upon fruit supplies from the same sources and to base preserve production upon a similar pattern of fruit-price interrelationships. The wide variance between the West and South, and the differences of each, in turn, from the Northeast and North Central, indicate the possibility that preservers in the West and South are more closely tied to local sources of fruit supplies and that preserve production tends to reflect nearby fruit supply and price relationships.

Regional preferences for fruit preserves are also factors in production. For example, a New England manufacturer commented, "around here if it isn't strawberry, it had better be raspberry."

Fruit use patterns are also affected by the relative portions of jams, preserves, and jellies produced. The Southern region, for example, is a heavy producer of jellies, whereas the North Central and West tend to produce a larger proportion of jams. The breakdown of jam and jelly production also affects the regional use of frozen fruits and berries since much of the jelly is made from pasteurized juices (nonfrozen) or from the juice of fresh fruits and berries.

How Representative Are 1953 Fruit Use Patterns?

This survey presents a picture of fruit used in commercial production of jam, preserves, and jelly during 1953. How representative is the 1953 fruit use pattern, and may it be used as a benchmark for future evaluation?

Although total production of jams, preserves, and jellies was at a high level, 1953 production followed closely the pattern of population and per capita income changes evidenced since 1948. No major production aberrations, resulting from such factors as unusually heavy military demand or large

inventory accumulation, are known to have occurred during 1953. Thus, the overall production of jams, preserves, and jellies during 1953 appears to represent a reasonable benchmark for comparison with other years.

The proportions of total preserve pack represented by products made from most of the individual fruits and berries also appear to be reasonably representative of the proportions during the period 1948 to 1953. Consumption of red raspberries and cherries in 1953 was considerably below the 5-year average; however, lowered use of red raspberries was in line with a downward trend throughout the period. Blackberry consumption was at a high level when compared with the preceding years. The use of strawberries, grapes, peaches, apples, currants, crabapples, and "miscellaneous" fruits and berries was generally in line with production trends found during the entire period.

The 1953 pattern of fruit use was less representative on a regional basis than on a national basis, since annual fluctuations in total output of preserves and in production of individual fruit preserves were wider in each region than in the country as a whole. However, the form in which fruits are used--frozen, fresh, canned, or as juices--appears to follow a pattern on a regional basis.

FACTORS AFFECTING FUTURE USE OF FROZEN FRUITS BY THE INDUSTRY

Future use of frozen fruits and berries by the preserve industry will depend, for the most part, upon the overall level of demand for commercially produced jams, preserves, and jellies. This demand will be affected strongly by the rate of national population growth, by changes in average disposable personal income, and, perhaps by promotion of sales by the industry. Analysis of the effect of income level upon family purchases of jams and jellies, in turn, tends to indicate changes in food consumption habits and home preserving activities.

These factors will affect the total quantity of fruits that will be required by the preserve industry. Other considerations will determine the breakdown of this total demand into segments for specific fruits or fruit forms. Among these will be location of the industry, price of frozen fruits, and possible technological changes in fruit processing.

Certain basic aspects of preserve manufacturing and marketing, such as manufacturing schedules, value added by manufacture, and preserve pricing policy, play an important role in determining quantities of individual fruits purchased and the form in which these are obtained. Therefore, a brief generalization of several phases of the nature of the industry are presented prior to consideration of specific factors which may affect fruit usage by this industry. This generalization is intended to serve only as background for evaluation of the possible impact of changes in such items as location of preserving activities and fruit processing technology upon the use of fruits and berries. It is not intended as a full report upon the nature of the preserve industry, as such.

Nature of the Industry

Scope of Operations

In 1953, about 350 firms or individuals were engaged in the commercial manufacture of fruit spreads; however, trade sources estimate that the 90 largest preservers produced around 85 percent of the fruit spread output. This concentration of production is borne out by the following data for 130 firms in 1953:

<u>Production of fruit spreads</u> Size class (1,000 pounds)	<u>Number of plants</u>
Less than 200	30
200 to 499.9	19
500 to 999.9	13
1,000 to 2,999.9	20
3,000 to 4,999.9	17
Over 5,000	<u>31</u>
Total	130

Based on U. S. Department of Commerce report, "Fruit Spread Production--1953."

The leading fruit spread manufacturers are scattered throughout the country, and few firms operate manufacturing plants in more than one region. Operations have tended toward being regional rather than national in scope. Location of the preserving industry appears to be dominated more by market location than by the source of fruit and berry supplies.

Production Schedules and Pricing Practices of Preservers

If preservers were dependent entirely upon fresh fruit supplies, their production would be seasonal in nature. However, when frozen or canned fruits and juices are used, preserve production may be extended throughout the year. Thus, usage of processed fruits, either totally or together with fresh fruits in season, permits closer optimum utilization of preserving facilities throughout the year. Production schedules may be tailored more closely to demand. The need for large seasonal inventories of preserves may be reduced as well as the amounts of working capital tied up in such inventories.

In a number of firms, jam, preserve, and jelly production is reported to be on a cyclical basis throughout the year. Within a production cycle, such as 60 or 90 days, for example, jams and jellies of many fruit types will be manufactured in quantities necessary to cover demand until the next production cycle is completed. This procedure permits a periodic reevaluation of demand for the items produced.

Survey responses indicated that most preserve manufacturers produced jams or jellies from several or many types of fruits or berries, and most of them were able to offer a line of products for sale. Manufacturers indicated that jams, jellies, and preserves were sold customarily on a line or split-line basis rather than under separate prices for each item produced. A line price for jams, for example, is a single price covering all jams produced, regardless of fruit type. A split-line price policy for jams establishes separate prices for product groups. Jams of one, several, or many fruit types may constitute the product group for which a single price is established.

When a single price quotation covers products of a number of fruit types, limited price fluctuations for an individual fruit or berry would be expected to exert less pressure upon the pricing of preserves containing that fruit than would occur if there were a separate price for the single items. Somewhat lower profit margins on a single item might be counterbalanced by a higher profit on a companion product. The average profit for the line or split line becomes a more important consideration than the relative profitability of individual jams or jellies.

If the price of a single fruit rises relative to other fruits, the manufacturer operating with a split-line pricing program faces several alternatives--transferring products of that fruit into a higher priced line, increasing the present line price, absorbing the higher fruit costs and maintaining the existing line price, or curtailing production of the item.

Fruit Usage

Commercially produced fruit jams, jellies, and preserves are subject to standards prescribed by the Food and Drug Administration. In the manufacture of fruit jams and preserves, for example, a general rule is that fruit ingredients must be not less than 45 parts by weight to each 55 parts by weight of sugar used in the mixture. These mixtures must be further concentrated to 65 or 68 percent soluble solids depending upon the particular fruit or fruits used.

Compared to the cost of materials--such as fruits, sugar, and containers--the value added by preserve manufacture is relatively small. Since fruit costs are usually the most important single cost item, as well as being the most variable, the prices paid by preserve manufacturers for fruits and berries are important in determining the firm's competitive position and profit status. The fruit purchasing policy of an individual firm usually must take into account the demand and price structure for an entire line of products as well as present and anticipated levels of quantity, quality, and price for numerous types of fruits and berries.

Fruit purchasing practices vary widely within the preserve industry. Some major firms reported contracting in advance for the bulk of their frozen fruit and berry requirements. Others are reported to purchase primarily on a hand-to-mouth basis. The rest operate between these extremes. The fruit purchasing policy of a firm may vary for different fruits in a single season.

Advance contracting is used to insure adequate supplies of fruit with desired quality characteristics or is made in anticipation of midseason price advances. Some of the leading operators have fruits and berries custom frozen. However, the preserve industry as a general practice is reported to buy commercially frozen fruits and berries under U. S. Department of Agriculture grade.

Evaluation of fruit quality by preservers is based, in part, upon characteristics in the end product--fruit preserves. For example, several preservers indicated a desire for a small strawberry that would hold its form after cooking, as well as maintaining good color and flavor. Thus, certain varieties of fruits are reported to be preferred. The fruit characteristics which are desired by this industry may vary considerably from those which best meet the needs of other outlets for frozen fruits.

By the nature of the end product and the manufacturing process involved, the preserving industry is able to utilize considerable quantities of fruits which might not be handled satisfactorily as fruits through retail channels. In this respect, it tends to be complementary to, rather than in competition with, the retail outlet as a market for frozen fruits and berries.

Location of Preserving Activities

Figure 1 shows the location of preserve manufacturers included in this survey. This map indicates that preservers tend to concentrate in the most densely populated areas.

Total transportation costs are important in determining the location of preserving activities. Any single firm making an effort toward minimizing transportation costs must take into consideration the costs of transporting fruit, sugar, containers, and the costs of moving preserves to market. Costs of transporting fruit are important, but are subordinate to the conglomerate of transportation costs involved. The costs of moving fruit to a preserver who is located near the market for his products must be balanced against the costs of moving finished products to the same market from a plant which is located in a fruit-producing area.

If the location pattern for the preserve manufacturing industry remains the same, relatively little change in the form of fruit would be expected. Preservers located away from fruit production areas are dependent upon frozen and canned fruits and juices. Preservers operating in fruit-producing areas must use frozen or canned products during the bulk of the year when fresh fruits and berries are out of season, if year-round production schedules are to be maintained.

