CONSUMER ATTITUDES AND BEHAVIOR TOWARD FROZEN MEATS

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CONSUMER ATTITUDES AND BEHAVIOR TOWARD FROZEN MEATS

By

Glen Willis Higgins

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Submitted to the College of Agriculture
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AN ABSTRACT

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ABSTRACT

This study was an attempt to determine some of the behavior patterns and attitudes of consumers toward frozen meats. Some persons believe that distribution of frozen meats from the packer to the consumer could result in economies in the meat industry and a reduction in the costs of marketing meat. However, consumers have been reluctant to accept frozen meats as perfect substitutes for fresh meats.

Taste panel palatability tests indicated no significant difference between fresh and fresh frozen pork loin roasts and beef rib roasts. However, significant palatability differences in favor of the fresh roasts were noted between fresh beef rib roasts and [illegible] frozen beef rib roasts with six months shelf life.

Additional taste panel tests were conducted using pork loin roasts and beef rib roasts which had been stored for varying periods up to six months. Half the roasts were stored at 0° F. and the other half were stored in an open top frozen food display case. There were no significant differences in the palatability ratings because of freezing or by storage periods up to six months either at 0° F. or in the frozen food display case.

As another part of this study, a personal interview survey of 436 households in five Detroit suburban cities was made in an effort to determine the purchase experience and home storage habits of consumers with respect to frozen meats.

More than 55 percent of the households surveyed shopped for meat only once a week and more than 85 percent purchased meat only on

major shopping trips. This purchase pattern is closely related to the practice of purchasing fresh meat and then storing it in the home refrigerator frozen food storage space. Within two months prior to the survey, 82 percent of the households reported following this practice. Eighty percent of these reported that this meat was stored for less than two weeks.

These findings point out that consumers do not object strongly to frozen meats as such when they are purchased fresh and then frozen in the home. This also indicates that the shortage of frozen storage space in the home is not a severely limiting factor in frozen meat sales.

Fifty-five percent of the households had never purchased any frozen steaks, roasts, or chops. For individual items of the heavier frozen red meats, the proportion of households which had never purchased exceeded 75 percent.

Those consumers who had tried frozen steaks, roasts, or chops were asked to compare these with fresh cuts of comparable quality on four factors: Flavor; tenderness; cost per serving; and convenience in preparation. Fresh meat had a relatively higher preference rating on flavor and cost per serving while frozen meats were rated highest on convenience in preparation. Ratings on tenderness were nearly evenly divided.

Convenience was the principal advantage which consumers associated with frozen meats although the inconvenience of thawing was an important disadvantage given by consumers. Other objections to frozen meats included poor quality, packaging, and price.

It seems clear that many consumers have not tried frozen meats because of imagined differences in quality. It is also evident that

many consumers do not now purchase frozen meats because of meal experiences with unsatisfactory frozen meats.

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CHAPTER I

INTRODUCTION

The Situation

The concept of food retailing was changed drastically with the introduction of the self-service supermarket in the 1930's. The self-service food store has become more and more a distribution outlet for merchandise that has been processed and packaged at a central location. Grocery items are now almost entirely processed and packaged in centralized plants.

Exceptions to this retailing pattern are notable in the perishable commodities. However, the trend to more centralized packaged seems to be continuing. More and more dairy products are packaged and ready for sale when they arrive at the retail store. More and more produce items, such as apples and oranges, are being packaged in consumer units before shipment to the retail store.

Centralized packaging of cured and processed meats has gained acceptance and is proving very popular with retailers as well as consumers. In most cases, however, experiments in centralized prepackaging of fresh meats have not been successful. Without a careful control of inventory, the spoilage losses more than offset gains in efficiency. The meat industry has looked to technology to find a solution to this problem.

Frozen meats.--Several technological processes have been and are being considered as means of making centralized red meat processing

and packaging possible. Of these, freezing is considered to have the most potential for commercial application at this time.

Many people claim that frozen meat processing and distribution will have many economic advantages for the retailer as well as the entire meat industry. Toothman has summarized the economic advantages claimed for frozen meats as follows:

> 1. Increasing labor productivity in fresh meat preparation through greater mechanization of fabricating and packaging work.
>
> 2. Retaining at the point of slaughter and converting into by-products the excess of fat and bone (about 40 percent by weight) of the dressed carcass that now goes to retail stores and homes.
>
> 3. Realizing the transportation economies resulting from the reduction of shipping weight and bulk.
>
> 4. Eliminating the cost of providing meat processing equipment and space at the retail level.
>
> 5. Eliminating the losses sustained from fresh meat shrinkage, downgrading and spoilage.
>
> 6. Lowering physical handling costs in distribution activities.[1]

It should not be inferred that all costs will be reduced. Some costs, such as packaging materials, may be higher than for marketing fresh meat. The transportation economies mentioned above may be offset by the added cost of zero degree storage requirements. In addition, there may be added costs which represent new services to consumers, such as precooking and breading.

Retail savings.--For the retail food store, the meat department represents the largest operating expense item of the store because of the necessity of having a "small" meat fabricating plant in each

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[1]James S. Toothman, Survey of Distribution Practices for Prepackaged Frozen Meats, Market Research Report No. 137, U.S.D.A., Agricultural Marketing Service, September, 1956, pp. 22-23.

store. High wages of the skilled meat department workers contribute to this high expense. For this reason retailers are interested in any possibility for shifting meat packaging to a centralized plant and thus reducing the cost of the retailing operation.

By a budgeting procedure, Ezzell estimated a 50 percent saving in total meat retailing costs by shifting completely to frozen meats. As a further breakdown, he estimated that at least 60 percent of the labor costs of retailing meats and 55 percent of total space costs may be saved. There would be no costs to the retailer of preparation and wrapping supplies and a savings of 90 percent of preparation and storage space costs would result.[2] These estimated savings, of course, apply only to the cost of retailing meat.

The same functions of fabricating and packaging meats into consumer units which are eliminated from the retail store would have to be performed at a centralized plant with added labor, equipment, space, and materials cost at this point. The net cost as a result of this shifting of functions has not been determined.

One intregrated multi-unit retailer who processes and packages all meats at a central location is using the freezing process. All red meat is sold in frozen form and frozen meats account for 25 percent of store sales in his large supermarket.[3] The meat is processed and frozen with the bone-in and is packaged in a wax coating. This retailer gives these advantages for frozen meat distribution:

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[2]Austin B. Ezzell, Some Economic Impacts of Frozen Meats on Meats Retailing, unpublished M.S. thesis, Michigan State University, 1956, pp. 99-101.

[3]Progressive Grocer, March 1956, pp. 57-59.

1. Lower than normal labor expense.
2. No packaging material cost at retail level.
3. Lower labor turnover in the meat department.
4. Reduced shrinkage, spoilage, markdowns.
5. Eliminates errors in weighing and processing.
6. Retail cuts are standardized.
7. Longer shelf life.
8. More cuts on display.
9. Full display all week.
10. Higher meat sales per customer.
11. Simplified record keeping.
12. Ordering is facilitated.
13. Stocking and displaying is made easier.
14. Meat department appears cleaner, more sanitary.
15. Reduces meat department accidents in stores.[4]

This retailer provides a complete line of frozen meat to many small stores who previously did not handle meat. The smaller retail food store would seem to have a special advantage in handling frozen meat by being able to handle and display a complete selection, even though volume and turnover are small.

Consumer reaction.--Regardless of the advantages claimed for frozen meat, there is considerable evidence indicating that most consumers are reluctant to accept frozen red meats as perfect substitutes for comparable fresh cuts. In 1955 Riley and Kramer[5] found in a study of 4,000 households in two Michigan cities that nine out of ten homemakers said that they preferred fresh beef over comparable frozen items. Although the principal disadvantage given for frozen meats was the time required for defrosting before cooking, 37 percent of the consumers listed poor flavor and/or inferior quality as reasons why they disliked frozen meats. This can be contrasted to 3

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[4] Ibid, p. 59.

[5] H. M. Riley and R. C. Kramer, What Consumers are Saying About Prepackaged Fresh and Frozen Meats, Special Bulletin 406, Agricultural Experiment Station, Michigan State University, East Lansing, December, 1955.

percent who gave better flavor or quality as a reason for purchasing frozen meats. There was no attempt in that study to determine whether this preference was based on "real" or "imagined" differences between these two commodities.

It seems safe to say that some of the reluctance to accept frozen meat as comparable to fresh is the result of "real" experiences with frozen meat of inferior quality. In the 1955 study quoted above, only 17 percent of the home freezer owners expressed a preference for frozen meat over a comparable fresh cut. As will be shown in this thesis, many consumers have had unpleasant experiences with frozen meats and therefore are not frequent purchasers of meat in the frozen form. More significant is the fact that many consumers have never purchased and tried frozen meat items.

Retail sales of frozen meat.--Sales of frozen meats in retail stores have been disappointing to many in the meat industry, probably as a result of consumer reluctance. Sales responses have been below even many of the conservative estimates of three to five years ago. In 1955, industry leaders' predictions for frozen meats were ranging from 12 to 50 percent of total meat sales within five years.[6] In 1954 frozen meats, including poultry, fish, and red meats, made up only 5 percent of total chain store meat sales.[7] This figure has not increased appreciably, if any, in the years up to and including 1957.[8]

One report based on a survey of 21 food chains shows that the sales of frozen red meats (excluding poultry, seafood and meat pies)

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[6]Ezzell, op. cit., p.21. [7]Riley and Kramer, op. cit., p. 14.

[8]Estimate derived from information appearing in Chain Store Age, "1958 Frozen Food Merchandising," April 1958, p. 125.

averaged $45 per week per store in 1957. This is based on a $15,530 average weekly total store volume, and frozen meats accounted for .289 percent of total store sales. The figures for a year earlier indicate frozen meat accounted for $41 per week per store based on an average weekly total store volume of $13,800.[9] Frozen meats then accounted for an average of .297 percent of total sales per store in 1956 for the group of reporting companies.

Trade sources estimated that the production of quick frozen meat was 250 million pounds in 1955 and reached 325 million pounds in 1956.[10] On equivalent retail weight, the 1955 figure for frozen meats represented only little more than one percent of the total red meat production.[11]

Table 1 gives a comparison of frozen red meat production from 1946 to 1956. These figures represent only red meat and do not include meat that locker plants, freezer provisioners, or supermarkets freeze and sell directly to consumers for storage in rented frozen food lockers or home freezers.

At the present time, there seems to be much doubt about the future possibilities of frozen red meats. Armour and Company has discontinued production of all consumer sized frozen red meat items and Swift and Company has reduced the number of items in its frozen red meat line.[12]

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[9] Ibid.

[10] Frozen Food Factbook, 1957-58, National Frozen Food Distributors Association, New York, p. 49.

[11] The Outlook for Frozen Foods, Agricultural Marketing Service Report 154, U.S.D.A. Washington, D.C., November 1956, p. 7.

[12] Supermarket News, July 14, 1958, p. 1.

This is taking place at the same time that sales of frozen specialty meat products are increasing.

TABLE 1.--Production of frozen red meats in the United States

Year	Million Pounds
1946	20
1947	15
1948	25
1949	27
1950	35
1951	55
1952	80
1953	125
1954	175
1955	250
1956	325

Source: Frozen Food Factbook, 1957-58, National Frozen Food Distributors Association.

Some chain store divisions are discontinuing the sale of frozen red meats and other chain food companies are replacing packers' brands with their own frozen red meat on an experimental basis.[13] Other tests are being conducted with different types of packaging for frozen red meat.

Yet one independent retailer found that his own line of frozen meat gained excellent consumer acceptance as well as enabling his store to carry a more complete line of red meats. Within one year, frozen meats accounted for more than 10 percent of the store's meat volume.[14]

The uncertainty in the meat industry of the future of frozen red meats makes this study particularly appropriate.

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[13] Ibid, December 16, 1957, p.1. [14] Ibid, August 11, 1958, p. 28.

Objectives of the Study

There are many problems existing in the distribution of frozen meats. It is the objective of this study to investigate some of the problems which the author believes are associated with the future expansion of frozen red meat sales.

Taste preferences.--Although most consumers express a preference for fresh meat over comparable cuts of frozen meat, it is not known if this difference exists because of a recognizable palatability difference. An objective of this study was to determine if significant palatability differences exist between fresh and frozen meat. Consumer taste panels were established to get palatability ratings of fresh and frozen pork loin roasts and beef rib roasts.

Notable among other variables which are believed to affect palatability of frozen meat at the consumer level are the length of time of frozen storage, condition of the frozen storage, packaging, and the processing itself. It was also the objective of this study to determine the effect of the two variables concerning the length of time and condition of frozen storage upon the palatability of frozen meats.

Purchase patterns.--At the same time that the investigation was done concerning consumer attitudes, further questions were asked to determine the extent to which consumers have had experience with frozen meats. Meat shopping habits were also studied as they relate to frozen food storage in the home. Consumers were also asked to compare frozen red meats with fresh meats with regard to flavor, tenderness, cost, and convenience. In addition, purchase patterns for specific meat items were studied.

Usefulness of this Study

The study should be of interest to all persons concerned with the frozen meat industry. The palatability tests with beef and pork roasts may be used as guides for further research on palatability of frozen meats with different histories of storage and handling conditions. This study combined with findings of the United States Department of Agriculture's time-temperature tolerance studies should provide educational information for all persons who handle or distribute frozen meats from the packer to the ultimate consumer.

