# NEWSPAPER ADVERTISING OF MEAT PRODUCTS AND ITS RELATION TO CONSUMER PURCHASES IN LANSING, MICHIGAN, DURING 1956

Thesis for the Degree of M. S. MICHIGAN STATE UNIVERSITY MerrillM. Parsons 1958

# NEWSPAPER ADVERTISING OF MEAT PRODUCTS AND ITS RELATION TO CONSUMER PURCHASES IN LANSING, MICHIGAN, DURING 1956

by

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AN ABSTRACT

Submitted to the College of Agriculture Michigan State University of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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This study was mainly directed toward determining whether the amount of newspaper advertising space for meat was directly related to the quantity purchased. In addition. it included an examination of the patterns of newspaper advertising of meat in Lansing. Michigan.

Weekly data on prices and consumer purchases of meat during 1956 were obtained from the Michigan State University Consumer Panel. The data revealed that sizeable variations occurred in the purchases of different meats from week to week. Measurements of newspaper advertising space for meat were taken from the <u>Lansing</u> State Journal.

It was found that pork, beef, and poultry. in that order. were the meat products receiving the most newspaper advertising space. The amount of advertising space for different meats varied seasonally. It was observed that frequently several firms featured a particular meat item as a special in the same week, but rarely did one firm feature the same item in two consecutive weeks. The firms studied consistently ran their ads on the same day or days from week to week.

The data on advertising. purchases. and prices were first examined by graphic techniques. Scatter diagrams showed the demand curves for certain meats had different positions or shapes in the weeks of above average advertising.

A more precise measure of the relationship was obtained by fitting the data to linear regression equations which expressed the quantity purchased of one kind of meat as a function of the price of that meat, prices of competing meats. temperature and an advertising variable.

The regression analysis showed that advertising was significant as a factor affecting weekly variations in the quantity purchased for ham. pork roast, all pork and broilers. The effect of advertising on purchases of all beef was statistically significant but incensistent with the results obtained for individual beef cuts. The measurement of the relationship between advertising and the quantity of beef and beef products purchased appeared to be affected by intercorrelation among the explanatory variables.

The partial regression coefficient for advertising. expressed in percentage terms. indicated that at the mean of both variables a ten percent increase in advertising would increase the quantity of all pork purchased by 1.2 percent. At the mean of both variables a ten percent increase in advertising would have increased the quantity of broilers purchased by 1.5 percent.

From the results obtained it was concluded that newspaper advertising was a significant factor affecting week-to-week variation in purchases of certain meats. It was felt that advertising had a different effect on the demand for each retail cut and that the best representation of the true structural relationship was obtained by measuring the effect on the individual meat items which consumers bought in the retail market.

A comparison of the amount of newspaper advertising space and the quantity of meat purchased at each firm indicated certain

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firms used more advertising space in proportion to the quantity of meat they sold to the consumer panel than others. A simple correlation analysis between newspaper advertising space and the expenditure for meat by the consumer panel at each of seven firms showed no statistically significant correlation.

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#### CHAPTER I

#### INTRODUCTION

#### Objectives of the Study

This study was initiated as a result of one of the problems which arose in a previous study of the consumer demand for meat.<sup>1</sup> The problem was the week to week variation in the quantity of meat purchased by the Michigan State University Consumer Panel. This was not adequately explained by variations in prices. A question arose as to the amount of this variation in purchases that might be related to newspaper advertising space for meat.

The primary objective of the study was to explain the relation between newspaper advertising space and the quantity of meat purchased by the Michigan State University Consumer Panel with respect to (1) aggregate purchases in the market area, and (2) purchases at individual firms. A secondary objective was to describe the patterns of newspaper advertising of meat in Lansing, Michigan.