If the location of the preserve industry should change, some change in the use of frozen fruits and berries would be expected. A tendency of the plants to move near the markets for their products would probably cause some increase in the proportion of frozen or canned fruits used; whereas movement of the plants toward location in fruit-growing areas would probably increase

the use of fresh fruits and berries. In either case, the extent of the change in form of fruit used would vary between individual fruits and berries.

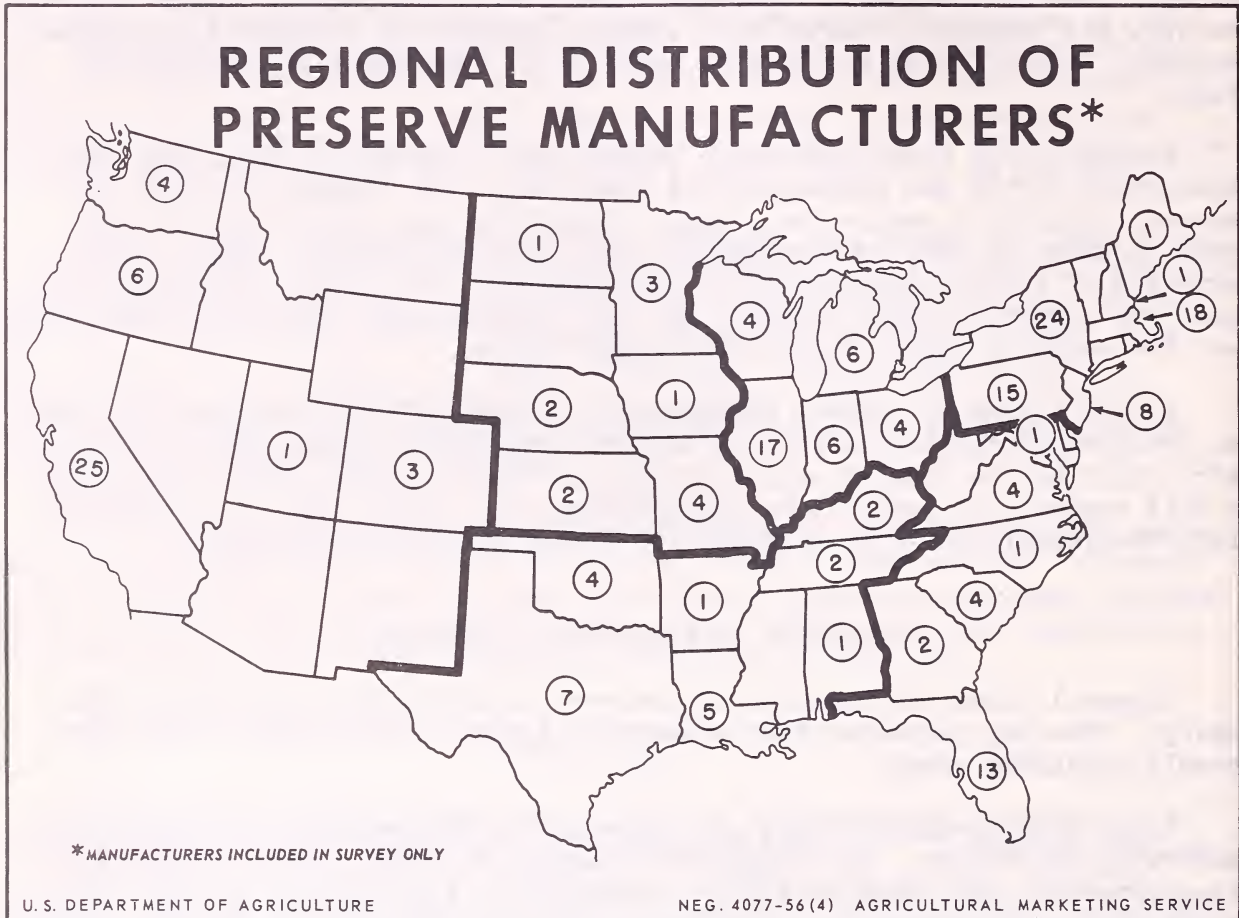


Figure 1

Technological Changes

If no changes occur in overall demand for fruits, preservers located in areas where fresh fruits are not available could increase their use of frozen fruits only by diversion from the canned form. Since peaches, pineapple, apricots, and fruit juices are the major fruit items in nonfrozen processed form, any sizable increase in total consumption of the frozen product must come through greater use of these frozen fruits or fruit juices. Conversely, any large increases in use of the canned product would probably reduce the quantities of frozen fruits being used.

Any increase in use of frozen peaches and apricots would appear to depend partly upon improvement in techniques or operating practices which will reduce oxidation or "browning" of the frozen fruit. Any rise in consumption of frozen fruit juices would depend upon their quality-cost relationship with

pasteurized nonfrozen juices.

Preservers having fresh fruit and berry supplies available could substantially increase use of frozen or canned fruits and berries only by substituting them for the fresh fruit. Since many of these firms already use processed fruits when the fresh are out of season, any increase in the use of processed fruits must occur when fresh fruits are available. Thus, length of the harvest period is a factor in the total quantities of fresh and frozen fruits used. New strawberry varieties in California have lengthened the harvest period for fresh strawberries and have reduced the number of months when processed strawberries must be used by preservers in that area.

Price of Frozen Fruits

Use of individual frozen fruits in the manufacture of jams, jellies, and preserves is partly controlled by complex price relationships. In several fruits, some manufacturers report that the frozen and canned products may be readily substituted for each other in preserve manufacture as price differentials develop.

Retail price relationships between preserves of different fruits also affect the quantities of individual frozen fruits used in making preserves. The consumer has a wide choice of fruit preserves and is reported to substitute purchases quite readily when price differentials exist. This flexible demand for individual fruit preserves is reflected in the preserve manufacturer's fruit purchasing policy.

Price differentials between individual frozen fruits also affect the volume purchased for preserve manufacture. For some fruits, these fruit-price interrelationships are relatively unstable and their effect is difficult to measure. Price levels for individual fruits and berries vary from year to year and prices fluctuate within a season. Prices of competing fruits and berries are not necessarily subject to the same fluctuations.

Evaluation of fruit price differentials is further complicated by the regional nature of the preserve industry. Since the fruit prices affecting the manufacturer essentially are delivered prices, the pattern of fruit price differentials will vary between firms, depending upon their location.

Reports of the U. S. Department of Agriculture on cold storage inventories of frozen fruits and berries assist many preserving firms to determine their frozen fruit purchasing program. However, these reports do not break down total inventories into size of container. The preserve industry uses fruits and berries packed in large containers (usually 30 pounds or over) and has difficulty in utilizing products packed in smaller containers. Sometimes the ratio between the supply of frozen fruits in large containers and the supply in small containers becomes out of balance, and the total inventory figures do not represent the actual supply situation for the preserve industry. When this imbalance becomes known, prices fluctuate considerably. Thus, a number of preservers report having purchased small quantities for immediate

use in the belief that adequate supplies were on hand, only to find out that the stock in large containers was nearly exhausted and that competition was keen for the remaining supply. The converse situation is also indicated.

There are essentially three markets for the individual frozen fruits and berries--consumers who buy large containers, those who buy institutional-size containers, and those who buy retail-size containers. There is little demand by the same consumers for containers of more than one of these sizes. Thus, prices for frozen strawberries, for example, at a given moment will vary in level, and changes in current prices may be in opposite directions depending upon the size of container and grade and quality characteristics of product. This complicates collection of price data which would permit measuring the effect of price relationships upon the use of individual fruits and berries in preserve manufacture.

Population Growth

In 1953 the United States population was about 13.2 million greater than in 1948. About 2.7 million potential consumers were added to the market for jams and jellies during 1953. Population growth is a major factor in determining future production of jams and jellies.

How much population growth may be expected within the next 20 years? The Bureau of the Census has published four projections on population growth up to 1975. These projections are based upon different conditions affecting population growth which could develop during the next 20 years (table 9). In view of the unknowns involved, the Bureau of the Census does not recommend any one series as the "best" series.

Population growth during the next 20 years will be an important factor in determining the quantities of jams, preserves, and jellies that will be produced commercially by 1975. However, as shown in figure 2, population estimates provide a wide range within which 1975 production might occur.

If per capita consumption should fall, population growth would tend to reduce the impact of this decline upon total production. If per capita consumption should increase, population growth would give an added boost to the increased requirement for jams and jellies.