The purchase patterns for specific frozen meat items will be interesting not only to the packers of these lines but to the retail food store operator who must plan his merchandising activities around fast-moving items. Consumer attitudes toward frozen meats in general should be looked at by all segments of the frozen meat industry.

The consumer will make the final decision if the meat industry is ever to realize the economies which may exist in frozen meat distribution. Realizing this, the attitudes, desires, and needs of consumers must be kept continually in mind as frozen meat products, packages, and distribution and merchandising activities are planned, developed, and carried out.

CHAPTER II

PILOT TASTE PANEL STUDY

This chapter describes the initial palatability test and reports the results of that study. This taste panel study was set up to determine if significant palatability differences existed between fresh and fresh frozen pork loin roasts because of freezing. Commercially frozen beef rib roasts were also tested against fresh roasts by this panel.

Panel Procedure

Make-up of panel.--This taste panel of 18 women was recruited from the Michigan State University married housing area. The women were primarily wives of students and because they were asked to come to a campus location for the test, they were given a small remuneration for participation. The panel members were not given any information about the test until all testing was completed. No attempt was made to get information, such as income level, age, etc. about the members of this panel.

Because the emphasis of the test was on "consumer" acceptance of frozen meats, the consumer or non-expert panel was used instead of a trained or professional panel.

When and where conducted.--Four different taste panel sessions were conducted with the same members. These sessions were conducted on successive Tuesdays, beginning on April 23, 1957. The preparation and testing of the roasts were done in the Meats Laboratory at

Michigan State University. The first two sessions were tests of pork loin roasts and the last two were tests of commercially frozen beef rib roasts and fresh beef rib roasts acquired from a local supermarket.

Rating used.--The panel participants were asked to rate four cooked meat samples, using the Hedonic Scale (see appendix illustration 1). This scale is numbered from 1 (dislike extremely) to 9 (like extremely). The four samples were served on a single plate and were coded. Panel members were asked not to discuss ratings or samples while in the testing room. The codes were varied with each member to prevent comparison. Each panel member was given instructions asking her to taste one sample, rate it, take a drink of water and wait 60 seconds before tasting the next sample. Ratings were to be made independently according to the degree of like or dislike, and no comparison was to be made between samples.

Preparation for testing.--The meat samples were cooked immediately prior to tasting. Cooking thermometers were used to provide uniform cooking as nearly as possible. No seasoning of any kind was used. Before serving the samples, all fat covering was removed, so that the samples consisted entirely of lean meat. Samples were approximately 3/8 inch thick and approximately 1 inch wide by 1 1/2 inches long. In several cases, only portions of the sample were tasted.

Pork Roasts

Sample design.--Identical sample designs were used for the first two sessions of the panel which tested pork loin roasts. Two hogs were used for each session--hogs A and B for session 1, and

hogs C and D for session 2. When the hogs were slaughtered six days prior to the time they were to be tested, two roasts were taken from each hog. One of the roasts from each hog was quick frozen and held at 0°. These roasts were thawed before cooking. The other roast from each hog was refrigerated until it was cooked for the test. The sample design is shown below:

Session #1

Hog A - roast cooked from fresh state

Hog A - roast frozen, thawed and cooked

Hog B - roast cooked from fresh state

Hog B - roast frozen, thawed and cooked

Session #2

Hog C - roast cooked from fresh state

Hog C - roast frozen, thawed and cooked

Hog D - roast cooked from fresh state

Hog D - roast frozen, thawed and cooked

The hogs used in this study were slaughtered and the roasts were processed and held under laboratory conditions in the Meats Laboratory at Michigan State University.

Results.--A summary of the ratings for the two sessions testing pork loin roasts is given in Table 2. For preliminary testing of rating differences, the sign test[15] was used. No statistically significant differences between palatability ratings for fresh and for fresh frozen meats were noted either within hogs or in the pooled data for all hogs combined.

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[15]W. J. Dixon and F. J. Massey, Jr., Introduction to Statistical Analysis, McGraw-Hill Book Co., New York, 1957, p. 280.

The analysis of variance procedure was used to further test for rating differences. At the 5 percent level there were no significant differences in the palatability ratings between fresh and fresh frozen pork loin roasts (see Table 3). A tentative conclusion based upon the results of this test was, that quick freezing of pork loin roasts and very short time storage at 0^{o} does not adversely affect the palatability ratings from a non-professional panel.

A note about significance levels to be used in the remainder of this report is appropriate at this point. The 5 percent level is used throughout the report with the exception of one instance in which the one percent level is used. If the differences tested are statistically significant at the 5 percent level, this means that the statistical odds are only one in twenty that the difference is due to chance alone. Conversely, if the differences are not significant at the 5 percent level, this indicates that the odds are 19 in 20 that any differences are due to chance alone.

Beef Roasts

Sample design.--The design for the test of beef rib roasts was considerably different from that for pork roasts. It was felt that a comparison between commercially frozen meat products and the fresh meat products from the same store would approximate the consumer evaluation problem.

Two frozen beef rib roasts with identical codes were selected from one supermarket. From the codes on the package and from information given by the packer of this line, it was determined that these roasts had been processed six months prior to the time of purchase. The frozen roasts were examined and an attempt was made to

TABLE 2.--Summary of palatability ratings, pork loin roasts, fresh as compared with fresh frozen, East Lansing, panel of 18 housewives

	Hog A		Hog B		Hog C		Hog D		All hogs	
	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen
Mean rating	6.94	6.89	7.12	6.44	6.94	6.72	6.17	6.22	6.79	6.57
Number preferring	6	7	9	5	6	4	5	8	26	24
No preference	5		4		8		5		22	

TABLE 3.--Analysis of variance, pork loin roasts, fresh as compared with frozen, East Lansing, panel of 18 housewives

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	143	310.94	2.17		
Hogs	3	11.91	3.97	1.84	2.68
Treatments	1	2.01	2.01	0.93	3.92
Hogs x treatments	3	3.18	1.06	0.49	2.68
Time	1	4.34	4.34	2.01	3.92
Time x treatments	1	0.84	0.84	0.39	3.92
Error term	134	288.65	2.15		

select fresh beef rib roasts of the same quality from the same store.

In each session, four samples were tested; however, two of the samples were from one frozen beef rib roast and the other two were from the single fresh roast. The design was as follows:

Session #3

2 samples from roast A; cooked from fresh state, bone in

2 samples from roast C; commercially frozen boneless roast, six months since packaged

Session #4

2 samples from roast B; cooked from fresh state, bone in

2 samples from roast D; commercially frozen boneless roast, six months since packaged

Frozen roast D was purchased at the same time as frozen roast C and was stored at 0° storage until session #4. Fresh roast B was purchased at the time of session #4. Both frozen roasts were thawed before cooking.

Results.--The meat palatability ratings for each roast are given in Table 4.

TABLE 4.--Summary of palatability ratings, beef rib roasts, fresh as compared with frozen commercial product with six months shelf life, East Lansing, panel of 18 housewives

	Session No. 1		Session No. 2		Both sessions	
	Fresh-A	Frozen-C	Fresh-B	Frozen-D	Fresh	Frozen
Mean rating	6.97	5.28	6.83	5.19	6.90	5.24

Because each panel member was given two samples of each beef roast, the two ratings for each roast of each panel member were averaged to determine the mean rating of that judge (Table 5). Using

the sign test, the differences in the judges' mean palatability ratings between fresh and frozen roasts were highly significant at the 1 percent level for each session and for the pooled data as well.

TABLE 5.--Combination of ratings, beef rib roasts fresh as compared with frozen commercial product with six months shelf life, East Lansing, panel of 18 housewives

Combination of rating	Session No. 1 number	Session No. 2 number	Both sessions number
Both fresh above either frozen.....	8	10	18
One fresh above frozen, other fresh tied with one or both frozen....	5	3	8
One fresh above frozen, other fresh below at least one frozen.....	2	1	3
Fresh and frozen tied for top, but second fresh over frozen.....	1	1	2
Frozen over fresh in top rating.....	2	3	5
Total.....	18	18	36
Judge mean rating fresh over judge mean rating frozen.....	16	15	31
Judge mean rating frozen over judge mean rating fresh.....	2	3	5
Total.....	18	18	36

A statistical test of the null hypothesis that no differences existed between fresh and frozen roasts was used to further test for variation in the palatability ratings.[16] The differences between each judge's mean rating for fresh and her mean rating for frozen were used for each session (Table 6).

[16] Ibid., p. 124

TABLE 6.--Judges' mean ratings, beef rib roasts, fresh as compared with frozen commercial product with six months shelf life, East Lansing, panel of 18 housewives

	Session #3				Session #4			
	Judge mean ratings		Diff.	Diff.	Judge mean ratings		Diff.	Diff.
Judge	Roast-A (Fresh)	Roast-C (Frozen)	A-C	squared	Roast-B (Fresh)	Roast-D (Frozen)	B-D	squared
1	6.0	4.0	2.0	4.0	5.0	4.5	0.5	.25
2	7.5	6.5	1.0	1.0	7.5	5.5	2.0	4.0
3	8.0	2.5	5.5	30.25	6.5	4.5	2.0	4.0
4	8.5	4.5	4.0	16.0	7.5	3.5	4.0	16.0
5	8.0	7.0	1.0	1.0	7.5	5.5	2.0	4.0
6	6.5	3.0	3.5	12.25	7.5	5.0	2.5	6.25
7	4.5	3.5	1.0	1.0	5.5	4.5	1.0	1.0
8	5.5	3.5	2.0	4.0	3.5	5.5	-2.0	4.0
9	5.5	5.0	0.5	.25	8.0	4.0	4.0	16.0
10	7.5	5.0	2.5	5.25	4.5	6.5	-2.0	4.0
11	9.0	8.0	1.0	1.0	7.5	5.0	2.5	6.25
12	8.0	6.0	2.0	4.0	8.0	5.5	2.5	6.25
13	6.5	4.5	2.0	4.0	8.0	7.0	1.0	1.0
14	7.5	4.0	3.5	12.25	7.5	6.0	1.5	2.25
15	6.5	7.5	-1.0	1.0	7.5	6.5	1.0	1.0
16	4.0	7.5	-3.5	12.25	7.0	7.5	-0.5	.25
17	7.5	5.5	2.0	4.0	8.5	1.5	7.0	49.0
18	---	---	---	---	6.0	5.5	0.5	.25
19	9.0	7.5	1.5	2.25	---	---	---	---
Total	125.5	95.0	30.5	116.75	123.0	93.5	29.5	125.75

For session #3, the mean difference between the judges' mean ratings is 1.6944. The standard deviation of this mean is 0.4611 and the computed t value is 3.6747. The t value is significant at the 1 percent level.

The mean difference between the judges' mean ratings for session #4 is 1.6389. The standard deviation is 0.5029 and the computed t value is 3.2589. This value is also significant at the 1 percent level.

Due to the nature of this test, it is possible that some of the differences in palatability might be associated with differences between cattle. However, observation of the frozen product before

cooking and tasting of the cooked fat covering indicated that some quality deterioration had taken place.

The results of this test indicated that there were significant differences in palatability between the fresh beef rib roasts and the commercially frozen beef rib roasts stored for 6 months. This conclusion must be limited to apply to only one lot of frozen beef rib roasts purchased in one retail outlet. No information on the processing or handling of the frozen product was available to determine if this sample was typical.

CHAPTER III

DETROIT TASTE PANEL STUDY

Purpose

A continuation of the taste panel palatability study was conducted with a larger panel made up primarily of persons between 30 and 45 years of age, who were high school graduates, and had a family income ranging from $4,000 to $10,000. Such a panel had already been established for other tests in Detroit and it was decided to use this panel for the palatability tests. In this study the palatability effects of frozen meat storage for different lengths of time and under different storage conditions were also studied.

Results of pilot study.--From the results of the pilot study described in the previous chapter, it was tentatively concluded that the process of freezing did not adversely affect the palatability ratings of the pork loin roasts. Observation and palatability ratings of the beef rib roasts would indicate that some quality deterioration had taken place in the commercially frozen beef rib roasts. From these two tests, it was tentatively hypothesized that quality deterioration in frozen meat may be due to: (1) the length of time in frozen storage and (2) the conditions under which the frozen product is stored. The taste panel palatability tests with the Detroit panel were designed to study these effects on the palatability of both frozen pork loin roasts and frozen beef rib

roasts as well as to further check the hypothesis that there is no significant difference in palatability ratings between fresh and fresh frozen beef and pork roasts.

Temperature variation in frozen food display cases.--Townsend has recently completed tests on temperature variations in a frozen food self-service display case. Thermocouples were placed in packaged frozen steaks located at various positions in a fully loaded display case. Temperatures were recorded continuously for ten days. The results show that on the bottom of the case temperature is normally -10° to -1° F. Toward the middle of the case, the temperature was normally from -3° F to +17° F, the 17° F reading from a steak about 2/3 distance from the bottom to the top of the case. The steaks at the top of the loaded case, but below the load limit, varied in temperature from +7° F to +24° F.[17]

During the twice a day defrost cycles, the temperature of the steaks reached from +11° F to +14° F for those steaks on the bottom of the case and from +37° F to +42° F for those at the top of the case. However, during the second defrost cycle, the temperatures did not rise to the extent that they did during the first cycle.[18]

Tentative hypotheses.--Because of the result of tests of temperature variation in frozen food display cases, the effect of storage in commercial frozen food display cases was given prominence in the experimantal design.