#### **Review** of Literature

## Importance of Newspaper Advertising in the Retail Food Industry

A recent national survey by <u>Super Market Merchandising</u> indicated that ninety-nine percent of the fifty-four companies

<sup>&</sup>lt;sup>1</sup>Harold M. Riley, "Some Measurements of Consumer Demand for Meats," unpublished Ph. D. thesis, Department of Agricultural Economics, Michigan State University, East Lansing, 1954.

which it surveyed advertised in newspapers.<sup>2</sup> Almost one cent out of every sales dollar in the super market industry went for advertising. Sixty-seven percent of this amount or about thirteen million dollars went for newspaper advertising.

One source indicated that roughly three-fourths of the housewives within two midwestern metropolitan areas frequently read food store advertisements in newspapers, and that roughly half of the housewives do so in all of the "Midwest."<sup>3</sup> Oakes based these figures on his Milwaukee survey made in 1948, on his Oak Park and River Forest, Illinois surveys made in 1938, and the "Midwest" survey in 1941, by the A. C. Nielsen Company.

A survey by the American Newspaper Publishers Association indicated larger sized ads were read by a higher percentage of housewives. This survey which was referred to in <u>Super Market</u> Merchandising reported that an 1,848 line ad by A and P received a total readership score of forty-eight percent while a 4,928 line Loblaw ad received a total readership score of sixty-six percent.<sup>4</sup>

<sup>&</sup>lt;sup>2</sup>"Where Advertising Dollars Went in 1956," <u>Super Market</u> <u>Merchandising</u>, XXII, No. 11, November 1957, p. 68.

<sup>&</sup>lt;sup>3</sup>Ralph H. Oakes, "Readership of Food-Store Advertising," Journal of Marketing, XVI, No. 1, July 1951, pp. 66-68.

<sup>&</sup>lt;sup>4</sup><u>Ibid.</u>, p. 80.

## Relation between Advertising and Economic Theory

Firms advertise chiefly to stimulate demand for their products. They try to shift the demand curve to the right; in other words, bring greater sales at a particular price or get a higher price for a particular quantity than they would without such selling effort.<sup>5</sup> To accomplish this end they appeal to the consumers buying motives with the aim of changing the utility to consumers of the class of products featured, and accordingly to change demand.

In a consideration of the relation between advertising and economic theory the extreme limits of pure monopoly and pure competition can be used as reference points. The concept of pure competition assumes an essentially homogenous, non-differentiated product with no seller or buyer large enough to affect the calculations of any other, and competition purely on a price basis. At the opposite extreme lies the concept of pure monopoly which envisages a single seller in control of the complete supply of a commodity and in a position to set the price.

Monopolistic competition differs both from pure competition and pure monopoly. However it is more closely related to the theory of pure monopoly because the theory of monopoly recognizes that although a monopolist has control over the price of his product, competition affects the elasticity of demand for the

<sup>5</sup>Neil H. Borden, <u>Advertising in Our Economy</u> (Chicago: Richard D. Irwin, Inc., 1945), p. 45. monopolist's product. The theory of monopoly is inadequate because it deals with the isolated monopolist. The theory of monopolistic competition differs in that it considers the adjustment of economic forces within a group of competing monopolists, ordinarily regarded merely as a group of competitors. The theory of monopolistic competition seems the most adequate to describe how advertising affects demand.

Under monopolistic competition an individual seller's market is separate to a degree from his rivals'. In theory his sales are limited and defined by three factors: (1) his price, (2) the nature of his product, and (3) his advertising outlays,<sup>6</sup> Advertising can affect the seller's market by spreading information. It can make buyers aware of the existence of sellers other than those with which they habitually trade. It can furnish buyers with information on comparative prices and qualities. A seller will be successful in increasing his sales at a lower price in proportion to the number of buyers who are reached. As buyers become more familiar with a name they are more likely to prefer it to an unfamiliar name. Thus by spreading information there is a chance for advertising to change the shape or position of the demand curve for a product.

<sup>&</sup>lt;sup>6</sup>Edward H. Chamberlin, <u>The Theory of Monopolistic Competi-</u> tion (Cambridge: Harvard University Press, 1948), pp. 69, 118.