Table 9.--Population: Four projections ^{1/} of growth, 5-year intervals, 1960-75

July 1	Projected population based on--			
	Series AA	Series A	Series B	Series C
	Millions	Millions	Millions	Millions
1960	179.4	177.8	177.8	176.5
1965	193.3	190.3	190.3	186.3
1970	209.4	204.6	203.0	196.4
1975	228.5	221.5	214.6	206.9

^{1/} Series AA, A, B, and C imply the following assumptions as to age-specific birthrates:

AA--1954-55 rates remain constant to 1975

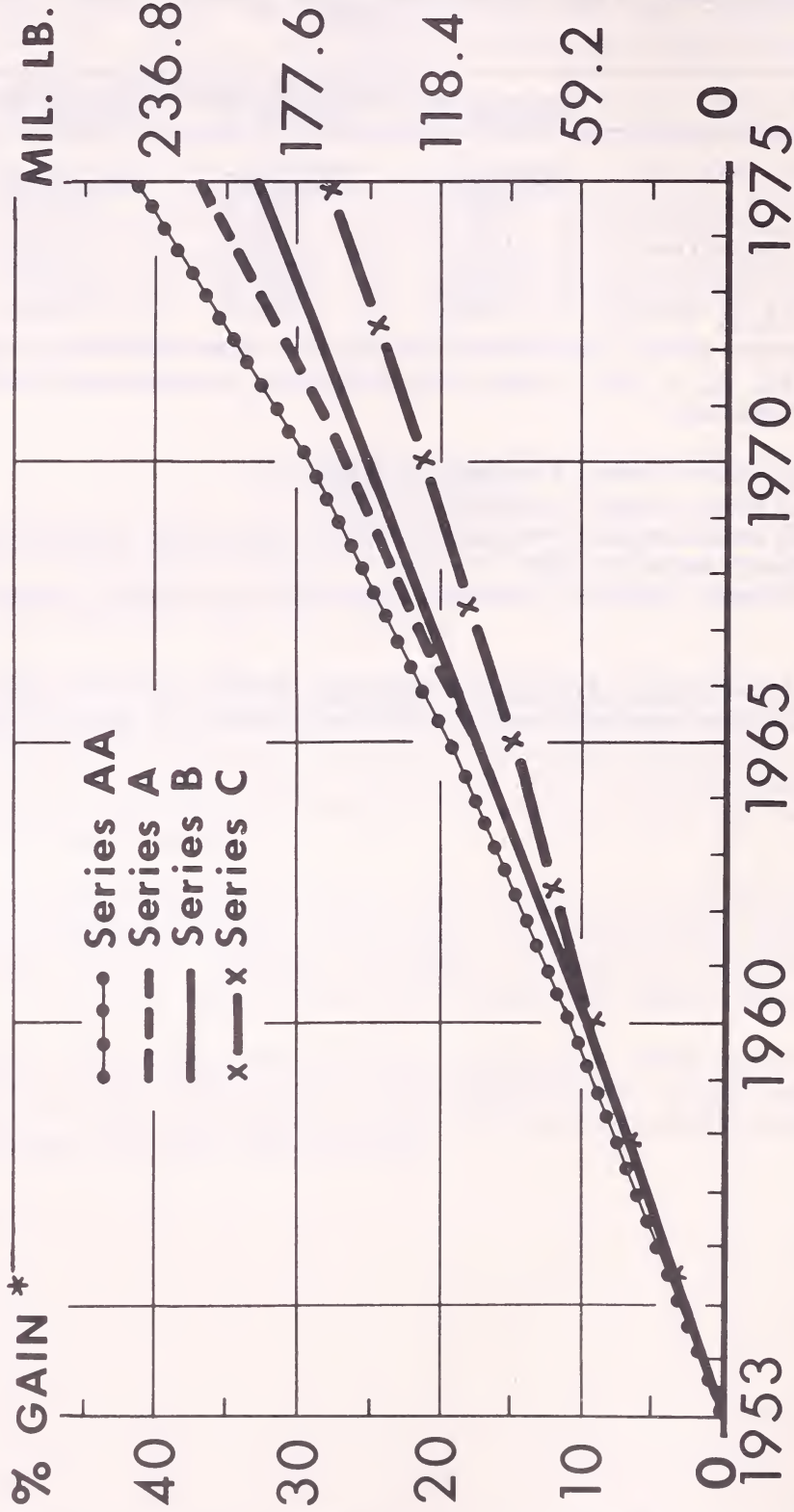
A--1950-53 rates remain constant to 1975

B--1950-53 rates remain constant to 1965, then drop linearly to roughly the prewar level by 1975

C--1950-53 rates decline linearly from 1953 to roughly prewar level by 1975

Compiled from Current Population Reports, Series P-25 No. 123, "Revised Projections of the Population of the United States, by Age and Sex, 1960 to 1975."

POTENTIAL INCREASE IN JAM, PRESERVE AND JELLY PRODUCTION TO 1975



* BASED ONLY UPON ESTIMATED POPULATION GROWTH, ASSUMING PER CAPITA PRODUCTION REMAINS AT 1953 LEVEL OF 3.656 POUNDS. POPULATION GROWTH ON BASIS OF 4 PROJECTIONS BY BUREAU OF CENSUS.

Figure 2

Disposable Personal Income

The amount of spendable income in the hands of the average consumer appeared to have a definite effect upon his purchase of jams, preserves, and jellies during the period 1948-53. These changes in purchasing patterns with rising or falling income may be translated into preserve manufacturing decisions with little delay. As shown in table 10, disposable personal income per capita increased rapidly from 1948 through 1953. From a reduced level of \$1,238 in 1949, spendable income rose to \$1,546 in 1953--an increase of \$308 per person. Total production of jams, preserves, and jellies rose from a postwar low of about 2.98 pounds per person in 1949 to almost 3.66 pounds in 1953. The only year during 1948-53 in which disposable personal income was lower than it had been the previous year was 1949. A similar drop occurred in production of jams, preserves, and jellies.

Figure 3 shows the relationship between spendable personal income and production of jams, preserves, and jellies during 1948 and 1953. When average disposable personal income rose 1.1 percent, the per capita production of jams, preserves, and jellies tended to rise 1 percent. When spendable income dropped, production also fell. With every \$10 increase in per capita spendable income, production of jams, preserves, and jellies tended to increase about 0.02 pounds per capita. At 1955 population levels, this would be equivalent to an increase of more than 3.5 million pounds of fruit preserves. 7/

This income-production relationship would suggest that jam, preserve, and jelly production is sensitive to changes in spendable income. Only in 1950 did production vary widely from this pattern. It is reported that in 1950 the preserving industry produced heavily in anticipation of needs arising from the Korean conflict. Heavy quartermaster purchases during 1951 are reported to have provided an outlet for a portion of this 1950 production.

It is estimated that increased spending money in the hands of consumers exerted about twice as much force as population growth in increasing total jam, preserve, and jelly production in the years 1948 to 1953. However, during this period, population growth in a single year appears to have had an effect upon total production equivalent to an increase of about 1.65 percent in average disposable personal income. Prosperity and population growth combined appeared to account for the bulk of the total increase in commercial fruit jam, preserve, and jelly production.

7/ Combined jam, preserve, and jelly production is used in evaluating the effect of changes in disposable personal income because of substitution between these products. The combined production figure tends to eliminate this factor. Strong relationships also exist between disposable personal income and per capita production of both jams and jellies. Statistical limitations of a 6-year series are recognized. This period, however, includes all "normal" years for which fruit preserve production data are available.

Table 10.--Disposable personal income and jam, preserve, and jelly production, per capita, 1948-53

Year	Per capita	
	Disposable personal income:	Jam, preserve, and jelly production
	Dollars	Pounds
1948	1,267	3.050
1949	1,238	2.978
1950	1,338	3.359
1951	1,438	3.371
1952	1,476	3.394
1953	1,546	3.656