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[17]William E. Townsend, Effect of Temperature Storage Conditions and Light on the color of Prepackaged Frozen Meats, unpublished PhD. thesis, Michigan State University, 1958, pp. 33-37 and appendix Tables A and B, pp. 85-86.

[18]Ibid

The tentative hypotheses were as follows:

(1) There are no significant differences in the palatability of meat cooked from the fresh state as compared with comparable meat cuts that have been quick frozen, thawed and cooked without being held in storage over a period of time.

(2) The palatability of meat quick frozen, packaged in Cryovac, and held at 0° storage decreases slightly as the length of the storage period is increased.

(3) The palatability of meat quick frozen, packaged in Cryovac, and held in a commercial frozen food display case will decrease over time and at a greater rate than meat stored at constant 0° temperatures.

Panel Procedure

When and where conducted.--The panel used for this series of taste panel sessions had been previously assembled in the Detroit area. The actual testing is carried on in the Home Economics Laboratory at Wayne State University in Detroit. The panel meets monthly from October through June and each panel member is paid to participate.

The number of panel participants ordinarily ranges from 120 to 150, with part of the group meeting in the afternoon and the remainder in the evening. The afternoon group sampled pork loin roasts and the evening group sampled beef rib roasts.

Classification of the panel.--The panel members were originally selected from respondents to a mail questionnaire survey in Detroit. The questionnaire was mailed to a random sample of persons selected from the Detroit telephone directory. In the questionnaire

respondents were asked to give classifying information such as age, education and income. Table 7 gives the percentage classification for each of these factors for each session.[19]

TABLE 7.--Age, education, income and sex of Detroit taste panels, June - December, 1957

	Afternoon			Evening		
	June percent	Oct. percent	Dec. percent	June percent	Oct. percent	Dec. percent
Age group:						
Under 30	1.5	--	--	2.4	--	--
31-45	87.5	86.3	81.3	90.4	92.4	86.3
46-60	10.9	11.8	18.8	7.2	7.6	12.5
Over 60	--	2.0	--	--	--	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Education:						
0-8 years	4.7	3.9	2.1	3.6	3.0	5.0
9-11	18.8	19.6	14.6	14.5	28.8	21.3
12-13	65.6	64.7	60.4	67.5	56.1	56.3
14-or more	10.9	11.8	22.9	14.5	12.1	17.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Income:						
Under $2000	--	--	--	--	--	--
$2000-$4000	4.7	--	--	12.0	--	--
$4001-$5400	34.4	45.1	43.8	31.3	39.4	35.0
$5401-$7000	40.6	37.3	29.2	26.5	40.9	42.5
$7001-$10,000	14.1	17.6	27.1	19.3	19.7	22.5
Over $10,000	6.3	--	--	10.8	--	--
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sex:						
Females	79.7	74.5	85.4	51.8	50.0	53.8
Males	20.3	25.5	14.6	48.2	50.0	46.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Twenty-five panel members participated in all three pork tasting sessions and 24 members attended twice. The other 72 members attended only one session of the afternoon panel. Eleven of the members participated in all three beef tasting sessions and 37

[19]For further details regarding the selection of panel members see: Smith Greig and Henry Larzelere, "Consumer Taste Preferences Among Dehydrated Mashed Potato Products," Michigan Potato Council News, August-September, 1957, p.4.

attended two times. Ninety-four attended the evening sessions only one time.

Rating used.--The Hedonic Scale was used to rate the samples just as had been done in the pilot study. Due to the number of other activities to be performed by the panel, only two meat samples were tasted by each participant. Instructions were the same as for the pilot study. The rating form used is shown as appendix illustration 2. The same system of coding was used as was used in the pilot study.

Preparation for tasting.--As in the pilot study, all frozen meat was thawed before cooking. Meat cooking thermometers were used to achieve the same degree of "doneness" in each roast; however, it was very difficult to achieve this because slight differences in the placement of the thermometers varied the results. Some noticeable differences were detected and this will be pointed out in a discussion of the results.

All roasts were processed, frozen and cooked with the bone in. Before serving, the bone and fat covering were removed. Only lean meat was tasted by the panelists. No seasoning of any kind was used.

Sample Design

The testing was carried out over a period of six months in 1957 according to the following plan:

June 3 - fresh and fresh frozen meat

Sample a - fresh

Sample b - fresh frozen

October 8 - meat stored four months

Sample c - frozen, stored at 0°

Sample d - frozen, stored in frozen food display case

December 10 - meat stored six months

Sample e - frozen, stored at 0°

Sample f - frozen, stored in frozen food display case

An identical procedure was followed for both pork loin roasts and beef rib roasts. The description of sample design which follows was applicable to both. All meat samples used in this test were processed, packaged and stored in the Meats Laboratory at Michigan State University.

Three animals were selected so as to be reasonable homogeneous, and they were designated as animal 10, animal 20, and animal 30. The beef roasts were selected from cattle which graded U. S. Choice. Three roasts were cut from each loin and each rib. Pork roasts were approximately 2 1/2 pounds each and beef roasts were cut to be 3-4 pounds each. These roasts were numbered according to the following plan. Animal 10: left side loin, front to rear--samples 11, 12, and 13; right side loin, front to rear--samples 14, 15, and 16. The sample roasts from animals 20 and 30 were numbered in a similar manner, beginning with 21 and 31, respectively.

The samples were paired for the taste tests in the following manner.

		Roast numbers		
June	Fresh	11	22	33
	Fresh frozen	13	21	32
October	0° storage	12	23	31
	Frozen food case	14	25	36
December	0° storage	16	24	35
	Frozen food case	15	26	34

Each pair of roasts was served to approximately 20 persons. In all cases the two samples served each individual were from the same animal.

Because the roasts which were stored in the frozen food display case were stored on or near the bottom of a relatively empty case, they were not subjected to the amount of temperature variation which meat normally stored and displayed near the top of the case would be subjected.

Townsend's study on temperature variation with a relatively empty frozen food display case showed normal temperature in steaks on the bottom of the case to range from -4° F. to +5° F. The highest temperature recorded during a defrost cycle was +26° F.[20]

Results of palatability tests

Pork roasts.--A summary of the palatability tests is given in Table 8. The individual ratings are given in appendix Table 2.

Preliminary results were obtained by using the sign test to test for significant palatability rating differences in each of the two treatments at each session. This test was used for individual hogs as well as the pooled data for each session. At the 5 percent level, the sign test indicated no significant differences in palatability ratings between treatments at each session.

To further test rating differences, the analysis of variance procedure was used for each individual session. The data for the June session (Table 9) indicated as the pilot study did, that there were no significant differences in the palatability ratings of fresh as compared with fresh frozen pork loin roasts.

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[20]Townsend, op. cit., p. 85.

TABLE 8.--Summary of palatability ratings, pork loin roasts, Detroit panel, 1957

Date of panel	Treatment	Mean ratings				Number preferring
		Hog 10	Hog 20	Hog 30	All Hogs	
June	Fresh	6.76	6.90	6.43	6.70	26
	Fr. frozen	6.81	6.90	6.57	6.76	24
October	0° - 4 mo.	6.00	7.70	7.10	6.93	21
	FFC - 4 mo.	6.79	7.65	7.33	7.26	32
December	0° - 6 mo.	7.23	7.00	6.93	7.05	13
	FFC - 6 mo.	7.08	7.67	7.73	7.49	26

Although no significant differences in palatability ratings were indicated because of treatments or for individual hogs for the pork roasts stored four months, there was significant interaction between hogs and treatments (Table 10).

TABLE 9.--Analysis of variance, pork loin roasts, fresh as compared with fresh frozen, Detroit, June, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	125	252.83	2.02		
Hogs	2	3.63	1.82	0.89	3.07
Treatments	1	0.13	0.13	0.06	3.92
Hogs x treatments	2	0.11	0.06	0.03	3.07
Error term	120	248.95	2.07		
Combined error	122	249.06	2.04		

TABLE 10.--Analysis of variance, pork loin roasts stored 4 months, storage at 0° as compared with storage in frozen food display case, Detroit, October 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	115	203.72	1.77		
Hogs	2	12.60	6.30	.64	19.00
Treatments	1	3.11	3.11	.31	18.51
Hogs x treatments	2	19.84	9.92	6.49*	3.09
Error term	110	168.16	1.53		

*Significant at the 5 percent level.

In other words, the treatments had different responses in different hogs. However, this might be the result of cooking differences. It was noted throughout the experiment that it was very difficult to achieve the same degree of "doneness" for each roast.

The data in Table 11 for the pork roasts stored for six months indicate a significant difference in the palatability ratings of samples held in 0° storage as compared with samples held in a frozen food display case. The higher ratings were for the roasts stored in the frozen food display case, although this result is opposite to the original hypothesis.

Although the sign test indicated no significant differences at the 5 percent level, the test would be significant at the 5.4 percent level. As seen in Table 11, the analysis of variance test is significant if the F value is 3.96 or above. The F value obtained in this test was 4.05. The results of the two tests do not differ greatly.

Logical reasoning would raise doubts as to the validity of the result of the analysis of variance. As mentioned previously, cooking differences resulted in some unmeasurable differences in the palatability ratings and the significance of this test may be the result of these differences. No noticeable deterioration was observed in any of the samples which were stored for six months.

An analysis of variance procedure was also used to test significant differences in the palatability ratings between various sets of treatments, or in other words to test the differences due to length of storage time. This test, shown in Table 12, indicates no significant differences due to length of storage time. A significant

difference is present in the interaction, treatments x hogs, for various pairs of treatments. This is present as a result of the significant interaction in the June session.

TABLE 11.--Analysis of variance, pork loin roasts stored 6 months, storage at 0° as compared with storage in frozen food display case, Detroit, December, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	85	99.30	1.17		
Hogs	2	0.58	0.29	0.25	3.11
Treatments	1	4.65	4.65	4.05*	3.96
Hogs x treatments	2	3.64	1.82	1.61	3.11
Error term	80	90.43	1.13		
Combined error	82	94.07	1.15		

*Significant at the 5 percent level.

TABLE 12.--Analysis of variance, pork loin roasts, 6 treatments, Detroit, June-December, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical Value F = .05
Total	327	578.66	1.77		
Time	2	22.81	11.41	2.90	5.14
Treatments within time	3	7.89	2.63	.67	4.76
Fresh vs. fr. frozen	1	.13	.13	.03	5.99
4 months: 0° vs. F.F.C.	1	3.11	3.11	.79	5.99
6 months: 0° vs. F.F.C.	1	4.65	4.65	1.18	5.99
Hogs	2	9.39	4.70	1.19	5.14
Hogs x time	4	7.43	1.86	.47	4.53
Treatment within time x hogs	6	23.59	3.93	2.42*	2.13
Error term	312	507.54	1.63		
Combined error	318	531.13	1.67		

*Significant at the 5 percent level.

Beef roasts.--A summary of the palatability tests for the beef rib roasts is shown in Table 13. The individual ratings are given in Appendix Table 3.

The sign test was first used to test these results. As in the data for pork discussed above, the tests were made for individual cattle at each session and for the pooled data for each session. These tests indicated no significant differences in the palatability ratings between treatments at each session at the 5 percent level.

The analysis of variance procedure was used to further test differences between treatments at each session. These tests are shown in Tables 14-16.

As shown in Table 14, there were no significant differences because of treatments or for individual carcasses for fresh as compared with fresh frozen beef roasts. There was significant interaction between treatment and individual carcasses. It was noted at the time of this test that one of the samples tested (Number 21, fresh frozen) was cooked very rare. Critical comments were received on the rareness of this sample.

No significant differences were indicated for the beef roasts at four months storage or at six months storage (Tables 15 and 16).

The analysis of variance procedure was used to test differences between sets of treatments in the beef roasts (Table 17). As was the case for pork roasts, this combined analysis shows no significant differences except that the interaction, treatments x carcasses, for various sets of treatments are significantly different.

A concluding statement.-- The results of this test indicate no basis for supporting the latter two of the tentative hypotheses presented at the beginning of this chapter. From the results, the conclusion must be made that the palatability ratings of pork loin roasts and beef rib roasts were not adversely affected by freezing

nor by storage at either constant 0° F. or in a commercial frozen food display case up to 6 months. However, these results apply to meat products processed, packaged and stored under laboratory conditions at Michigan State University.

Storage in the commercial frozen food display case was an important part of the test design. Palatability ratings did not indicate any evidence of quality deterioration with up to 6 months storage in this case. It must be said that the meat samples used in this test were stored on the bottom of the display case used. This case contained only the meat used in this study in addition to not over 6 other pieces of meat and this case was not subject to other temperature variations which might affect frozen food display cases in normal usage.