Effects of Advertising on the Demand for Certain Products

Neil H. Borden's study of advertising showed wide differences in the effects of advertising on different products.<sup>7</sup> Included in the commodities studied were cigarettes, cigars, sugar, dentifrices, domestic sheeting, oranges, walnuts, lettuce, shoes, and mechanical refrigerators. Oranges, walnuts, and lettuce are commented on here because they were the three food products, and were probably more closely related to meat in demand characteristics than any of the others.

Borden's study found oranges were one of the products showing the most response to advertising. Promotion and advertising of oranges began about thirty years ago. Since then consumption has increased over two and one-half times. Borden indicated that although consumption might have increased without it, advertising should be given credit for speeding up education of consumers to the health and dietary benefits of oranges.

This study indicated advertising had been used extensively for walnuts. The marketing of over eighty percent of this crop has been controlled by the California Walnut Growers Association. The association has conducted a consistent program of advertising, the expenditure varying with the size of the crop. Advertising has been employed to help stimulate consumption at prices as favorable as possible to growers. The report indicated that difficulty was experienced in measuring the effects of indirect

<sup>&</sup>lt;sup>7</sup>Neil H. Borden, <u>The Economic Effects of Advertising</u> (Chicago: Richard D. Irwin, Inc., 1942).

action advertising on the sales of walnuts. It was found impossible to isolate and weigh each of the innumerable factors affecting the volume consumed and prices received. It was noted, however, that over the period studied the volume of walnuts consumed, and possibly, the prices received for them were greater after the institution of advertising than they had been before.

The section on lettuce indicated it was a product which experienced a relatively large increase in demand over a period of years without the benefit of advertising by its producers.

As with many products the explanation of the change in the consumption of lettuce was highly speculative. However, advertising by lettuce producers or sellers as a cause for the increase in consumption was ruled out. Borden emphasized the point in this section, as elsewhere, that the demand for a product rests in the wants and desires of people as developed by a complex of social forces.

#### Some Methods of Research Used to Determine Advertising Effectiveness

Three basic types of research are commonly used in determining the effectiveness of advertising.<sup>8</sup> They are sales tests in a market area, advertising copy testing, and consumer psychological surveys.

Test market research involves comparing sales in a market area or areas with and without advertising. It involves the problem

<sup>&</sup>lt;sup>8</sup>Charles F. Sarle, "Research on Advertising Effectiveness," Journal of Farm Economics, XXXVIII, No. 4, November 1956, pp. 964-970.

of controlling a large number of variables and the problem of obtaining reliable sales data.

Advertising copy research measures how well the ad catches the consumers attention, how well the ad is understood, how well the ad is remembered, the opinion formed by the reader, and the positive or negative impact on the reader and the subsequent action implied.

Consumer psychological survey research provides such information as the features of a product considered most important by potential buyers, the good features they do not see, the features they see incorrectly, and the importance of each of opinions in influencing their final decision to buy.

The present study is similar to test market research in some respects. However, it involved only one market area.

A study at the University of Michigan examined several different methods of market research.<sup>9</sup> It included an examination of the retail store audit of the A. C. Nielsen Company and the consumer purchase panel of the Market Research Corporation of America. These are specialized research services providing information on a continuing basis. Both provide data for individual brands. Both provide consumer sales figures. The consumer purchase panel characterizes the individual consumer and helps to explain his behavior pattern. This study illustrates how the retail audit and consumer panel data can be used in analyzing the

<sup>&</sup>lt;sup>9</sup>Stewart H. Rewoldt, "Economic Effects of Marketing Research," <u>Michigan Business Studies</u>, XI, No. 4, University of Michigan Press, Ann Arbor, 1953.

effect on sales of a given advertising expenditure. The volume of sales before and after a given advertising expenditure are compared as a means of determining the effectiveness of the advertising.