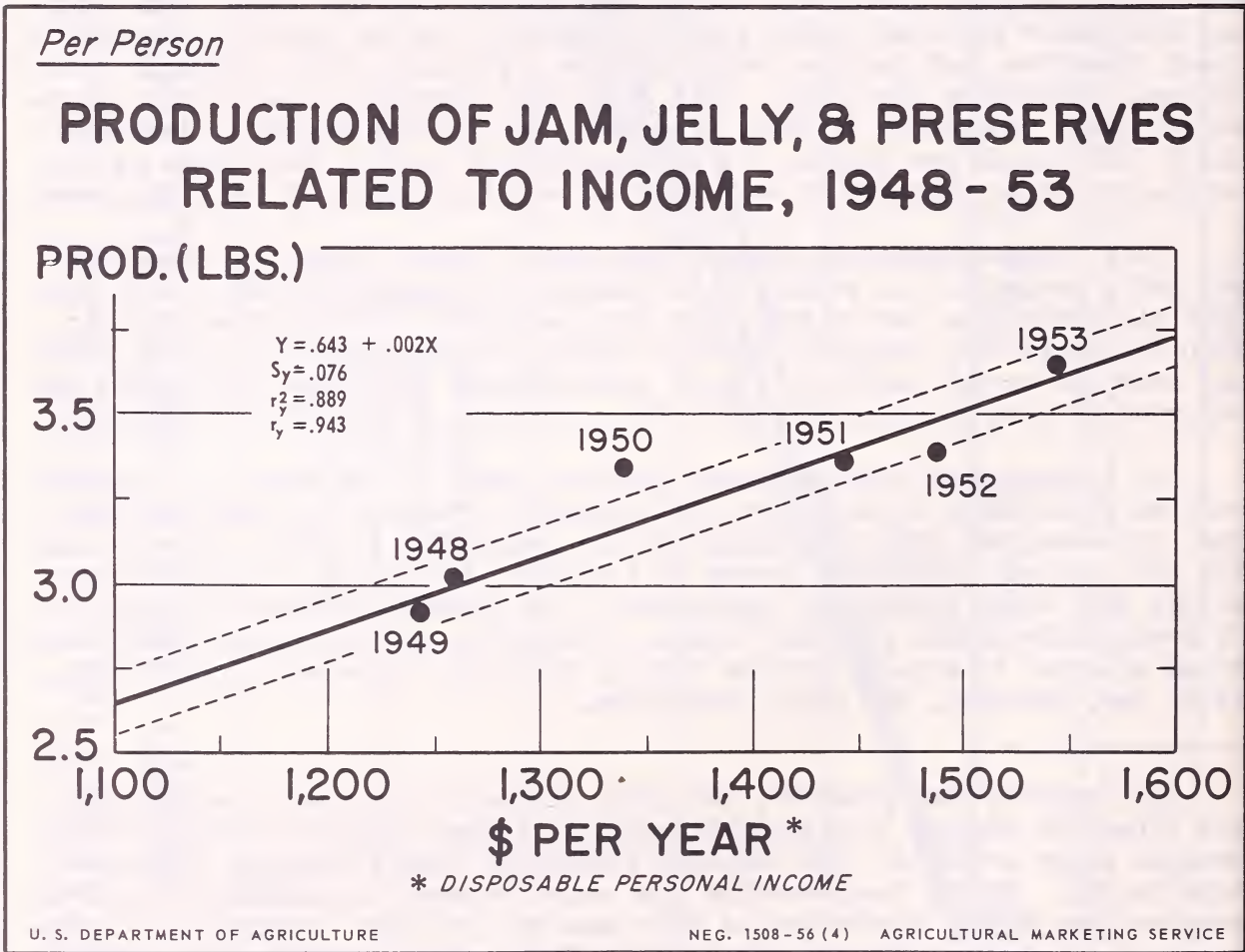


Figure 3

Industry's Promotional Activities

The National Preservers Association and other segments of the preserve industry are expressing active interest in developing promotion programs to increase sales of fruit jams, jellies, and preserves. Previous work on a limited scale has been conducted by individual firms to increase brand preference. Some industry efforts have been expended toward increasing the overall demand for these products.

Any promotional activities by the industry would be expected to aim at expanding the market in three areas: Substituting commercial products for home-produced jams, jellies, and preserves; increasing consumption of current users, and developing new consumers. Substitution of commercial preserves for homemade preserves would not increase total fruit use in these end products. However, it would be expected to substitute frozen and canned fruits and berries to a large extent for fresh fruits and berries.

Home Production and Consumer Purchase of Preserves

Only limited data are available as to home production of fruit preserves or the consumption of commercially manufactured items.

An indication of the extent of home preserving in 1947 is obtained from a USDA food consumption survey of urban housekeeping families of two or more persons. ^{8/} Table 11 shows the percentage of households reporting home production of jams, preserves, and jellies, and average quantities preserved per household during 1947 for all households in the survey and for households preserving. These data are broken down by income category, city size, and region. It must be noted, however, that the 1948 survey included no information as to production or purchase of these items by rural families.

It is evident that city size was a significant factor in the prevalence of home preserving during 1947--the larger the city of residence, the smaller the percentage of families making preserves. The percentage of families in cities of over 1 million population that produced preserves was only one-fourth as great as in cities of 2,500 to 10,000 population.

It is evident also that families with incomes under \$5,000 made more fruit preserves than families with higher incomes. Family units with incomes of more than \$7,500 made about one-third less fruit preserves than the average for all urban families. These figures were averages for all family units included in the sample, whether fruit preserves were made in the home or not.

^{8/} Clark, Faith, Murray, Janet, Weiss, G. S., and Grossman, Evelyn. Food Consumption of Urban Families in the United States...with an appraisal of methods of analysis. U. S. Dept. of Agr., Agr. Inform. Bul. 132, 203 pp., illus. October 1954.

Table 11.--Home production of jams, jellies, and preserves: Quantity per household and percentage of households preserving, urban families, by income, size of city, and region, 1947 ^{1/}

Income ^{2/} city size, and region	House- holds	Family size	Quantity per household		Percentage of house- holds reporting preserving
			All house- holds	Per house- hold preserving	
	<u>Number</u>	<u>Persons</u>	<u>Quarts</u>	<u>Quarts</u>	<u>Percent</u>
All incomes ^{2/}	1,446	3.29	3.6	12.9	27.8
Under \$1,000	53	2.41	4.0	11.2	35.8
\$1,000-\$1,999	204	2.81	2.3	10.6	22.1
\$2,000-\$2,999	410	3.22	4.1	13.4	30.7
\$3,000-\$3,999	351	3.46	3.5	13.4	26.5
\$4,000-\$4,999	167	3.52	5.1	17.5	29.3
\$5,000-\$7,499	154	3.59	3.2	10.9	29.2
\$7,500 and over ...	72	3.98	2.3	9.4	25.0
Not classified	35	3.51	1.2	6.2	19.4
<u>City size:</u>					
1 million and over...	302	(3)	1.3	12.4	10.6
250,000-999,999	251	(3)	2.1	8.9	23.4
50,000-249,999	296	(3)	3.3	13.2	25.3
10,000-49,999	382	(3)	5.3	14.0	38.0
2,500-9,999	215	(3)	5.8	13.6	42.3
<u>Region:</u>					
North and West	1,125	3.21	3.3	12.7	25.8
South	321	3.57	4.6	13.0	35.5

^{1/} Urban housekeeping families of two or more persons in the United States.

^{2/} 1947 family income (after Federal income taxes).

^{3/} Not available.

From data given in Agr. Inform. Bul. 132 (see footnote 8, page 23).

About 27.8 percent of all urban families made fruit jams, preserves, and jellies during 1947. Average production per family was 12.9 quarts, or about 38.7 pounds. ^{9/} This production was equivalent to 3.6 quarts, or 10.8 pounds, of fruit preserves for each urban family, whether or not engaged in preserving activities. For this population stratum, home production of preserves was equal to about 3.3 pounds per person.

The same USDA survey provides an indication of the size of the urban market for commercially produced jams and jellies. Table 12 shows the average quantity of purchased jams and jellies used during a single week in the period April-June 1948 by all urban households and the percentage of urban families using these products. During this period 41.3 percent of these urban families used jams and jellies produced commercially.

Table 12.--Purchased jams and jellies: Quantity used per household and percentage of urban households using, by income, in 1 week, spring (April-June) 1948 ^{1/}

Income ^{2/}	: Quantity of jams and :	
	: jellies used per	: Percentage of
	: household	: households
	<u>Pounds</u>	<u>Percent</u>
Under \$1,000.....	0.317	30.2
\$1,000-\$1,999.....	.335	30.9
\$2,000-\$2,999.....	.355	40.2
\$3,000-\$3,999.....	.424	47.0
\$4,000-\$4,999.....	.348	40.1
\$5,000-\$7,499.....	.396	46.1
\$7,500 and over.....	.512	52.8
Not classified.....	.340	39.5
All incomes.....	.376	41.3

^{1/} Urban housekeeping families of two or more persons.

^{2/} 1947 family income (after Federal income taxes).

Based on data given in Agr. Inform. Bul. 132 (see footnote 8, p. 23).

A definite relationship apparently exists between family income and the percentage of urban families purchasing jams and jellies. About 30 percent of the families with incomes of less than \$2,000 purchased these products, whereas over 52 percent of families with incomes over \$7,500 made such purchases. The average usage per family unit, during a 1-week period, also tended to increase with higher income levels. However, this was due, in part, to an increase in average family size with rises in income level.

^{9/} A #303 can contains 1 pound 8 ounces of jam.

During a single week in the spring of 1948 the average consumption of purchased jams and jellies by all urban family housekeeping units of two or more members (including users and nonusers) was estimated at 0.376 pounds, or about 0.114 pounds per family member. Since seasonal usage cannot be determined from this survey, caution must be used in attempting to expand these figures to a yearly basis. However, it would appear that use of commercially produced jams and jellies exceeds consumption of the home product by urban housekeeping families.

It is not known to what extent urban families who made fruit preserves also reported use of commercially produced jams and jellies. However, under the most extreme assumption that no duplication existed, it would appear that a sizable portion of urban families indicated neither home production during 1947 nor usage of purchased jams and jellies during a week in the spring of 1948. Under this assumption, the portion of urban families not using jams and jellies ranged from 22 percent in the highest income bracket to 47 percent in the \$1,000-\$2,000 level. About 31 percent of all urban families of two or more persons indicated neither home preserving nor usage of purchased products during the periods under study.

The data available do not reflect changes in urban family purchasing patterns or income status since 1948. ^{10/} However, they indicate that greater usage of the commercial product might be obtained from both users and nonusers. This market potential appears to include all income classes.

FRUIT PRODUCER'S STAKE IN INCREASING PRESERVE PRODUCTION

The fruit producer and the processor have a stake in increasing the overall market for fruit preserves. For every additional pound of jam and jelly produced, fruit requirements (fresh weight equivalent) will rise about one-half pound. Since 46 percent of all fruits and berries used in jams and jellies are obtained in frozen form, an average increase of 1 pound in the production of fruit preserves would result in a demand for 0.23 pound of frozen fruits, berries, and juices.