TABLE 13.--Summary of palatability ratings, beef rib roasts, Detroit panel, 1957

Date of panel	Treatment	Mean ratings				Number preferring
		Carcass 10	Carcass 20	Carcass 30	carcasses	
June	Fresh	6.31	6.92	6.63	6.62	37
	Fr. frozen	7.45	6.27	5.52	6.41	39
October	0° - 4 mo.	7.43	7.35	7.00	7.26	32
	FFC- 4 mo.	7.17	7.05	6.38	6.87	22
December	0° - 6 mo.	6.95	6.45	6.76	6.72	23
	FFC- 6 mo.	6.91	6.82	7.00	6.91	32

TABLE 14.--Analysis of variance, beef rib roasts, fresh as compared with frozen, Detroit, June, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	163	518.90	3.18		
Carcasses	2	18.52	9.26	.47	19.00
Treatments	1	1.20	1.20	.06	18.51
Carcasses x treatments	2	39.81	19.90	6.85*	3.06
Error term	158	459.38	2.91		

*Significant at the 5 percent level.

TABLE 15.--Analysis of variance, beef rib roasts stored 4 months, storage at 0° as compared with storage in frozen food display case, Detroit, October, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	127	242.37	1.91		
Carcasses	2	9.25	4.63	2.51	3.07
Treatments	1	4.88	4.88	2.65	3.92
Carcasses x treatments	2	0.82	0.42	0.22	3.07
Error term	122	227.41	1.86		
Combination error	124	228.23	1.84		

TABLE 16.--Analysis of variance, beef rib roasts stored 6 months, storage at 0° as compared with storage in frozen food display cases, Detroit, December, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	129	310.03	2.40		
Carcasses	2	4.27	2.13	0.89	3.07
Treatments	1	3.08	3.08	1.28	3.92
Carcasses x treatments	2	2.42	1.21	0.50	3.07
Error term	124	300.26	2.42		
Combination error	126	302.68	2.40		

TABLE 17--Analysis of variance, beef rib roasts, 6 treatments, Detroit, June-December, 1957

Source of variation	d.f.	Sum of squares	Mean square	F value	Critical value F = .05
Total	421	1093.88	2.60		
Time	2	22.58	11.29	1.57	5.14
Treatments within time	3	9.15	3.05	.43	4.76
Fresh vs. fr. frozen	1	1.20	1.20	.17	5.99
4 months: 0° vs. FFC	1	4.88	4.88	.68	5.99
6 months: 0° vs. FFC	1	3.08	3.08	.43	5.99
Carcasses	2	15.26	7.63	1.06	5.14
Carcasses x time	4	16.79	4.20	.58	4.53
Treatment within time x carcasses	6	43.05	7.18	2.94*	2.12
Error term	404	987.05	2.44		
Combination error	410	1030.10	2.51		

*Significant at the 5 percent level.

CHAPTER IV

CONSUMER SURVEY

Introduction

This chapter summarizes information obtained in a personal interview survey of 436 households which was made to determine consumer purchase habits and attitudes toward frozen meat items. This survey was conducted in the suburban residential area surrounding Detroit during the week of April 7, 1958.

Taste panel results.--The results of the taste panel study indicated that under laboratory conditions the process of freezing or frozen storage up to six months' time, does not adversely affect the palatability of frozen beef or pork roasts. However, the preliminary panel which tasted the commercially frozen beef rib roasts indicated that the palatability of this product may have been affected adversely before it reached the consumer.

Clearly, the reluctance of consumers to accept frozen red meats as substitutes for comparable fresh meats would indicate that either real differences exist in the two products or that differences in the two products are imagined and exist only in the minds of consumers. It was the purpose of this segment of the study to investigate not only consumer purchase habits and experiences with frozen meat products, but also to gain some insight into the general attitude of consumers toward frozen meats.

Earlier studies.--In the 1955 study by Riley and Kramer, it was found that young housewives were more favorable toward frozen meats

than were older ones. However, there was very little, if any, relationship between family income and the frequency of purchasing frozen red meats. The purchases of frozen cooked meat items were more frequent among high income families. This study also found that more than three-fourths of the home freezer owners preferred fresh beef cuts to comparable frozen cuts.[21]

A University of Missouri study shows only three factors with statistically significant differences between purchasers and non-purchasers of frozen meats. The three factors were income, size of family, and number of children under 12 years of age. The results indicate that higher income families, and the larger families with children under 12 years were more inclined to purchase frozen meats than their opposites.[22] The results of this study were not known at the time of the personal interview survey which this chapter reports.

Specific objectives.--The specific objectives of the personal interview survey were as follows:

(1) To determine meat shopping habits as they relate to frozen food storage in the home.

(2) To determine the extent to which consumers have had experience with frozen meat items.

(3) To determine the degree of satisfaction or dissatisfaction with specific frozen meat items.

(4) To find out how consumers rate frozen meats when compared

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[21]Harold Riley, "What Consumers are Saying about Prepackaged Frozen Meats," Quarterly Bulletin, Michigan Agricultural Experiment Station, August, 1956, p. 36.

[22]Richard C. Maxon and Gale C. Hawkins, Knowledge and Consumption of Frozen Meats by Selected Kansas City Households, Missouri Agricultural Experiment Station Journal Series No. 1847.

with fresh meats with respect to flavor, tenderness, cost per serving, and convenience.

(5) To determine the meat purchase patterns of home freezer owners.

(6) To gain insight into the attitudes of consumers toward frozen meat products in general.

Survey Procedures

Questionnaire construction.--After consultation with subject-matter specialists in various departments at Michigan State University, a 4-page questionnaire was constructed. The questionnaire was constructed to accomplish the first four of the objectives listed above. A part of the questionnaire also asked for classification factors of the household such as age, income and size of the family.

After a pretest of this questionnaire, the schedule was revised to include a broad general question on the consumers' attitudes toward frozen meat. This question was added upon the recommendation of Dr. Edward Moe of the Department of Sociology and Anthropology, Michigan State University, and he also recommended that this question come prior to more specific questions on frozen meats. Other minor changes were made before the schedule was finalized and duplicated. A copy of the questionnaire used is shown in the appendix.

A one-page supplemental questionnaire was also prepared to be answered by those consumers who owned home freezers. The purpose of this schedule was to obtain information on the purchase habits of the home freezer owners. A copy of this schedule is shown in the appendix.

Pretest.--The questionnaire was pretested by the group who were members of the December taste panel participating in the palatability tests described earlier. In this test, the schedules were given to

the participants and they were asked to complete the schedules and return them by mail to the author. Of the 116 schedules given out, there were 85 returned. Because the pretest was not a personal interview survey, it was difficult to gauge the reaction to the various questions exactly, but some clarifications were found necessary. The final schedule for the personal interview survey was pretested among several housewives.

Areas selected.--Five suburbs in the Detroit metropolitan area were selected after studying 1950 census tract data and data assembled by The Detroit News in a 1956 survey. These suburban cities are located in a semicircle about the city of Detroit and are characterized by rapid post-World War II development, (see figure 1). Single family dwellings predominate, with shopping centers geared to a highly mobile population.

The suburban cities selected were Roseville, Royal Oak, Livonia, West Dearborn, and Lincoln Park. These cities are populated by medium to above average income, non-colored families.

Economic characteristic data were available for Birmingham, the Grosse Pointes, and East Dearborn, as well as the five selected areas. Economic characteristics for the selected areas are shown in Table 18. In comparison to these figures, the average family income for the Detroit standard metropolitan area was $6,300 for 1957. This SMA comprises all of Macomb, Oakland, and Wayne counties.

Sample design.--An area probability sampling procedure was used in selecting the households to be surveyed. Detailed maps prepared by the Detroit Edison Company were used in preparing the sample. Each suburb was first divided into approximately 20 equal and

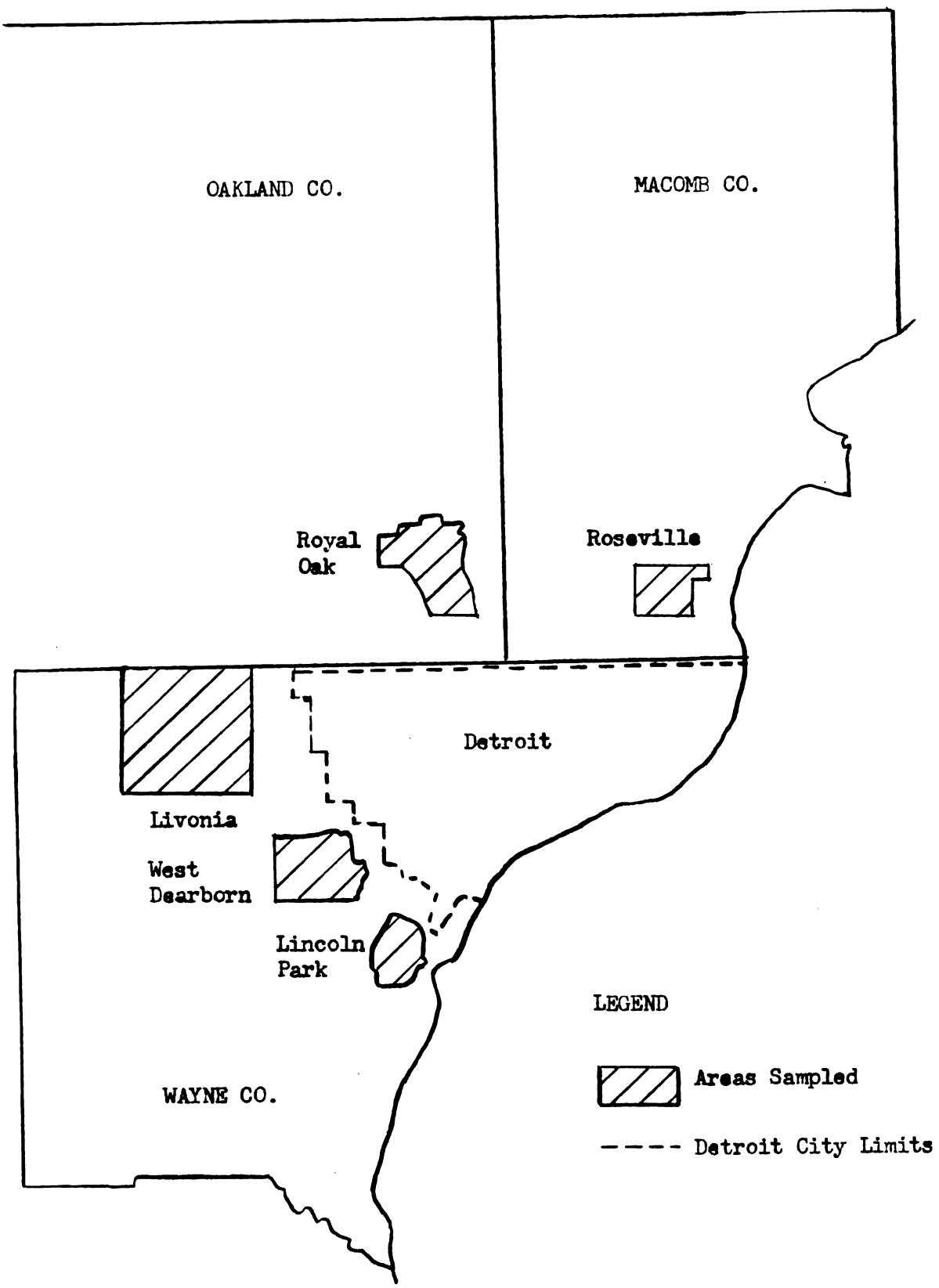


Figure 1. Location of five suburban areas sampled.

seemingly homogenous residental areas of 40 to 100 blocks each. By random sampling, 10 of the areas were selected for further sampling. In each of the 10 selected areas a random selection procedure was followed again to select one block where the interviewing would be done. The south-east and north-west corners of the selected blocks were alternated as starting positions for the interviewers.

TABLE 18.--Economic characteristics of five Detroit suburban areas

Suburb	Estimated 1957 population	Number of houses		Average family income, 1956	Median home value, 1950
		1950	1957	dollars	dollars
Roseville	37,200	4,257	10,400	6200	6,980
Royal Oak	71,500	13,284	21,000	7800	10,764
Livonia	46,000	4,832	13,100	6900	8,988
West Dearborn	58,000	11,396	16,300	8400	11,815
Lincoln Park	46,500	8,135	13,400	7400	8,444

Each of the selected blocks was personally checked before interviewing began to eliminate any non-residential areas. In a few cases another block had to be randomly selected because the selected block was a commercial area.

The interviewers were instructed to obtain schedules from the first 11 households in each of the selected blocks. It was anticipated that this would yield a net sample of 100 completed schedules from each suburb. Although interviewers made up to three call backs including evening calls, only 436 schedules were completed. In two suburbs, an additional cluster of 11 households was added to the sample to increase the total number. The number of schedules obtained from each suburban area are given in Table 19.

Recruitment and training of interviewers.--Interviewers were recruited through and with the cooperation of the Home Economics

Department at Wayne State University. All interviewers selected were junior or senior women students majoring in home economics. These students did the interviewing during their spring vacation.

TABLE 19.--Schedules completed in Detroit suburban cities, 1958.

Suburb	Number
Roseville	94
Royal Oak	90
Livonia	93
West Dearborn	79
Lincoln Park	80
Total	436

A training session was held 4 days prior to the beginning of the interviewing. Subjects covered in the training session were: The purpose of the study; method and sampling procedure used; instruction on locating households; and detailed instructions on conducting the interview. In addition to the oral training presentation, an interviewer's manual was given to each of the interviewers. This contained much of the same detailed information given in the oral training. The interviewer's manual is shown in the appendix.