### Unexplained Variation in Previous Demand Equations to Explain Weekly Variation in Meat Purchases

Measures of consumer responses to changes in prices for different kinds of meat were made in a previous study on Michigan State University Consumer Panel data by Harold M. Rilev.<sup>10</sup> Weeklv average prices and quantities purchased per family by the consumer panel were used for the two-year period, July 1951 to July 1953. Single equation demand models were fitted to the data using least squares regression techniques. The basic equation expressed the quantity purchased of one kind of meat as a function of the price of that meat group, the prices of competing meats, and a temperature variable. The study revealed sizeable fluctuations in the quantities of meat purchased from week to week. It appeared from an inspection of the fluctuations in weekly purchases of different kinds of meats that the basic model was not comprehensive enough to account for all the wide variations observed. It appeared possible that sizeable week-to-week fluctuations in meat purchases might have been related to the extent of advertising activity. It was felt that the size of the residuals might be reduced and the multiple correlation coefficient increased by the

<sup>10</sup>Ibid.

addition of an advertising variable. This study was undertaken in an attempt to, among other things, develop such a variable.

Market Structure

The largest share of the volume of the retail meat sales in the Lansing area was through combination meat and grocery chains. In the retail food trade of the area there were approximately 210 stores which did a total annual sales volume of about thirty seven million dollars.<sup>11</sup> The structure of the food retailing business in Lansing included the Atlantic and Pacific Tee Company, National Market Basket, the Kroger Company, and Wrigley Stores, Inc., which are large regional chains; Schmidt Brothers and Shop Rite, which are local chains, and Bazley-Junedale, a local meat market, plus a number of other independent stores. The seven firms mentioned by name had a total of twenty-six stores in the Lansing area during 1956.

#### Source of Data

The Michigan State University Consumer Panel was the source of purchase data for this study. The panel was established in March 1951, and has been running continuously since that date. It was originally set up as a research project to run for ten years. It is composed of approximately 250 families in the Lansing area. Since the date it was established, weekly records have been

<sup>&</sup>lt;sup>11</sup>Anon., <u>Census of Business and Retail Trade</u>, Preliminary Data, Bureau of Census, Washington, D. C., 1954.

maintained by all panel families as to price, quantity, and total expenditure for each food item purchased. These records, called diaries, were mailed to the Department of Agricultural Economics of Michigan State University by panel members. This record of purchases by the consumer panel was considered the best available indicator of the behavior of the market demand for meat in Lansing.

Data on advertising space was taken from the <u>Lansing State</u> <u>Journal</u>. A complete file of all food-store advertisements in the <u>Lansing State Journal</u> was meintained and used as a source for obtaining measurements of meat advertising space.

#### Method of Analysis

Measurements of meat advertising space from the <u>Lansing</u> <u>State Journal</u> were tabulated according to the type of meat, the day of the week, the four-week period, and the firm. In chapter two a study of the patterns of newspaper advertising in Lansing is discussed. Variations in the amount of advertising space among meat products, and among firms throughout the year were analyzed.

The relation between the amount of newspaper advertising space and the quantity of meat purchased was studied in chapter three. The first step after tabulating the data on the quantity of meat purchased and the amount of advertising space for meat was comparing the data graphically. Graphic analysis was also used to study the relationship between the price of a meat and the quantity purchased for selected retail cuts. Weeks when there was an above average amount of advertising space were distinguished

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from the other weeks of the year in order to study the effects of advertising space on the shape and position of the demand schedule for certain retail meat cuts.

Multiple and simple correlation techniques were used to measure the relationship between the quantity of meat purchased and the amount of advertising space for meat.