Information gathered in this study, together with official estimates of population and income trends, was used as a basis for estimating fruit usage in the commercial manufacture of jams, preserves, and jellies in 1975. A detailed report is found in the appendix.

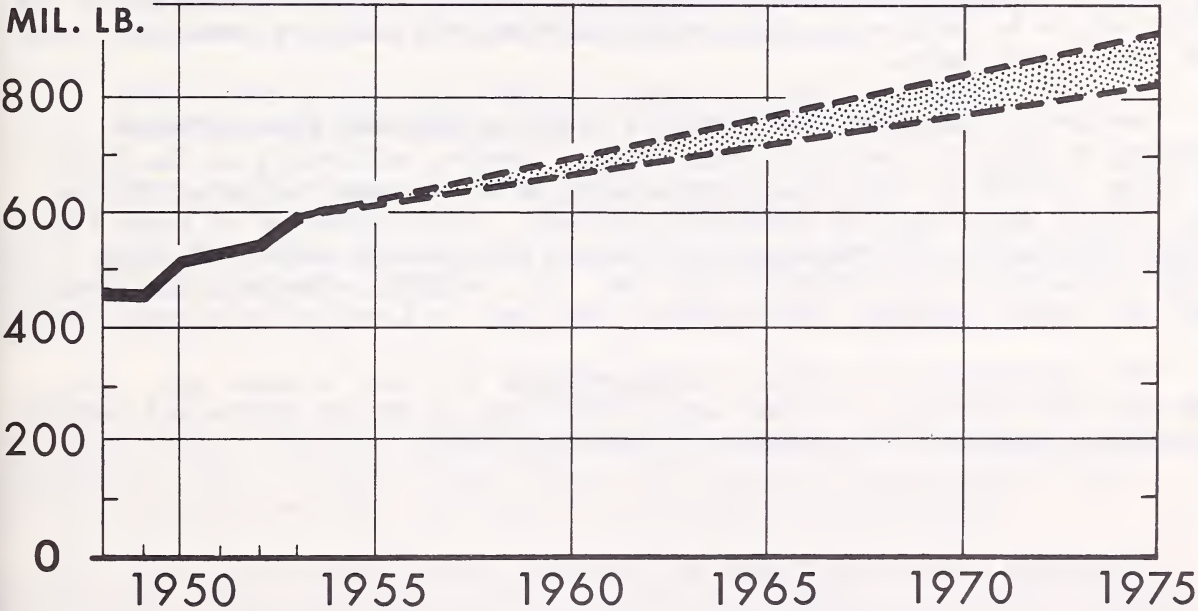
^{10/} The USDA food consumption survey for spring 1955, covering all urbanization groups, is now being prepared and should be available late in 1956.

If the considerations included in the hypothesis hold true, it is estimated that in 1975 total commercial production of jams, preserves, and jellies will range from about 825 million to 915 million pounds, or about 40 to 55 percent greater than production during 1953. This projection is shown in figure 4. The range in the projection arises primarily from the range in population estimates for 1975.

This volume of jam, preserve, and jelly production would require from 410 million to 460 million pounds of fruits (fresh weight equivalent), using present production techniques. If the relationship in volumes of fruits received in frozen form to quantities received in nonfrozen form remains the same, usage of frozen fruits in 1975 by the preserve industry should be between 190 and 210 million pounds. This usage would represent an increase from 1953 of about 50 to 70 million pounds of frozen fruits marketed through the preserve industry. Such increases would be equivalent to between 9 and 13 percent of the total 1953 commercial frozen fruit pack, excluding frozen citrus juice concentrates.

With Projections to 1975

COMMERCIAL JAM, PRESERVE AND JELLY PRODUCTION



DATA FOR 1948-53 FROM U. S. DEPARTMENT OF COMMERCE

Figure 4

PRESERVERS' SUGGESTIONS FOR IMPROVING FROZEN FRUIT PACK

In the questionnaire used in this study preservers were asked if there were any quality factors which limited their use of frozen fruits or juices during 1953. Also, space was provided for any suggestions or comments as to how frozen fruits and juices may be improved for use in preserve manufacturing.

Mail responses and personal interviews indicated that most preserve manufacturers had few suggestions to offer. Several preserve manufacturers commented that the level of quality currently maintained is better generally than that found in earlier periods, particularly during World War II. Other comments indicated that the preserve manufacturers have had time to learn which freezers provided satisfactory products and to choose their frozen fruit sources accordingly.

Oxidation of frozen fruits, particularly peaches and apricots, appears to be the major problem in using the frozen product. Oxidation or "browning" of the top layer of these fruits during the thawing process is a continuing problem and affects other users of frozen fruits, as well as the preserve industry. The importance of this quality factor in the marketing of frozen fruits was stressed by the fact that a number of firms actually reported limiting their purchases of frozen fruits because of oxidation problems.

Apricots and peaches were the commodities mentioned most often as requiring careful selection of mature fruits for freezing if satisfactory color and flavor are to be obtained. When buying berries, the industry wants firm berries and a clean pack.

Preservers indicated that benefits could be obtained from improved handling of sugar in packing frozen fruit. Greater uniformity in the fruit and sugar content of individual containers, with the same indicated fruit-sugar ratio, would aid the preserving process. Good agitation of sugar improves the quality of fruits and berries and reduces the amount of sugar sludge settling to the bottom of the can. If 30-pound containers are used again for other purposes, considerable labor may be involved in cleaning them.

The desirability of faster thawing methods was also pointed out. The time and space required to thaw large containers of frozen fruits and berries presented a problem to a number of preserving firms.

APPENDIX

Projected Fruit Usage in Commercial
Jams, Preserves, and Jellies in 1975

The development of a projection of fruit usage in the manufacture of jams, preserves, and jellies 11/ to 1975 provides a guideline for consideration of long-term demand for fruits and berries through this market outlet. It is not designed as a forecast, but rather as an estimate based upon a set of assumptions. Outside forces, either economic or noneconomic, may change fruit requirements of the preserving industry within the next 20 years.

The projection of fruit usage to 1975 by the preserving industry was predicated upon the following general assumptions:

1. Existence of a growing economy with a high level of employment.
2. An economy free of controls and restrictions associated with heavy mobilization or wartime conditions.
3. Costs and prices for fruits and jams, jellies, and preserves essentially unchanged relative to costs and prices for competing foodstuffs. Also, the relationships between market outlets for fruits remain relatively unchanged.
4. Prices for fruits and fruit preserves adequate to obtain necessary production expansion.
5. Past trends in eating habits will continue.

Such a projection also depends upon specific assumptions as to population and levels of real income in 1975.

Population

A population estimate of 214.6 million persons in 1975 is used in this projection. This is about midway between the range of projections, 206.9 and 228.5 million persons, developed by the Bureau of the Census.

The 228.5 million population estimate was predicated upon a continuance through 1975 of the rate of population growth in 1954-55. The lower estimate, 206.9 million, was based upon the assumption that the 1950-53 rate of population growth would decline linearly to prewar levels by 1975. Population growth through 1955 indicates that a choice of 214.6 million as the estimated population in 1975 would possibly be conservative.

11/ Excluding marmalades and fruit butters.

Real Income in 1975

A recent USDA report 12/ indicates the possibility that by 1975 there may be "an increase in real income per person of about two-thirds above the 1951-53 average." This estimate was based upon the projections that population would be about a third above the 1951-53 average, and that the economy would be producing about double the 1951-53 output of goods and services. According to this assumption, in 1975 an average family of 3.4 persons would be receiving a spendable income of almost \$8,500.

Relationship Between Family Income and Consumption

Commercially produced jams, preserves, and jellies are consumed in the home, in public eating places, and as ingredients in various bakery products. In addition to the customary use as fruit spreads, some of these preserves are used as pie fillings and toppings for sundaes. Thus, any estimate as to the effect of income change upon commercially produced jams, preserves, and jellies must take these several markets into consideration. An estimate of the effect of income change upon the retail outlet (home consumption) can be obtained in quantitative terms, whereas indicators only are available for the effect of income upon the institutional and bakery outlets.

Home Consumption

A recent USDA report 13/ provides a measure of the relationships between urban family income 14/ and purchases of jams, preserves, and jellies during 1 week in spring 1948. As shown in figures 5 and 6, urban families purchasing jams, preserves, and jellies tended to buy about the same amount of these products per family member, 15/ regardless of income level. Only in the lowest family income brackets, under \$2,000, was there any evidence of wide variation from this general level of consumption. However, the percentage of families in each income level which reported purchases of these products rose as family income increased. This trend appears to assume a curvilinear relationship with a decelerating rate of increase as income rises.

The average urban family, in the food consumption survey, consisted of about 3.4 members. The average income (based on national data on per capita disposable income) of a family of this size would have been about \$4,300 in 1948. Income projected to 1975 would be almost \$8,500. A comparison of

12/ U. S. Department of Agriculture. Long Range Prospects for Agriculture, Summary of report presented before the National Agricultural Credit Commission, Chicago, Illinois, June 6, 1955. (Mimeo.)