Survey Findings

Household characteristics.--The findings presented in this section are the summarized results of schedules from 436 households. The last six questions in each interview dealt with characteristics of the household. These were the size of the family, number of wage earners in the family, number of wage earners currently employed, whether the housewife is employed outside the home,

age of the person doing most of the family meat buying, and the average weekly family income. The results of these questions were used to establish the type of households in the survey and to test whether differences in these characteristics were associated with differences in frozen meat purchase patterns or attitudes.

A weighted average figure is reported for each of the household characteristics reported in this section. Because of the differences in the populations of the suburbs and the differences in number of schedules obtained in each suburb, the weighted average was obtained by taking the estimated population for each suburb, as shown in Table 18, and dividing it by the combined population of all five suburbs to get the weighting factor for each suburb. This weighting factor for each suburb was multiplied by the percentage shown for each item in the tables. These resulting figures were added for each item to get the weighted average figure for the combined five suburban areas.

The percentage of households in each of five income categories is given for each suburb in Table 20. The income figure reported was the weekly family income after federal income taxes. For households in which some members were unemployed during the survey, the usual weekly wage was reported.

As in the economic characteristics of these five suburbs reported by The Detroit News survey, Roseville had the lowest family income and West Dearborn had the highest. On the basis of a Chi-square test it was concluded that the proportion of families in the different income classifications varied significantly among the five suburbs. The Chi-square value was 77.2867 with 20 degrees of freedom. The

probability of obtaining a Chi-square value of this size from subsamples from the same population would be less than one in one hundred.[23] The Chi-square test is used throughout this report in testing differences in responses to survey questions.

TABLE 20.--Proportion of households in various income levels, Detroit suburban area survey, 1958

Average weekly income after federal income taxes	Percent of households					Weighted Average
	Roseville	Royal Oak	Livonia	West Dearborn	Lincoln Park	
Under $60	6.4	10.0	6.5	1.3	10.0	6.91
$60 - 89	33.0	17.8	16.1	8.9	25.0	18.97
$90 - 119	46.8	28.9	34.4	24.1	31.3	31.79
$120 - 149	9.6	12.2	23.7	26.6	12.5	17.14
$150 and over	2.1	17.8	15.1	20.3	5.0	13.33
No answer	2.1	13.3	4.3	19.0	16.3	11.91
Total	100.0	100.0	100.0	100.0	100.0	100.00

The proportion of age groupings of the persons doing most of the family meat shopping is given in Table 21. Of the suburban areas Roseville had the largest percentage of shoppers in the under 30 age group and the fewest in the 50 and over age group. West Dearborn was at the other extreme having the smallest percentage of shoppers in the under 30 group and the highest proportion in the 30 to 49 age classification. However, the Chi-square test indicated no significant differences in the proportion of meat shoppers in different age groups among the five suburban areas. For the five areas combined,

[23]Robert Ferber, Statistical Techniques in Market Research, McGraw-Hill Book Company, New York, 1949, pp. 260-79.

the weighted average indicated that 54 percent of the meat shoppers were in the 30 to 49 age category.

TABLE 21.--Proportion of age groups doing most of the family meat shopping, Detroit survey, 1958

Age Group	Percent of households					
	Roseville	Royal Oak	Livonia	West Dearborn	Lincoln Park	W.A.
Under 30	30.9	20.0	22.6	12.7	23.8	21.07
30 - 49	48.9	50.0	50.5	65.8	53.8	54.13
50 and over	17.0	28.9	26.9	21.5	21.3	23.81
No answer	3.2	1.1	--	--	1.2	1.00
Total	100.0	100.0	100.0	100.0	100.0	100.00

The question was asked, "How many persons are usually at your family dinner table?" Although in most cases this would be the number of persons in the family, it also included boarders if any were present. The responses to this question are shown in Table 22.

TABLE 22.--Proportion of family sizes, Detroit suburban area survey, 1958

Number	Percent of households					
	Roseville	Royal Oak	Livonia	Dearborn	Lincoln Park	W.A.
One	3.2	3.3	1.1	2.5	5.0	3.02
Two	16.0	32.2	30.1	19.0	25.0	25.25
Three	19.1	17.8	17.2	24.1	25.0	20.58
Four	20.2	23.3	19.4	29.1	10.0	21.07
Five	27.7	12.2	19.4	16.5	17.5	17.61
Six or more	13.8	11.1	12.9	8.9	17.5	12.46
Total	100.0	100.0	100.0	100.0	100.0	100.00

The Chi-square test indicated no significant differences among suburbs in the proportion of households of various sizes at the 5 percent level of significance. It can be seen from the table that Roseville had a higher percentage of 5-person households and a lower proportion of 2-person families. Lincoln Park had the highest proportion of households with 6 or more while West Dearborn has the highest proportion of households of any of the areas in the 4-person category.

By making an assumption that the 6 or more household size consisted of only six persons, an average size of household was estimated for each of the areas. In comparing these averages, Roseville had the largest average size of household with 3.95 persons and Royal Oak had the smallest with 3.42 persons. Royal Oak had the highest percentage of households with only 2 persons. The weighted average for all areas was 3.62 persons per household. It should be remembered that this figure will be biased downward slightly because of the assumption stated above.

The number of wage earners in the family was indicated on the schedule. The largest group, 72.5 percent, reported only one wage-earner in the family. Two wage earners were reported by another 17.9 percent of the households and 2.5 percent reported three wage earners. The 5.5 percent who reported no wage earners in the family were primarily retired persons and widows. There was no significant difference at the 5 percent level in the number of wage earners per family among suburbs.

A second question concerning wage earners was asked to determine the number of wage earners who were employed at the time the survey

was taken. It was impossible to determine accurately the percentage of those wage earners employed because of the increase in the number of non-respondents to the second question. However, by finding the total number of wage earners from the first question and subtracting the total number of currently employed determined from the second question, a figure representing both unemployed and non-respondents was obtained. For the entire survey, this figure amounted to 10.1 percent of the total wage-earners reported. The figure ranged from 16.5 percent in Roseville (including the largest number of non-respondents) to 5.4 percent in West Dearborn. The West Dearborn figure did not include any non-respondents. The higher figures were for the lower income suburbs in the study.

The housewife was employed outside the home in 19.3 percent of the households surveyed. At the 5 percent level, there was no significant difference among suburbs in the percentage of housewives who were employed. The average number of hours worked by the employed housewives ranged from 28.9 hours per week for those in Royal Oak to 39.1 hours per week for those in West Dearborn.

Meat purchase habits.--The frequency of shopping for meats was the first question asked in each interview. The predominate reply was once a week shopping with 55.90 percent (weighted average) of the households giving this answer (See Table 23). In all suburbs, an equal or larger percentage of households made two or more major shoppings a week than made one major shopping trip with small fill-in shopping trips for meat. Using the weighted average, this would indicate that more than 87 percent of the households did not follow the practice of shopping for meat on a fill-in basis. With

these purchasers, meat was bought only on major shopping trips.

TABLE 23.--Frequency of meat shopping, Detroit suburban area survey, 1958

Frequency of shopping per week	Percent of households					
	Roseville	Royal Oak	Livonia	West Dearborn	Lincoln Park	W.A.
Irregularly, but less than once	8.5	17.8	16.1	13.9	20.0	15.68
Once a week	66.0	44.4	53.8	57.0	66.3	55.90
One major shopping with fill-ins	12.7	16.7	8.6	13.9	1.3	11.30
Two or more major shoppings	12.7	18.9	20.4	15.2	12.5	16.30
No answer	--	2.2	1.1	--	--	0.80
Total	100.0	100.0	100.0	100.0	100.0	100.00

The Chi-square test indicates significant differences among suburbs in meat shopping frequency. The test also indicated significant differences in proportionate shopping frequencies among income groups. Both tests were significant at the 5 percent level.

The highest income group, $150 weekly and above, had the highest proportion of households who made two or more major shopping trips per week and had the lowest percentage of households who shopped only once a week for meat. The lowest income group, under $60 weekly, had the largest proportion of households who made less than one meat shopping trip per week and the lowest percentage who made one major shopping trip per week but purchased several items during the week. Generally, the higher the income, the more frequently households shopped for meat.

It is quite probable that the difference among suburbs in meat shopping frequency is due to the differences in income levels in the suburbs. The Chi-square test indicated no significant differences in proportions of meat shopping frequency among different family sizes, age levels, income levels, or between households in which the housewife was employed and those in which the housewife was not employed outside the home.

Home meat storage.--The amount and kind of home frozen food storage space available is closely related to the practice of buying fresh meat and then freezing and storing this meat in the home frozen storage space.

All of the households surveyed contained a mechanical refrigerator and 10.3 percent of the households had home freezers. The percentage of households with home freezers varied considerably among suburbs and the differences among suburbs was significant at the 1 percent level (see Table 24). Four of the homes surveyed had two refrigerators and three households rented frozen food locker space.

The amount of frozen food storage space in the refrigerator was determined by asking each respondent to classify the home refrigerator into one of three groups: (1) One door with ice cube compartment only; (2) one door with frozen food storage space across top or bottom; or (3) two door refrigerator-freezer combination. The results indicated that the majority of households are equipped with a one door refrigerator with frozen storage space across the top or bottom. (See Table 25). The type of refrigerator classified by the amount of frozen food storage space available varied significantly at the 1 percent level among suburbs. West Dearborn, the highest income area, had the highest percentage, 26.6% of homes with a

refrigerator-freezer combination. Roseville, the area with the lowest age classification, had the largest percentage of households with the newer-type refrigerators with frozen storage space across the top or bottom.

TABLE 24.--Households having home freezers, Detroit suburban area survey, 1958

Suburb	Number of households having freezers	Percent of households having home freezers
Roseville	3	3.2
Royal Oak	13	14.4
Livonia	16	17.2
West Dearborn	10	12.7
Lincoln Park	3	3.7
All suburbs weighted average	45	10.99

In addition to this classification of refrigerators, the size of the refrigerator in terms of cubic feet was also asked. The range of averages for each suburb was from 8.9 cubic feet in Royal Oak to 10.2 cubic feet in Roseville. The average size of all refrigerators reported was 9.75 cubic feet.

To further check differences in home meat storage patterns, all households were divided into two groups. One group consisted of those homes with a refrigerator and home freezer, and the other group consisted of households who had only a refrigerator. Chi-square tests indicated no significant differences among income levels or family sizes in the proportion of households who had a refrigerator only

TABLE 25.--Proportion of households having various types of refrigerator frozen food storage, Detroit suburban area survey, 1958

Type of Refrigerator	Percent of households					
	Roseville	Royal Oak	Livonia	West Dearborn	Lincoln Park	W.A.
One-door refrigerator with ice cube compartment only	9.6	26.7	25.8	17.7	23.8	21.55
One-door refrigerator with frozen food storage across top	80.9	61.1	57.0	54.4	67.5	62.84
Two-door refrigerator-freezer combination	9.6	8.9	15.1	26.6	6.3	13.59
No answer	--	3.3	2.1	1.3	2.5	2.02
Total	100.0	100.0	100.0	100.0	100.0	100.00

and those who had both a refrigerator and home freezer. However, significant differences at the 5 percent level were found among age levels and among households with varying frequencies of meat shopping.

While 22 percent of the households without home freezers were in the 50 and above age group, 39 percent of households with home-freezers fell into this age category. Home freezer owners were more likely to shop less than once a week than those who own refrigerators only. Those with home freezers do not tend to make two or more major meat shopping trips per week or fill in shopping trips as often as the households with a refrigerator only.

The practice of purchasing fresh meat and freezing it in the home frozen food storage space is well established. Within the two months prior to the survey, 82 percent of the households had stored meat in this manner. No significant difference was found among suburbs in the proportion of households who did and did not freeze meat at home (see Table 26). However, significant differences were apparent among suburbs in the proportion of different types of refrigerator frozen food storage space, and between households with home freezers and those with a refrigerator only.

Those households who reported following the practice of purchasing fresh and the freezing it in the home contained a larger percentage of households who had one door refrigerators with frozen food storage space across the top or bottom and a larger percentage of households with the two door refrigerator-freezer combination than those households who did not follow this practice. This difference was significant at the 1 percent level.

The difference in the percentage following the practice of

freezing fresh meat at home was also significant at the 1 percent level between households with and without home freezers. Home freezer owners reported following this practice less than households with a refrigerator only. However, 65 percent of the home freezer owners reported the practice.

TABLE 26.--Proportion of households reporting purchases of fresh meats and subsequent frozen home storage within the last two months Detroit suburban area survey, 1958

Item	Percent of households					
	Roseville	Royal Oak	Livonia	West Dearborn	Lincoln Park	W.A.
Had followed practice	78.7	75.6	87.1	87.3	85.0	82.36
Had not followed practice	19.1	22.2	10.8	12.7	15.0	16.31
No answer	2.1	2.2	2.1	--	--	1.28
Total	100.0	100.0	100.0	100.0	100.0	100.00

Those who purchased fresh meat and stored it in their refrigerator frozen food storage space tended to shop for meats less frequently than those who did not. This difference was significant at the 5 percent level. Chi-square tests with the household characteristics indicated no significant differences in the percentages following this practice.

Households who had followed this practice were asked if the meat was stored for less than or more than two weeks. Over three-fourths, 80.6 percent reported the meat was stored for a period of less than two weeks.