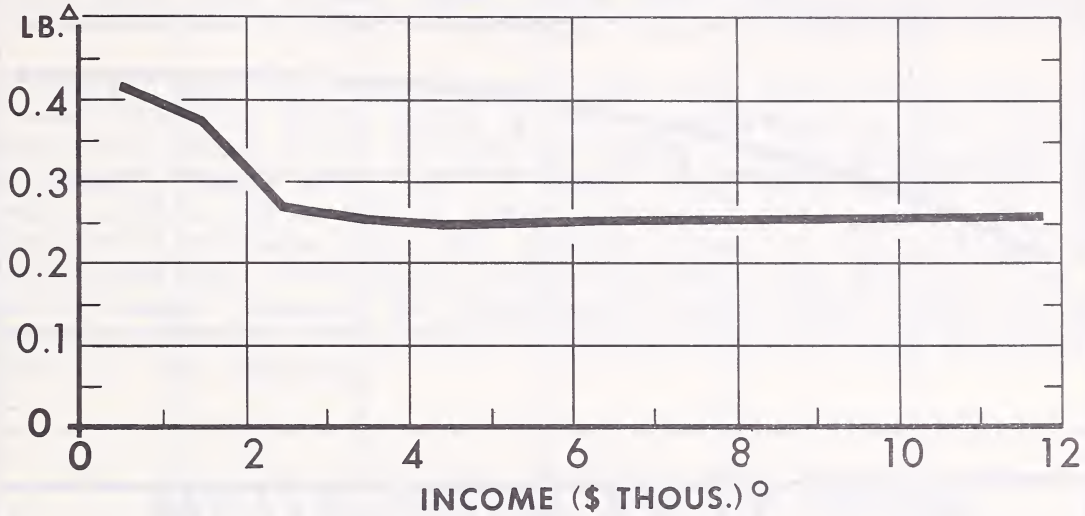
13/ Food Consumption of Urban Families in the United States. (See footnote 8, p. 23.)

14/ 1947 income after taxes.

15/ Change from household to per family member basis was made to adjust for differences in average family size at varying income levels.

JAM AND JELLY PURCHASES PER PERSON, BY INCOME CLASS

Urban Families *, Spring 1948



* FAMILIES REPORTING PURCHASES ONLY
Δ IN 1 WEEK, APR. - JUNE ○ 1947 FAMILY INCOME AFTER TAXES

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Figure 5

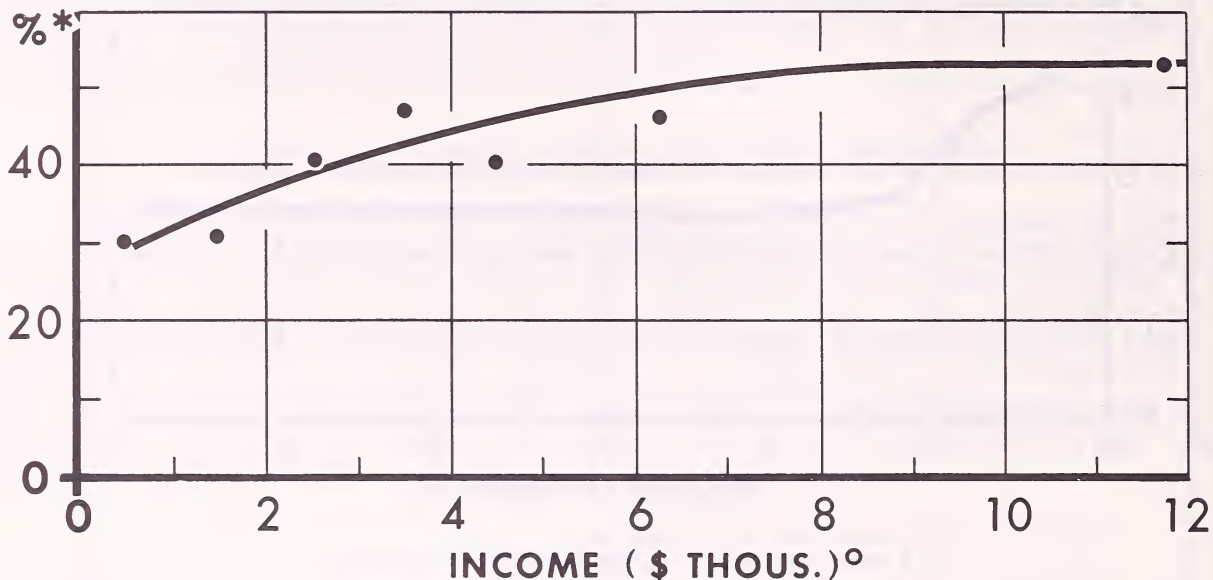
preserve purchasing patterns of urban families in these respective income levels during 1948 may provide an indicator as to the possible level of demand for these products in 1975. This bears the implicit assumption that families with incomes of \$8,500 in 1975, for example, would have the same preserve purchasing pattern as those of the same income level in 1948.

From interpolations on 1948 data in figures 5 and 6, it would appear that families with incomes of \$8,500 and \$4,300 that purchased jams or jellies tended to buy about the same quantity of these products per family member. However, during the period covered in the survey, about 52 percent of urban families with incomes of \$8,500 would have purchased jams or jellies, as compared with about 44 percent of families with incomes of \$4,300. Although only about 8 percent more families in the \$8,500 income level are estimated to have bought jam and jelly, these purchases would result in a greater percentage increase when purchases are measured on a per capita basis, since buying and nonbuying families are included.

In 1948, it is estimated that average jam and jelly purchases per member of all families with incomes of \$8,500 were about 19 percent higher than the purchases of families with incomes of \$4,300. If these basic relationships that prevailed in 1948 between consumption and family income continue

USE OF PURCHASED JAMS AND JELLIES, BY INCOME CLASS

Urban Families, Spring 1948



* PERCENTAGE OF FAMILIES PURCHASING, 1 WEEK, APR.-JUNE
○ 1947 FAMILY INCOME AFTER TAXES

U. S. DEPARTMENT OF AGRICULTURE

NEG. 4080-56 (4) AGRICULTURAL MARKETING SERVICE

Figure 6

throughout the period, it would appear that per capita consumption of commercially produced jams and jellies by urban families might be about 19 percent above the 1948 level.

This computation is based on the assumption that consumption of commercially produced jams, preserves, and jellies by families with average incomes would represent average consumption for all urban families. Although some deviations from this assumption will be found, it is believed that such variations would be of limited importance. A general upward shift in all family incomes, portrayed against the background of a decelerating rate of increasing consumption, would be expected to show a relatively greater increase in purchases by families in the lower percentiles of income distribution than would occur at average or higher income levels.

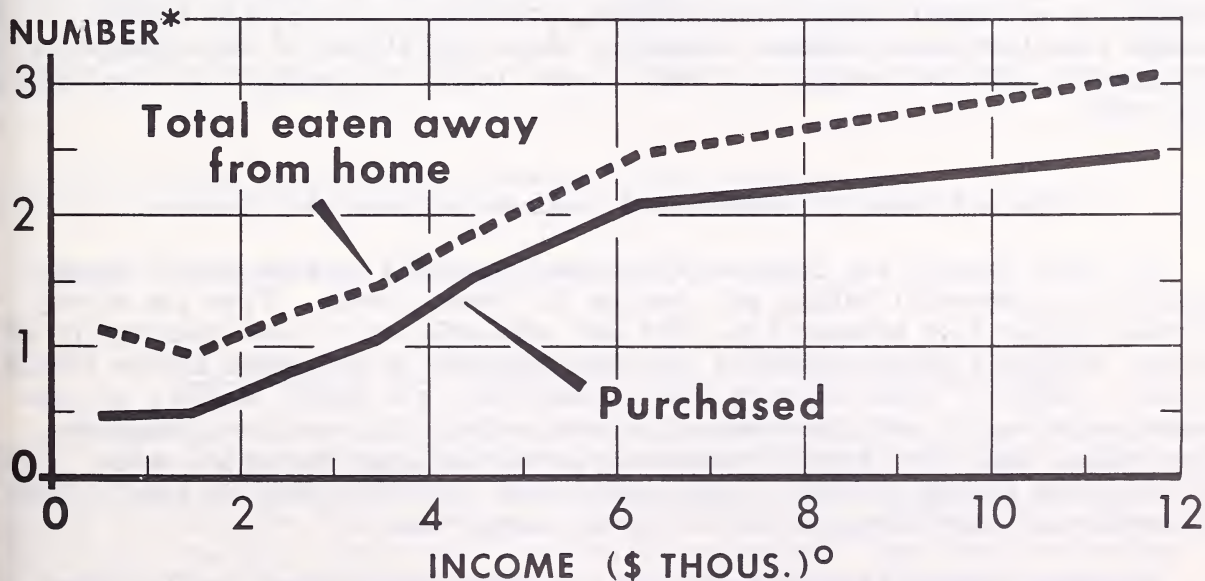
Consumption in Restaurants, Cafeterias, and Other Institutional Feeding Outlets

Little information is available as to the use of jams, preserves, and jellies in restaurants, cafeterias, and other institutional outlets. However, an indicator of the possible demand for these products in the institutional feeding market under varying income levels can be obtained from the USDA study on food consumption by urban housekeeping families during 1948.

Figure 7 shows the number of meals eaten away from home per family member in 1 week during the spring months of 1948 by urban families with different income levels (after tax). It shows the number of meals purchased and the total number of meals eaten away from home. Total meals include those received as gift or pay as well as meals purchased. It is apparent that total consumption of purchased meals will somewhat exceed the reported meals purchased because part of the meals received as gift or pay will have been purchased by others. However, the relationship between family income and meals reported as purchased will probably be representative of total purchased meals consumed by urban families.

MEALS EATEN AWAY FROM HOME, BY INCOME CLASS

Per Member of Urban Families, Spring 1948



* NUMBER OF MEALS, 1 WEEK, APR.-JUNE

○ 1947 FAMILY INCOME AFTER TAXES

Figure 7

Number of meals purchased was chosen for comparison with income levels, rather than dollars paid for meals or other measures, because it is believed that number of meals purchased has a relatively greater relationship to use of jams, preserves, or jellies by institutional feeding establishments.

Figure 7 indicates that there is an association between number of meals purchased per family member and family income level. The number of meals purchased increases as income rises, but the rate of increase decelerates as income rises.

If the assumption were made that these relationships between urban family income and purchases of meals away from home remain constant, an estimate of the effect of future family income changes can be obtained. In 1948, a family of average income would have been expected to purchase about 1.4 meals per family member in a week. If average family income had been about \$8,500, the average number of meals purchased would have risen to about 2.25 per week per family member. With almost a doubling of family income, an increase of about 60 percent in number of purchased meals per family member would have been expected. This is equivalent to the assumed situation in 1975.

If the usage pattern for jams, preserves, and jellies remains the same throughout the period, changes in quantities purchased by restaurants, cafeterias, or other institutional feeding establishments would be expected to change in direct relationship to the number of meals served.

An increase in the number of meals purchased should result in a corresponding decrease in the number of meals eaten at home. This substitution of food sources, however, should not affect the validity of estimates made as to consumption of commercially produced jams, preserves, and jellies either through retail or institutional channels, since the effect of this change in eating habits of families of different income levels is implicit in the basic data used.

Use of Jams, Preserves, and Jellies by Commercial Bakers

No clear measure was obtained as to relationships between use of these products in commercial baking and changes in income levels. From the survey of urban family food consumption, data are available as to home consumption of various purchased bakery products by urban families of different income levels in 1948. Table 13 shows average home consumption, per family member, of purchased cakes, pies, and other bakery products--including cookies, doughnuts, sweet rolls, buns, and sweet crackers--by urban families during a 1-week period in the spring of 1948. Jams, preserves, or jellies may be used in the manufacture of some items in each of these categories.

Apparently there is relatively little association between family income and the purchase of pies. A limited tendency is evidenced for cake purchases, per family member, to increase as income levels rise. Only in the "other bakery products" category does there appear to be a strong association between quantity purchased and level of family income. For these items, purchases

increase rapidly through the lower family income levels, up to \$4,000. As incomes rise above this level, however, relatively small increases appear to take place in quantities purchased.

There is no indication in any of these bakery goods categories as to the relative purchases of items containing jams, preserves, or jellies by families with different income levels. However, if purchases of items containing jams, preserves, or jellies approach the average for their respective bakery goods categories, it would appear that changes in family income level probably would have relatively little effect upon quantities of preserves purchased, particularly when average family incomes are \$4,000 or more. In such a case, the demand by the bakers' trade for fruit jams, preserves, or jellies would be expected to be affected more by changes in total population than from shifts in family income level.

Table 13.--Selected bakery products purchased: Average quantity used per member of urban housekeeping families, by income class, in 1 week, spring (April-June) 1948

Income ^{1/}	Selected bakery goods			
	Cake	Pie	Other ^{2/}	Total
	Pounds	Pounds	Pounds	Pounds
Under \$1,000.....	0.128	0.041	0.160	0.329
\$1,000-\$1,999.....	.173	.050	.179	.402
\$2,000-\$2,999.....	.130	.050	.237	.417
\$3,000-\$3,999.....	.156	.043	.241	.440
\$4,000-\$4,999.....	.147	.032	.260	.439
\$5,000-\$7,499.....	.121	.069	.276	.466
\$7,500 and over.....	.166	.031	.213	.410

^{1/} 1947 family income (after Federal income taxes).

^{2/} Includes cookies, doughnuts, sweet rolls, buns, and sweet crackers.

From Agr. Inform. Bul. 132 (see footnote 8, p. 23).

Estimated Overall Demand for Jams, Preserves, and Jellies

An estimate of overall future demand for commercially produced jams, preserves, and jellies must be based upon movements through each major outlet--retail, institutional, and food manufacturing. With increases in national income, the relative increase in marketings of these products through the institutional feeding outlet may be considerably greater than those occurring in the retail or bakery trade outlets. Increases in family income levels probably will have more effect in increasing demand for those items used in the home than those used in the bakery industry.

Limited information is available as to relative volumes of jams, preserves, and jellies moving through the retail, institutional, and food

manufacturing channels. A breakdown of the preserve pack by size and type of containers provides an intimation as to the probable distribution pattern. Preserves packed in glass containers of 1 pound or less are generally marketed through retail channels. Preserves packed in larger sizes or other types of containers are destined usually for food manufacturing or institutional outlets (including military).

During the years 1950-53 a declining portion of the total jam, preserve, and jelly pack was packed in glass containers of 1 pound or less. In 1950, this portion was about 73 percent of the total. By 1953 it had dropped to about 64 percent. This decline would indicate that the institutional and food manufacturing outlets have been increasing in importance relative to the retail market. Increases in quantities of preserves packed for the institutional and food manufacturing markets accounted for a sizable portion of the total production increases taking place during this period.

The unknown quantity of jams, preserves, and jellies used in food manufacturing is probably affected less by income changes than the quantities used for other purposes. This unknown quantity was compensated for by assuming that about 75 percent of commercially produced jams, preserves, and jellies would be affected by changes in income level in a way similar to that estimated for use of these products by urban households (retail channel). The remaining 25 percent was assumed to have an income relationship approaching that estimated for the use of these products in restaurants and other feeding establishments.

Per capita consumption of purchased jams and jellies by urban families in 1975 may be about 19 percent above 1948 levels. Use of these products in restaurants and other feeding establishments may be about 60 percent greater by 1975 (on a per capita basis). Therefore, an application of the above weights would indicate the possibility that per capita consumption of these items through all channels in 1975 may be about 30 percent higher than in 1948.

Estimated Consumption in 1975

In 1948 total commercial jam and jelly production (and consumption) was about 3.05 pounds per person. By 1975, per capita consumption would be expected to rise about 30 percent, or to about 4 pounds per person, if the projected relationships continue throughout the period. An estimated population of 214.6 million in 1975 indicates a demand for about 860 million pounds of commercially produced jams, preserves, and jellies in 1975. If the 1975 population is as high as 228.5 million, this would project a production of about 915 million pounds. Should the rate of population increase slacken and a population as low as 206.9 million be attained, a jam, preserve, and jelly pack of about 825 million pounds would be expected. Considering the rate of population growth through 1955, a projection of preserve production based upon a population of 214.6 million would appear conservative.

Fruit Requirements for Projected 1975 Production

If the fresh weight of fruits used in jam, preserve, and jelly production continues to approximate 0.5 pounds to each pound of finished product, total fruit requirements in 1975 would range between 412.5 and 457.5 million pounds, depending upon population estimates used. If estimate is based upon a population of 214.6 million, requirements would be about 430 million pounds.

Likewise, if frozen fruits continue at the 1953 level of usage, when they constituted about 46 percent of fruits and berries used, between 190 and 210 million pounds of fruits and berries would be frozen for use in the manufacture of jams, preserves, and jellies. This quantity would represent an increase from 1953 of about 50 to 70 million pounds. Such an increase in frozen fruit requirements would be equivalent to between 9 and 13 percent of the total 1953 commercial frozen fruit pack, excluding frozen citrus juice concentrates.

Comparison of Short-Range and Long-Range Effects of Increasing Income Upon Consumption

Under the assumptions made, the estimated increase of 30 percent in per capita consumption of commercially produced jams, preserves, and jellies between 1948 and 1975 would be associated with a projected change in per capita disposable income from \$1,267 to \$2,449. This association would not be expected to take the form of a uniform relationship, however. If the projected income rise were to occur at a steady rate throughout the period, a proportionately larger segment of the total increase in per capita consumption of jams, preserves, and jellies would be expected during the earlier years. The impact of income upon consumption would be expected to decelerate throughout the period in a curvilinear relationship.

The effect of income changes were estimated for 1948-53 as well as for 1948-75 so that estimates of the short-range and long-range effects of higher family incomes upon consumption of these products could be compared. This comparison was developed through measures of elasticity implied from income and consumption projections. Indicated income-consumption relationships for 1948 are assumed to remain constant throughout both the 1948-53 and 1948-75 periods.