Frozen meat purchase experience.--All respondents were asked to indicate their purchase experience for seventeen different frozen meat items. The response was in terms of one of the following: Have never purchased; tried, but no longer buy; or tried and buy occasionally. Table 27 summarizes the replies to this series of questions for all suburban areas combined.

A tabulation was made of all those households who had purchased any one of these items and it was found that only 45 percent had purchased any frozen roasts, steaks, or chops. An additional 27 percent had tried frozen cubed or chopped steaks or ground beef patties and had never purchased the heavier frozen red meat cuts. For individual frozen steaks, roasts, and chops, more than 75 percent had never tried these particular items.

All households were grouped into three categories: Those that had tried frozen steaks, roasts, or chops; those that had not tried the heavier frozen cuts, but had tried the frozen steakettes or ground beef patties; and those that had never tried either the heavier cuts or the sandwich steaks. Chi-square tests indicated no significant differences among these three groups with regard to household characteristics, frequency of shopping, amount of frozen storage space in the refrigerator, the practice of storing fresh meat in the frozen storage space, or home-freezer owners as opposed to households with a refrigerator only.

After the question regarding experience with the various frozen meat items, questions were asked regarding those frozen products which had been most satisfactory and those which had been most unsatisfactory. These items are listed in Tables 28 and 29 with the comments and reasons for approval or disapproval.

TABLE 27.--Reported purchase experience with frozen meat items, Detroit suburban area survey, 1958

Item	Have never purchased	Tried but no longer buy	Tried and buy occasionally	No answer	Total
	percent	percent	percent	percent	percent
1. Meat pies	22	24	54	--	100
2. Tray dinners	56	19	24	1	100
Poultry:					
3. Turkeys	36	4	59	1	100
4. Chicken, fryers ..	52	6	41	1	100
5. Chickens, roasting	52	6	41	1	100
Beef:					
6. Cubed or chopped steaks or steakettes ..	42	13	44	1	100
7. Steaks	76	6	15	3	100
8. Ground beef patties or hamburger ...	63	8	28	1	100
9. Roasts	81	4	12	3	100
Veal:					
10. Cutlets	86	3	8	3	100
11. Breaded cutlets .	86	4	9	1	100
12. Roasts	90	2	7	1	100
Pork:					
13. Chops	81	4	14	1	100
14. Breaded chops ...	91	2	4	3	100
15. Roasts	89	2	7	2	100
16. Sausage	88	1	10	1	100
17. Frozen fish or seafood	21	4	74	1	100

Price was a principal reason for dissatisfaction although many housewives gave a specific example of a bad experience with a frozen item. It would appear from the comments from this question that

quality had not been the best in many cases. Many housewives made specific references to the dislikes of their family for individual items. It was evident that housewives were strongly influenced by the likes and dislikes of their husbands and children.

On the positive side, 449 mentions were made of satisfactory items while unsatisfactory items had 321 mentions. Convenience and quick preparation were the comments most frequently made but tenderness and the availability were mentioned several times.

The similarity of the two lists should be noted. The frozen items that received the most mentions as satisfactory also received numerous mentions as unsatisfactory. This is probably due largely to the fact, as seen in Table 27, that these items have been purchased and tried by the largest percentage of households, and thus consumers have had greater experience with these products.

Attitude toward frozen meats.--Before questions were asked regarding specific frozen meat items each respondent was asked the question, "In general, how would you describe your feelings toward frozen meats as compared with fresh meat?" After noting all replies to this question, four classifications were set up to analyze the results. The first category was for those who replied by stating a preference, or by directly comparing the two products. The other three classifications were: (1) Things housewives said they disliked about buying frozen meats; (2) reasons why homemakers liked frozen meat; and (3) why fresh meat was preferred. Most replies were stated so that they were classified into two or more of these categories.

Of the 436 households interviewed, 394 or 90.4 percent answered the question by stating a preference in one of the groups in Table 30.

TABLE 28.--Unsatisfactory frozen meat items reported and comments received, Detroit suburban area survey, 1958

Item	Number of mentions	Comments
Meat pies	73	Too small; meat tough; no taste; family didn't like; don't like without bottom crust; poor seasoning; too much gravy; expensive; and too spicy.
Tray dinners	59	Poor variety; just awful; too small; expensive; taste too drab; family didn't like.
Steakettes	44	Dry; bad cuts; can't see product; too thin; husband doesn't like; too dry; too much fat; and poor flavor.
Fish or seafood	28	No taste; loses flavor; tastes like iodine; no variety; rotten; and has strong flavor.
Ground beef patties	25	No flavor; too much water; poor taste; expensive; was bad; too thin; and too much fat.
Chicken	20	Got food poisoning; no taste; expensive; bone turns black when cooked; and rotten.
Breaded veal cutlets	15	Too much breading; dry; no flavor; tasteless; off odor; and mostly fat.
Beef roasts	14	Not available; off odor; expensive; fatty; poor flavor; not enough storage; and they shrink.
Beef steaks	12	Got food poisoning; flavor bad; expensive; don't like to thaw, needed much seasoning; greasy; and not available.
Pork chops	10	Poor flavor; expensive; tough; can't see product; no taste; too few in package; and quality degenerates after freezing.
Breaded pork chops	7	Do own breading; package too large; and not fresh.

TABLE 28.--Continued

Item	Number of mentions	Comments
Turkey	7	Poor taste; no storage; expensive; bruised; and poor flavor.
Pork roasts	5	Not right cut; bad flavor; no texture; poor color; and expensive;
Sausage	1	
Lamb chops	1	Strong flavor
Total	321	

TABLE 29.--Satisfactory frozen meat items reported and comments received, Detroit suburban area survey, 1958

Item	Number of mentions	Comments
Fish or seafood	125	Wider variety; flavor good; easy to use; economical; no fresh available; right size; can keep longer; good taste; always available; properly packaged; and looks better.
Meat pies	65	Convenient; easy to fix; quick; family likes; time-saver; good taste; complete dinner; and depends on brand.
Steakettes	54	Easy to prepare; quick meal, children like; good taste; good for sandwiches; reasonable price; good for emergencies; tasty; and attractive.
Chicken	52	Good; easy to prepare; tender; more readily available; easy to store; family favorite; well-cleaned; and good taste.

TABLE 29.--Continued

Item	Number of mentions	Comments
Turkey	47	Good taste; tender; easy to prepare; no fresh available; can store; convenient; and good flavor.
Tray dinners	21	Good; easy to fix, variety, no left-overs; children like; quick and easy.
Ground beef patties	20	Tender; quick; easy to prepare; and good flavor
Beef steak	17	Like frozen; tender; well trimmed; good flavor; and family favorite.
Beef roasts	16	Saves time; tender; well cut and trimmed; can store; and good taste.
Pork chops	13	Tender; convenient; well-trimmed; and easy to fix.
Veal cutlets	7	Tender; and good taste.
Breaded pork chops	4	Tender
Sausage	4	Can store; convenient; and good flavor.
Veal roast	3	Convenient form
Pork roast	1	
Total	449	

The Chi-square test indicated no differences among these preference statements when related to the households characteristics and to the frequency of shopping for meats. At the 1 percent level, significant differences existed in the proportion making these preference statements with respect to the home freezer owners, the

practice of freezing fresh meat at home, and the amount of experience with frozen meat items.

TABLE 30.--General statement of preferences, frozen as compared to fresh meat, Detroit suburban area survey, 1958

Statement of preference	Percent of households
Prefer fresh	42.9
Prefer fresh but take advantage of frozen specials	.7
Prefer to buy fresh, then freeze	6.9
Prefer fresh, haven't tried frozen	2.5
No experience with frozen	13.1
Both the same	13.5
Buy both, depends on price	.9
Prefer frozen	7.6
Some frozen good, some bad	2.3
No answer	9.6
Total	100.0

Fifty-one percent of those households with a refrigerator only made the statement that they preferred fresh meat while only 25 percent of the home freezer owners made this statement. A larger percentage of home freezer owners than refrigerator owners made the statement that they preferred fresh but took advantage of frozen meat specials and that they preferred to buy fresh and then freeze it. Of the households preferring fresh meat but admitting at the same time that frozen meat had never been tried, none had home freezers.

A higher percentage of those who had not purchased fresh meat to store in the home frozen food storage space made the statements that fresh meat was preferred but that frozen meat specials were taken advantage of a higher proportion of these households reported no experience with frozen meats. All of the households who stated a preference for frozen meat were households which had reported

the practice of purchasing fresh meat and then freezing it at home.

The households which had the most experience with frozen meats (those who had tried frozen steaks, roasts or chops) had the highest percentage that preferred fresh meat but did take advantage of frozen meat items on special sales. The respondents who had tried frozen sandwich meat items had the highest proportion of any of the three groups who said they preferred fresh meat. This group had the highest percentage who stated that fresh meat was preferred and frozen meat was purchased to take advantage of specials.

As might be expected those households who had tried neither the heavier cuts nor the frozen sandwich meat items had the highest proportion of respondents who stated that fresh meat was preferred but frozen meat had not been tried.

Two hundred seventy-nine objections to frozen meat were given by 216 households or 49.5 percent of those surveyed. This was the second classification of responses to the general question about attitudes toward frozen meats. Inferior quality was the most frequently mentioned objection. The fact is worth noting that the second most frequently mentioned objection to frozen meats is the inconvenience of thawing. Many consumers also mention price and the fact that they cannot see the meat as disadvantages of the frozen product. Twenty-three respondents felt that the frozen product was not fresh or was "old." These statements are summarized in Table 31.

Twenty-two percent of the households replied to the general question with some statement of why frozen meats were preferred or giving an advantage of frozen meats. Of these statements, nearly 60 percent had to do with the convenience of frozen meat products.

Another 20 percent referred to quality aspects such as tenderness, flavor, and taste (see Table 32).

TABLE 31.--Objections to frozen meat as compared to fresh meats, Detroit suburban area survey, 1958

Statement about frozen meats	Number of times mentioned
Quality not as good - bad experience	64
Inconvenient thawing	51
Too expensive	42
Cannot see meat	34
Not fresh - "old"	23
Not enough home storage	21
Not available at store	20
Size of cuts not right	14
Too watery - wasteful	10

TABLE 32.--Reasons for preferring frozen meat as compared to fresh meat, Detroit suburban area survey, 1958

Statement about frozen meats	Number of times mentioned
More convenient	58
More tender	12
Better flavor, taste	8
Satisfied with frozen	8
Less expensive	5
No waste	4
Readily available	2

Ninety-five households or 22 percent of those surveyed gave reasons why fresh meat was preferred. The 101 reasons given are summarized in Table 33. More than one-half of the reasons given were better flavor or taste. Seventeen households reported that the desirability of fresh meat depended upon the butcher. Ten persons stated that they preferred fresh meat although there was no difference in fresh and frozen meats.

Other comparisons between fresh and frozen meats.--Those housewives who had tried at least one frozen item of heavier red meat cuts, such as chops, roasts, or steaks, were asked to make a comparison of

fresh and frozen meat of the same cut and grade on four factors. These were flavor, tenderness, cost per serving, and convenience in preparation. Only 45 percent had purchased at least one of these items. The ratings are given in Table 34.

TABLE 33.--Preference statements for fresh meat as compared to frozen meats, Detroit suburban area survey, 1958

Statements about fresh meat	Number of times mentioned
Better flavor, taste	53
Depend on butcher	17
Prefer or buy fresh...no difference in fresh and frozen	10
Less expensive	8
Does not require thawing	7
Readily available, better selection	6

TABLE 34.--Ratings of fresh vs. frozen red meats by consumers who have tried frozen meats, Detroit suburban area survey, 1958

Comparative rating	Flavor	Tenderness	Cost per serving	Convenience in preparation
	percent	percent	percent	percent
No difference	35	40	22	25
Prefer fresh	44	20	36	20
Prefer frozen	10	25	19	46
No opinion	5	8	17	1
No answer	6	7	6	8
Total	100	100	100	100

Frozen meats were rated highest on convenience in preparation while fresh meats were preferred on flavor and cost per serving. No great difference was noted in the ratings on tenderness, although 25 percent of the homemakers thought frozen meats were more tender.

Purchase patterns of home freezer owners.--Forty-five of the 436 households surveyed had home freezers. However, these were primarily

concentrated in three suburbs, Royal Oak, Livonia, and West Dearborn. The average size home freezer was 13.5 cubic feet.

It was found that 16 percent of the home freezer owners do subscribe to some type of a "freezer plan." Almost seventy percent reported purchasing prepackaged fresh meat when featured as a special in retail stores and subsequently storing this meat in the home freezer.

In the previous six months period, 16 households or 36 percent reported purchasing sides or quarters of beef for their home freezer. Nine purchased for cash and five made the purchase on credit. Packing houses and frozen food plants were the predominate source of these quantity purchases of meat, but five purchased directly from farmers.

In addition to buying prepackaged fresh meat at retail stores and buying sides or quarters of beef, there were very few other purchases or sources reported. Three reported small purchases or gifts from relatives and two reported purchases from farmers. Two others reported purchases from a butcher.

All home freezer owners were asked if they believed that their home freezer enabled them to reduce their expenditures for meat. While 62 percent answered yes to this question, 20 percent answered no, and 8 percent thought that it was nearly the same cost, but expressed the opinion that they "ate better."