The estimated income elasticity ^{16/} for overall purchases of jam, preserves, and jelly by urban families for 1948-53 was about 0.475, compared with 0.30 for 1948-75. The estimated income elasticity for consumption through the institutional outlet only for 1948-53 was about 1.10, whereas for the longer term it drops to around 0.60. Although income elasticities were not developed for use of preserves in the bakery trade, it would appear that as families move from lower income brackets their increasing purchases

^{16/} Income elasticity is the ratio of percentage change in consumption to percentage change in income.

of such bakery products would not keep pace percentagewise with their rise in income.

Evaluation of Projected Consumption

The estimated consumption in 1975 of between 825 and 915 million pounds of commercially produced jams, preserves, and jellies may be conservative. As mentioned earlier, if population growth continues at the present rate, the 1975 population would be expected to be found in the upper portion of the projected population range. Also, the estimated 30-percent increase in per capita demand resulting from rising family incomes may be a conservative evaluation.

Under the assumptions used, it was estimated from budget data that the income elasticity for jams, preserves, and jellies for 1948-53 would have been about 0.475. However, the income elasticity developed from actual production data for the period was considerably higher--about 0.88. ^{17/} A part of this difference may be ascribed to conservative estimates of the portion of the preserve pack moving into the institutional outlet.

Other changes in the consumption pattern, which are not subject to measure from data available, may have accounted for increasing consumption during 1948-53. During these years, there has been a general trend toward more marketing services that improve the quality and attractiveness of the food and save the housewife time in preparing it. Because of this trend, commercially produced jams, preserves, and jellies may have been substituted for some home-preserved jams and jellies.

The increasing portion of the total population living in large cities would be expected to affect the home production of jams and jellies, since the percentage of families engaged in such activities drops rapidly as the size of the city of residence increases. To the extent that such substitution took place during the 1948-53 period, the full impact of the change would be registered within this period. Future use of commercial preserves by families that have already shifted from home preserving to the use of the commercial product might be expected to remain relatively stable.

One of the basic assumptions made was that current trends in food consumption were expected to continue throughout the period of the projections. However, there are many changes occurring which may be expected to be reflected in preserve purchasing patterns. Changes in the composition and age structure of the population, the make-up of the labor force, the extent of public eating facilities, and changes in home meal preparation methods are only a few of the many factors which may be expected to have an effect upon

^{17/} Based on examples given by Lawrence R. Klein, in "A Textbook of Econometrics," 1953, pp. 211-225, coefficients derived from budget data would be expected to differ from comparable coefficients derived from time series data, with the difference depending on the particular way in which the data were generated.

the quantities of commercially produced preserves that will be consumed during the next 20 years. Preserves, jams, and jellies account for a small portion of the consumer's food dollar. A small change in general food consumption patterns could cause sizable changes in the demand for these products.

Table 14.--Estimated composition of commercial jam, preserve, and jelly pack, by regions, 1949-53

Year and item	Region				
	North- east	North Central	South	West	United States
<u>1953</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Jams and Preserves:					
Strawberry	33.0	31.3	27.2	33.1	31.5
Red raspberry	9.3	6.8	1.7	4.2	6.3
Grape	15.6	18.1	12.9	5.2	14.2
Peach	7.2	9.5	18.1	6.7	9.6
Cherry	4.8	4.5	4.4	3.2	4.3
Blackberry 1/.....	5.4	6.1	13.7	11.2	8.0
Other	24.7	23.7	22.0	36.4	26.1
Total	100.0	100.0	100.0	100.0	100.0
Jellies:					
Grape	32.1	33.8	19.1	27.7	28.9
Apple	9.3	8.3	46.2	12.2	18.5
Apple mixture	28.5	18.2	17.6	15.7	22.0
Currant	4.6	4.4	0.6	5.9	3.7
Crabapple	3.9	5.6	0.9	2.5	3.4
Blackberry 1/.....	2.8	8.2	8.5	13.9	6.6
Other	18.8	21.5	7.1	21.9	16.9
Total	100.0	100.0	100.0	100.0	100.0

Continued

See footnote at end of table.

Table 14.--Estimated composition of commercial jam, preserve, and jelly pack, by regions, 1949-53--continued

Year and item	Region				
	North- east	North Central	South	West	United States
<u>1952</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Jams and Preserves:					
Strawberry	29.9	29.4	25.5	40.3	30.4
Red raspberry	11.2	6.7	2.1	4.9	7.2
Grape.....	15.8	17.0	13.6	8.5	14.8
Peach	8.0	9.4	16.2	6.2	9.6
Cherry	5.7	6.0	5.4	4.6	5.6
Blackberry <u>1/</u>	5.1	5.4	13.0	12.2	7.6
Other	24.3	26.1	24.2	23.3	24.8
Total	100.0	100.0	100.0	100.0	100.0
Jellies:					
Grape	30.4	27.9	20.5	20.9	26.5
Apple	11.5	8.6	46.4	9.7	19.6
Apple mixture	28.5	21.9	17.4	23.9	23.8
Currant	5.1	5.1	1.1	6.6	4.2
Crabapple	4.5	7.5	0.8	3.4	4.2
Blackberry <u>1/</u>	3.6	7.9	6.9	15.9	6.4
Other	16.4	21.1	6.9	19.6	15.3
Total	100.0	100.0	100.0	100.0	100.0

Continued

See footnote at end of table.

Table 14.--Estimated composition of commercial jam, preserve, and jelly pack, by regions, 1949-53--continued

Year and item	Region				
	North- east	North Central	South	West	United States
<u>1951</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Jams and Preserves:					
Strawberry	26.1	32.5	30.7	33.5	30.5
Red raspberry	10.5	6.6	3.2	5.7	7.1
Grape	20.9	18.0	15.0	7.4	16.0
Peach	7.5	8.7	12.7	12.8	9.8
Cherry	6.2	6.6	6.9	3.9	5.9
Blackberry 1/	4.3	4.8	11.7	10.8	7.1
Other	24.5	22.8	19.8	25.9	23.6
Total	100.0	100.0	100.0	100.0	100.0
Jellies:					
Grape	32.6	28.7	24.8	31.1	30.0
Apple	12.0	9.4	42.2	10.0	18.2
Apple mixture	27.7	18.2	16.7	16.4	21.9
Currant	4.8	5.2	1.2	5.9	4.2
Crabapple	4.9	6.9	1.2	2.6	4.1
Blackberry 1/	2.1	8.1	4.7	12.6	5.2
Other	15.9	23.5	9.2	21.4	16.4
Total	100.0	100.0	100.0	100.0	100.0

Continued

See footnote at end of table.

Table 14.--Estimated composition of commercial jam, preserve, and jelly pack, by regions, 1949-53--continued

Year and item	Region				
	North- east	North Central	South	West	United States
1950	Percent	Percent	Percent	Percent	Percent
Jams and Preserves:					
Strawberry	25.3	24.3	27.1	35.1	27.4
Red raspberry	11.9	9.4	4.5	6.7	8.9
Grape	19.2	18.4	13.1	6.6	15.3
Peach	8.5	11.2	14.1	10.5	10.6
Cherry	5.7	5.6	7.4	3.6	5.5
Blackberry 1/.....	6.1	6.9	13.0	11.3	8.5
Other	23.3	24.2	20.8	26.2	23.8
Total	100.0	100.0	100.0	100.0	100.0
Jellies:					
Grape	29.8	29.5	23.1	35.4	29.0
Apple	18.8	10.6	41.7	9.7	21.4
Apple mixture	24.6	16.2	16.1	12.9	19.9
Currant	4.9	5.8	1.0	6.1	4.3
Crabapple	4.7	7.6	1.1	2.8	4.2
Blackberry 1/.....	1.9	8.6	5.6	10.9	4.9
Other	15.3	21.7	11.4	22.2	16.3
Total	100.0	100.0	100.0	100.0	100.0

Continued

See footnote at end of table.

Table 14.--Estimated composition of commercial jam, preserve, and jelly pack, by regions, 1949-53--continued

Year and item	Region				
	North- east	North Central	South	West	United States
<u>1949</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Jams and Preserves:					
Strawberry	31.4	22.1	32.2	34.1	29.2
Red raspberry	13.7	9.4	3.4	10.9	10.6
Grape	16.3	19.6	16.5	5.9	15.4
Peach	7.8	12.3	13.2	8.4	9.9
Cherry	5.7	5.8	7.4	4.1	5.7
Blackberry ^{1/}	5.8	8.7	11.6	14.1	8.9
Other	19.3	22.1	15.7	22.5	20.3
Total	100.0	100.0	100.0	100.0	100.0
Jellies:					
Grape	27.3	32.6	28.1	29.1	28.7
Apple	16.3	8.9	41.7	8.1	19.7
Apple mixture	21.7	17.9	17.1	13.2	19.1
Currant	6.4	4.3	0.6	6.2	4.7
Crabapple	4.9	4.6	0.9	3.3	3.8
Blackberry ^{1/}	2.9	11.1	5.6	16.4	6.4
Other	20.5	20.6	6.0	23.7	17.6
Total	100.0	100.0	100.0	100.0	100.0

^{1/} Includes dewberry, loganberry, boysenberry, and youngberry.

Based upon U. S. Department of Commerce Fruit Spread reports.