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This study was an attempt to determine some of the behavior patterns and attitudes of consumers toward frozen meats. Some persons believe that distribution of frozen meats from the packer to the consumer could result in economies in the meat industry and a reduction in the costs of marketing meat. However, consumers have been reluctant to accept frozen meats as perfect substitutes for fresh meats.

In a recent study, 9 out of 10 consumers expressed a preference for fresh beef over a comparable frozen cut. No attempt was made to determine if this difference was "real" or "imagined" in that study. This study attempted to determine this by establishing a palatability taste panel. Fresh frozen pork loin roasts were tested against fresh pork loin roasts from the same animals. There was no significant difference in the palatability ratings.

To more nearly approximate the actual choice which consumers have, commercially frozen beef rib roasts with six months shelf life and fresh beef rib roasts were purchased from a retail store. An attempt was made to select fresh roasts of the same grade as the frozen roasts. The palatability ratings of the taste panel indicated that very real differences existed between the fresh and commercially frozen beef rib roasts. Observation of the frozen product and tasting

of the cooked fat also indicated that some quality deterioration had taken place.

An elaboration of the taste panel test was conducted to determine if frozen storage for different lengths of time and under different storage conditions significantly affected the palatability ratings of pork loin roasts and beef rib roasts. Samples of pork loin roasts and beef rib roasts were processed, packaged and stored in the Meats Laboratory at Michigan State University. Part of the samples of the frozen meat were stored at 0° F. and part of the samples were stored for periods up to six months in an open-top retail frozen food display case. There were no significant differences in the palatability ratings because of freezing or by storage periods up to six months either at 0° or in the frozen food display case. However, samples stored in the frozen food display case were stored on the bottom of the case where temperature variations are less than at the top of a loaded case.

As another part of this study, a personal interview survey of 436 households in five Detroit suburban cities was made in an effort to determine the purchase experience and home storage habits of consumers with respect to frozen meats. These consumers were also asked questions about their attitude toward frozen meat. Some of the more significant findings can be summarized in the following statements:

1. More than 55 percent of the households shopped for meat once a week. Eighty-seven percent of the households purchased meat only on major shopping trips.
2. The higher the weekly family income, the more frequently

households shopped for meats.

3. All households surveyed were equipped with mechanical refrigerators and more than 10 percent had home freezers. About 6 out of 10 households had a one-door refrigerator with frozen food storage space across the top or bottom.
4. Households with persons in the over 50 age category were more likely to have a home freezer than other age groups. The households with home freezers shopped for meat less frequently than households without home freezers.
5. Within two months prior to the survey, 82 percent of the households reported that they had purchased fresh meat and stored it in the refrigerator frozen food storage space. Eighty percent of these reported that this meat was stored for less than two weeks.
6. Fifty-five percent of the households had never purchased any frozen steaks, roasts, or chops. For individual items of these heavier frozen red meats, the proportion of households which had never purchased exceeded 75 percent.
7. Prepared meat items, seafood, sandwich meat, and poultry received the most mentions both as satisfactory and unsatisfactory frozen meat items. Quality and price were most frequently given as disadvantages of these frozen meat items while convenience and ease of preparation were mentioned as favorable attributes of these frozen items.
8. In response to a general question on feelings toward frozen meat, nearly 43 percent of the respondents stated that they preferred fresh while only 7.6 percent stated a preference

for frozen meat. Others answered that they were both the same, that they had no experience with frozen, and that they preferred to buy fresh meat, then freeze it at home.

9. Other answers to the general question were in terms of objections to frozen meat, advantages of frozen meat, and advantages of fresh meat. Nearly 50 percent of the households stated disadvantages of frozen meat. The primary objections were related to quality, inconvenience of thawing, packaging, and price. Twenty-two percent of the homemakers gave reasons why they liked frozen meat. Convenience was the most frequently mentioned. The majority of preference statements for fresh meat concerned quality.
10. Those consumers who had tried frozen steaks, roasts, or chops were asked to compare these with fresh cuts of comparable quality on four factors: flavor, tenderness, cost per serving, and convenience in preparation. Fresh meat had a relatively higher preference rating on flavor and cost per serving, while frozen meats were rated highest on convenience in preparation. Ratings on tenderness were nearly evenly divided.
11. Nearly 70 percent of the home freezer owners reported buying quantities of prepackaged fresh meat when featured as a special and storing this meat in the home freezer.
12. Sixty-two percent of the home freezer owners believed the freezer enabled them to reduce the family meat expenditures and another 8 percent felt that the family ate better meat although not saving any money.

Conclusions

Some of the conclusions which can be made from the results of the study are listed below.

1. In preliminary tests under laboratory conditions, quick freezing did not adversely affect the palatability of pork loin roasts and beef rib roasts.
2. Under laboratory conditions, storage at 0° F or on the bottom of an open top frozen food display case up to six months did not adversely affect the palatability of pork loin roasts and beef rib roasts.
3. Based upon two samples of commercially frozen beef rib roasts with six months shelf life, it can be said that some frozen meat items are being offered for sale to consumers which have deteriorated in quality to the extent that the palatability is affected.
4. Most consumers follow the practice of purchasing fresh meat and subsequently freezing it in their home refrigerators. This procedure makes possible once a week shopping which is typical in the areas studied. This also suggests that homemakers do not have strong objections to "frozen meats" handled in this manner.
5. The point mentioned above would also suggest that frozen food storage space in the home does not appear to be a critical factor limiting present purchases of commercially frozen meats.
6. Over one-half of the consuming households have never purchased frozen roasts, steaks or chops. More than

three-fourths have not purchased specific items of the frozen red meat cuts. This indicates a reluctance on the part of the consumer to even "give frozen meats a chance."

7. The prepared meat items, seafoods, sandwich meats, and poultry have been tried by most consumers. Because of the consumer's more extensive experience with these products they are given both as the most satisfactory and the most unsatisfactory of the frozen meat items.
8. Convenience is a principal advantage associated with frozen meats; however, the inconvenience of thawing before cooking is an important disadvantage.
9. Principal criticisms of commercially frozen meats are: quality not as good, inconvenience of thawing, too expensive, and cannot see the meat.

This study has pointed the need for additional research on frozen meats. Much more should be known regarding the effects of storage time and temperature on frozen meats. The United States Department of Agriculture is currently working on a project of this type. It would seem that palatability and consumer acceptance of the meat after freezing should be a part of the tests concerning the results of time and temperature variations on frozen meats.

Very little scientific data are available about the varying conditions under which frozen meats have been and are being handled, stored, and transported. Because these handling conditions determine to a large extent the quality of the product that is presented to the consumer, the importance of this problem can be easily recognized. A study of frozen meat handling practices might identify the factors associated with product deterioration now occuring in distribution

channels.

Continuing studies of consumer attitudes and opinions toward frozen meats are needed for the meat industry to meet and overcome objections of consumers and to merchandise frozen meats to advantage.

A strong educational program is needed to carry the results of these suggested research studies to the meat industry as well as to consumers. Consumer attitudes are of vital concern to frozen meat packers. Distributors should be informed of proper handling conditions and temperatures. Consumers should be informed of the proper methods of home storage and preparation of frozen meats.

APPENDICES

APPENDIX A

APPENDIX TABLE 1.--Palatability ratings of pork loin roasts, fresh as compared with fresh frozen, East Lansing panel of 18 housewives April, 1957

RATINGS							
SESSION #1				SESSION #2			
Hog A		Hog B		Hog C		Hog D	
Fresh	Fresh Frozen	Fresh	Fresh Frozen	Fresh	Fresh Frozen	Fresh	Fresh Frozen
7	5	4	6	7	6	6	4
4	5	7	8	5	6	4	5
7	4	7	2	8	7	3	4
7	7	8	6	7	7	7	7
9	8	4	7	7	7	9	8
8	9	7	2	7	7	6	7
7	8	8	8	7	7	7	6
8	7	7	6	8	8	7	7
8	8	8	8	5	7	4	7
8	6	8	7	7	7	5	6
8	8	9	7	9	6	9	4
4	7	6	8	7	5	8	8
6	4	6	7	8	8	4	5
7	9	9	8	7	8	7	8
6	7	8	4	8	7	7	7
6	6	8	7	4	5	5	7
7	8	7	7	8	7	7	7
8	8	8	8	6	6	6	5

APPENDIX TABLE 2.--Palatability ratings for pork loin roasts, Detroit panel, June-December 1957

Roast Numbers and Treatments Indicated																	
June (Fresh and Fresh Frozen)						October (4 Months Storage)						December (6 Months Storage)					
Fresh #11	Fresh Frozen #13	Fresh #22	Fresh Frozen #21	Fresh #33	Fresh Frozen #32	0° #12	FF Case #14	0° #23	FF Case #25	0° #31	FF Case #36	0° #16	FF Case #15	0° #24	FF Case #26	0° #35	FF Case #34
7	7	8	8	7	6	4	8	7	8	6	8	6	7	7	8	7	8
7	7	7	4	8	6	6	8	7	8	6	8	9	8	7	8	8	7
8	7	7	5	7	8	6	8	8	9	7	8	7	8	8	7	6	8
4	7	8	6	8	7	5	7	7	8	8	9	8	8	6	7	8	6
6	9	8	8	7	6	6	9	8	7	8	9	8	6	8	8	7	8
8	7	7	8	4	4	7	8	8	3	7	7	8	7	7	8	7	9
8	7	8	7	7	7	8	6	7	9	9	7	7	8	7	6	7	9
8	4	4	8	8	8	8	7	7	9	7	8	4	6	5	7	8	7
5	4	7	8	8	9	7	8	9	8	5	9	7	5	8	9	8	7
9	6	6	8	5	3	7	6	8	7	8	7	9	6	8	7	7	7
7	8	7	7	7	8	4	7	9	8	4	8	7	8	8	8	7	9
7	7	7	5	3	7	4	8	8	7	7	7	6	8	7	8	7	8
4	5	9	7	7	7	7	8	8	9	7	8	8	7	7	8	3	7
7	8	3	7	6	7	8	7	8	7	8	2			6	8	6	7
6	9	7	6	6	5	8	4	7	8	8	8			6	8	8	9
6	7	8	7	4	6	6	7	7	8	7	8						
9	7	6	7	4	5	8	8	7	7	7	6						
4	5	8	7	7	7			7	6	7	9						
5	7	8	7	8	7			9	8	8	7						
8	7	5	8	8	8			8	9	7	6						
9	8	7	7	6	7					8	5						

APPENDIX TABLE 3.--Palatability ratings for beef rib roasts, Detroit panel, June-December 1957

Roast Numbers and Treatments Indicated																	
June (Fresh and Fresh Frozen)						October (4 Months Storage)						December (6 Months Storage)					
Fresh #11	Fresh Frozen #13	Fresh #22	Fresh Frozen #21	Fresh #33	Fresh Frozen #32	0° #12	FF Case #14	0° #23	FF Case #25	0° #31	FF Case #36	0° #16	FF Case #15	0° #24	FF Case #26	0° #35	FF Case #34
7	8	3	9	6	4	9	8	7	8	7	4	7	7	7	9	8	7
7	8	6	4	8	7	8	5	7	8	6	8	6	9	4	5	6	8
7	8	8	7	6	8	6	7	7	5	8	8	7	4	4	7	7	8
6	7	6	8	7	8	8	6	7	6	8	8	4	4	6	5	8	9
6	8	8	9	6	7	8	7	6	4	8	6	6	3	5	7	7	8
8	9	7	5	6	5	8	5	8	7	7	9	7	8	9	8	9	9
7	8	7	8	7	6	7	8	8	9	9	6	8	9	8	6	2	7
6	8	8	7	8	6	7	6	9	8	8	7	7	6	7	8	5	7
2	7	5	8	7	8	8	7	8	7	7	7	8	9	7	8	5	7
4	8	8	8	8	8	7	8	8	7	7	8	5	8	9	8	6	7
5	8	8	7	8	7	6	8	6	7	8	5	8	7	7	6	5	9
6	6	8	6	7	8	2	7	8	7	4	9	8	7	4	7	5	5
7	7	7	4	7	6	7	8	8	7	8	7	8	7	7	8	8	7
7	6	7	7	6	2	7	5	7	8	6	6	4	7	6	7	6	7
4	8	5	7	8	1	7	8	8	7	3	3	8	3	7	8	8	8
9	8	3	1	5	8	9	9	7	8	3	4	8	7	7	8	8	7
4	8	5	5	7	4	8	7	7	8	8	6	8	7	4	4	8	8
4	7	6	3	2	4	8	8	7	8	9	6	4	7	7	4	7	9
6	8	9	7	6	2	8	8	7	5	8	6	9	7	8	8	9	7
6	7	8	4	9	4	8	8	7	7	7	8	8	9	5	5	7	5
7	8	8	7	6	7	9	7			8	3	8	8	8	7	8	6
8	7	7	8	7	2	7	8					7	9	6	7		
6	5	9	8	7	2	8	7										

APPENDIX TABLE 3 (Continued)

Palatability ratings for beef rib roasts,
Detroit panel, June-December 1957

Roast Numbers and Treatments					
June (Fresh and Fresh Frozen)					
Fresh #11	Fresh Frozen #13	Fresh #22	Fresh Frozen #21	Fresh #33	Fresh Frozen #32
7	8	8	7	7	8
7	5	8	6	6	2
6	7	8	3	6	8
7	8			6	7
8	8				
7	8				

APPENDIX B

MICHIGAN STATE UNIVERSITY - Meats Laboratory

Preference Test

Name Division Date

	Code	Code	Code	Code
9	Like Extremely	Like Extremely	Like Extremely	Like Extremely
8	Like Very much	Like Very much	Like Very much	Like Very much
7	Like Moderately	Like Moderately	Like Moderately	Like Moderately
6	Like Slightly	Like Slightly	Like Slightly	Like Slightly
5	Neither Like Nor dislike	Neither Like Nor dislike	Neither Like Nor dislike	Neither Like Nor dislike
4	Dislike Slightly	Dislike Slightly	Dislike Slightly	Dislike Slightly
3	Dislike Moderately	Dislike Moderately	Dislike Moderately	Dislike Moderately
2	Dislike Very much	Dislike Very much	Dislike Very much	Dislike Very much
1	Dislike Extremely	Dislike Extremely	Dislike Extremely	Dislike Extremely
	COMMENTS:	COMMENTS:	COMMENTS:	COMMENTS:

APPENDIX ILLUSTRATION 1. Hedonic rating scale used by tast panel, East Lansing, April-May, 1957.

MICHIGAN STATE UNIVERSITY
Consumer Meat Preference Test

Name_____ Plate Number_____

Code_____	Code_____	Comments
9____Like extremely	____Like extremely	
8____Like very much	____Like very much	
7____Like moderately	____Like moderately	
6____Like slightly	____Like slightly	
5____Neither like nor dislike	____Neither like nor dislike	
4____Dislike slightly	____Dislike slightly	
3____Dislike moderately	____Dislike moderately	
2____Dislike very much	____Dislike very much	
1____Dislike extremely	____Dislike extremely	

APPENDIX ILLUSTRATION 2. Hedonic rating scale used by taste panel, Detroit, June-December, 1957.

MICHIGAN STATE UNIVERSITY

Consumer Meat Survey

	Code
Area _____	1 — 79
Address _____	2
Interviewer _____	3
1st call _____	4
2nd call _____	
3rd call _____	

1. How frequently did you shop for meats last month? (Check one) 5

___Irregularly, but less than once a week.

___Once a week.

___One major shopping a week, but a few items purchased during the week.

___Two or more major shoppings a week.

2. What meat storage do you have? (Check all that apply)

___Home freezer. (If yes, complete Schedule B) 6

___Refrigerator. (If more than one, how many? _____)

___Rent frozen food locker space.

3. What is the cubic foot capacity of your refrigerator? _____ 7 8

4. What frozen food storage space do you have in your refrigerator? (Check one)

___One door with ice cube compartment only. 9

___One door with frozen food storage inside at top or bottom.

___Two door refrigerator-freezer combination. _____ (brand or make)

5. In general, how would you describe your feelings toward frozen meats as compared with fresh meats? _____ 10

_____ 11

_____ 12

_____ 13

_____ 14

_____ 15

6. In the last two months have you bought <u>fresh</u> steaks, chops, or roasts and then placed them in your refrigerator frozen food storage space?

___Yes ___No 16

7. If yes, how long were they stored?

Frozen items		Check one of these columns for each item: Have never purchased	Tried but no longer buy	Tried, buy occasionally	Weeks since last purchase	
Cooked meat dishes	1. Meat pies					18___ 19___ 20___
	2. Tray dinners					21___ 22___ 23___
Poultry	3. Turkeys					24___ 25___ 26___
	4. Chicken, fryers					27___ 28___ 29___
	5. Chickens, roasting					30___ 31___ 32___
Beef	6. Cubed or chopped steaks or steakettes					33___ 34___ 35___
	7. Steaks					36___ 37___ 38___
	8. Ground beef patties or hamburger					39___ 40___ 41___
	9, Roasts					42___ 43___ 44___
Veal	10. Cutlets					45___ 46___ 47___
	11. Breaded cutlets					48___ 49___ 50___
	12. Roasts					51___ 52___ 53___
Pork	13. Chops					54___ 55___ 56___
	14. Breaded chops					57___ 58___ 59___
	15. Roasts					60___ 61___ 62___
	16. Sausage					63___ 64___ 65___
17. Frozen fish or seafood						66___ 67___ 68

9. If there are any frozen meats you have tried and no longer buy, please list those items and briefly explain why you discontinued buying them.

10. If there are any frozen meats that you buy frequently, please list those items and briefly explain what you like about them.

11. If you have tried frozen steaks, roasts, or chops, how do they compare with fresh, unfrozen meat of the same grade and cut?

(a) Flavor

___ No difference
___ Prefer fresh
___ Prefer frozen
___ No opinion

(b) Tenderness (steaks and roasts) 69___

___ No difference 70___
___ Fresh more tender 71___
___ Frozen more tender 72___
___ No opinion

(c) Cost per serving

___ No difference
___ Fresh costs less
___ Frozen costs less
___ No opinion

(d) Convenience in preparation

___ No difference
___ Fresh is more convenient
___ Frozen is more convenient
___ No opinion

12. How many persons are usually at your family dinner table?

___ One ___ Four 73___

___ Two ___ Five

___ Three ___ Six or more

13. How many wage earners are there in the family?

___ One 74___

___ Two

___ Three

14. How many of these are currently employed?

___ One 75___

___ Two

___ Three

15. Is the housewife employed outside the home?

___ Yes ___ Number hours per week 76___

___ No 77___

___ No housewife in family 78___

16. What is the age of the person doing most of family meat shopping?

___ Under 30 79___

___ 30 to 49

___ 50 or over

17. What is your average weekly family income after Federal Income Taxes?

___ Under $60 80___

___ $60 to $89

___ $90 to $119

___ $120 to $149

___ $150 and over

(If unemployed, get their income level before unemployment.) Then ask, "How long have you been unemployed?" _____weeks. "What is your current level of income from unemployment compensation?" $_____ per week.

Address:_____

SCHEDULE B

Area:_____

For Home Food Freezer Owners

Interviewer:_____

1. What is the capacity of your frozen food freezer? _____ cubic ft.

2. What are the year and make of your freezer? _____

We would like to know about your meat buying for storage in your home freezer.

3. Do you subscribe to a freezer plan? _____Yes _____No

4. If yes, whose plan is it? _____

5. During the past six months have you made purchases of any quarters or sides of beef? _____Yes _____No

6. If yes, where did you purchase them? _____

7. Was this sale for cash or on credit? _____

8. Do you buy prepackaged fresh meats when featured as a special in retail stores and place them in your home freezer? _____Yes _____No. Do you have any other source of meat for freezer storage? _____

_____

9. Do you believe that your home freezer enables you to reduce your expenditures for meat?

_____Yes _____No _____Same cost but eat better meat _____No opinion

Take any comment: _____

_____

INTERVIEWER'S MANUAL

CONSUMER SURVEY ON FROZEN MEATS

CONDUCTED IN THE SUBURBS OF DETROIT

APRIL 7-12, 1950

RESEARCH PROJECT -- E. S. 155

Department of Agricultural Economics

Michigan State University

East Lansing, Michigan

CONSUMER SURVEY ON FROZEN MEATS

Who is Conducting the Study?

This study is part of a research project being carried on by the Department of Agricultural Economics at Michigan State University. The title of the project is, "Economic and Technical Problems of Marketing Prepackaged Fresh and Frozen Meats". Dr. Harold Riley is the project leader. Mr. Glen Higgins will prepare a Master's thesis based on information from this survey.

Purpose of the Study

The purpose of this survey is to obtain information on consumer acceptance of frozen meats.

It is anticipated that centralized processing and distribution of meat would lead to increased economic efficiency and greater stability of meat prices and consumption. If this should prove to be true, consumers, marketing agencies, and farmers would share these benefits.

Over the past 30 years, there have been numerous changes in meat processing and distribution, but these changes have not been as revolutionary as for many other foods. With the emergence of the modern supermarket as the dominant retail food outlet, there has been a shift toward self-service selling of grocery items and, more recently, meats and produce. The processing and packaging of grocery items has been shifted almost entirely from the retail store to centralized plants. However, fresh meats are still fabricated and packaged into consumer units within thousands of retail markets. Currently frozen meats are still a small but growing part of the meat sold through wholesale and retail trade channels. The degree of acceptance has been somewhat greater in restaurants and institutional feeding than in retail stores.

The specific objectives of this survey are as follows:

(1) To determine meat shopping habits as they relate to frozen food storage in the home.

(2) To determine the extent to which shoppers have had experience with the more common frozen meat items.

(3) To determine the degree of satisfaction or dissatisfaction with specific frozen meat items.

(4) To find out how consumers rate frozen meats when compared with fresh meats with respect to flavor, tenderness, cost, and convenience.

Information from this study will be summarized and disseminated through trade publications, special bulletins, and the Michigan State University Extension Agents serving consumers and marketing agencies.

General Method of Study

Information will be obtained through a personal interview survey of 500 households in the suburbs of Detroit. Five surburbs were selected for the survey. These include:

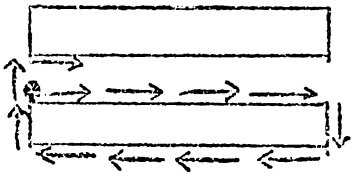
Roseville
Royal Oak
Livonia
West Dearborn
Lincoln Park

Schedules will be obtained from 100 households in each surburb. These households were selected randomly by an area sampling plan.

Instructions on Finding Houses

Two interviewers will be assigned to each suburb. Each pair of interviewers will have a list of 10 "blocks" to visit. Your instructions will be to go to a particular intersection and to start down one side of a particular street taking the first 11 households.

Each dwelling may have more than one household. Be sure you have all households at each address before moving on to the next. If there are less than 11 households on a block, circle the block until you have the required number. If you circle the block and still have not located 11 households, cross the street and complete your quota on the block facing the side of the block you initially started on. For example:



If no one answers the door -- ask the nearest neighbor when they are likely to be home and note this on the schedule. In some cases it will be necessary to make call-backs in the evening.

Instructions on Conducting the Interview

The first step to a successful interview is to properly introduce yourself to the interviewee. A good procedure is to introduce yourself, tell the person you are helping to conduct a study for Michigan State University, and ask for 10 minutes of her time. If she asks further questions or hesitates, you can use the preceding material for convincing her that it is important that she participate.

Begin the questioning as soon as possible. You should have a schedule ready so that you can begin as soon as possible. Diplomacy is the key word in interviewing.

Be sure to fill in the area and address information in the upper right-hand corner of page one. Do not write in the right-hand column on any of the pages. These are for IBM coding.

Question 1 -- Read the possible answers and let interviewee answer as a selection of one of these.

Question 2 -- Check all that apply. If they have a home freezer, go immediately to Schedule B.

Question 3 -- If they do not remember the cubic footage, you may be able to help estimate it. Cubic feet = length x width x depth.

Question 4 -- Give only one answer. Do not fill out schedule B if they have a refrigerator-freezer combination. The brand name is important only if they do have the refrigerator- freezer combination.

Question 5 -- This is probably the most important question on the schedule. Do not pass over it quickly. We are interested in basic attitudes and prejudices. Later questions will deal with reactions to specific items, so try to keep this on a general basis. We are particularly concerned here, as we are in the entire study, with the "red" meats, such as steaks, roasts, and chops. Follow-up questions should be used to get the answer to this general question. Examples of follow-up questions are as follows: "Which do you generally prefer"? "Why"? Do not condition their response by asking negative questions such as "What are your reasons for not liking frozen meats"?

Record the answers accurately.

Questions 6 and 7 -- Ask question 7 only if the answer to question 6 is yes.

Question 8 -- Explain that you will read through the list of frozen items and you would like her answer for each in terms of one of the first three column headings -- have never purchased, have tried but no longer buy, and have tried and buy it occasionally. If they buy it occasionally, ask the weeks since the last purchase.

Question 9 and 10 -- Take the cue from answers to question 8 in the items that they have tried and no longer purchase or purchase frequently. Let them recall answers if they can so that this list may show first those items which they were most dissatisfied with and most satisfied with.

Question 11 -- Here again the specific reference should be to the "red" meats -- steaks, roasts, and chops. Comparison should be with the same grade and cut of meat. Record comments on whether these factors vary with different cuts.

Question 12 -- This usually will mean the number of people in the family but it should include boarders or others who regularly eat with the family.

Question 13 -- Include part-time wage earners except students who may deliver newspapers or work after school.

Questions 14 and 15 -- These should be self-explanatory.

Question 16 -- On both this question and question 17, do not ask for a specific figure. Ask instead for the classification into which they fit. For example, you might ask, "Into which age classification does the person who does most of the family meat shopping fit? Under 30; 30 to 49; 50 or over"?

Question 17 -- Classify their normal income level for the entire family before unemployment if this condition exists. If unemployed, what is the total unemployment compensation being received?

Write down the answers to each question as you come to it. Do not try to remember answer until later.

Check the schedule before you leave. Make sure all questions are answered.

When you have finished the schedule, thank the person and leave gracefully, as quickly as possible.

If you have any questions or need help in any way, you can contact either Harold Riley or Glen Higgins at TRinity 3-0794. We will be in Room 318 Boulevard Building, at 7310 Woodward Avenue.

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