#### CHAPTER II

# PATTERNS OF NEWSPAPER ADVERTISING FOR MEAT IN LANSING, MICHIGAN

This chapter describes newspaper advertising of meat by seven retailing firms in Lansing, Michigan, during 1956. The number of agate lines of advertising space for meat varied significantly from week to week. Noticeable fluctuations occurred in conjunction with the major holidays. Thanksgiving, Christmas, and Easter. There was nearly three times the average amount of advertising space for ham the week of Easter. There was extensive advertising of turkey at Thanksgiving and Christmas. The day of the week on which any particular firm's advertisment appeared changed very little from week to week throughout the year. The food retailing firms in this study used the most advertising space on Wednesday and Thursday. Large differences appeared among firms in the amount of advertising. The largest advertiser used twice as much space as the smallest advertiser. Meat advertising space comprised roughly 18 percent of the food advertising space. The amount of food advertising space devoted to meat varied considerably among firms. Some meat items were advertised to a much greater extent than others. For instance, broilers received more than twice as much advertising space as pork roast.

In this study meat includes fresh and sausage meat items. Advertisements for canned and frozen meats were not included. A special was defined as a headliner item which was given the most

prominent position in the ad. Not all advertisements contained a special. In some advertisements more than one item received special attention. When such items appeared they were recorded as secondary specials.

## Source and Nature of Data

#### The Lansing State Journal

Lansing is served by one daily newspaper, the <u>Lansing</u> <u>State Journal</u>. This made the problem of measuring advertisements much simpler than if there had been several newspapers in the area carrying food store advertising.

The Lansing State Journal has wide coverage reaching a large number of the homes in the market area. Its circulation in Lansing is approximately 39,500. Being the only important newspaper containing local news it is read by most Lansing residents. Usually it contains about twenty-five pages of which about half are advertising. Advertising by retail food stores may vary from none to four pages for a single paper. The amount of advertising by food stores varies by the day of the week. The big food advertising sections are usually in Wednesday and Thursday papers. The amount of meat advertising is roughly in proportion to the size of the food advertisements.

#### Stores Included in the Study

Data from the advertisements of the following seven large food retailing organizations were compiled:

1. Atlantic and Pacific Tea Company

2. Bazley and Junedale

3. Kroger's

4. National Market Basket

5. Schmidt Brothers

6. Shop Rite

7. Wrigley Stores Inc.

These seven organizations had a total of twenty-six stores in the Lansing shopping area in 1956.

Advertisements by meat manufacturers were also measured. These ads were all meat advertising except an occasional portion devoted to promoting the brand name.

The selection of these firms was largely predetermined. Since early 1955, the Michigan State University Consumer Panel has been reporting the store where each meat item was purchased. For purposes of IBM coding seven of the largest meat retailing firms were selected for individual identification. All independent stores were combined into one category. Subsequent purchase data from the panel indicated that roughly two-thirds of the meat expenditures by consumer panel members were made at these seven firms.

About seventy-eight percent of all the food advertising space in the <u>Lansing State Journal</u> was by these seven firms.<sup>1</sup> The seven organizations listed above were larger than most of the

<sup>&</sup>lt;sup>1</sup>Three weeks were selected to represent weeks of normal advertising. Measurements were made of all food advertisements during these weeks.

other retail food firms in the area and usually ran larger ads. The amount of advertising space used per week by other stores varied directly with the amount used by these firms. It appeared that data for these seven organizations yielded information which was nearly as complete as that which could have been obtained from advertisements of all the food retailers in the area. All the firms studied except Bazley-Junedale were combination grocery and meat markets. Bazley-Junedale was primarily a meat market.

#### Procedure for Measuring Ads

Measurements of the meat advertising space were taken directly from a complete file of all food store advertisements in the <u>Lansing State Journal</u> kept by the Department of Agricultural Economics at Michigan State University. The food ads were measured in column inches. One hundred and seventy-six column inches made a full page. The meat ads were measured in agate lines. One column inch contained fourteen agate lines.

Only the part of the ad that definitely referred to meat was recorded as meat advertising space. Such things as the name of the store or pictures of things other than meat were considered part of the total food advertisement but not part of the meat advertisement. Some of the ads were so constructed as to leave some room for an arbitrary decision on the part of the person doing the measuring. However, since instructions on what was considered meat advertising were explicitly given before the measuring started and all the measurements were made by one person it is felt the measurements were consistent for the entire study.

#### Method of Coding

The measurements were first recorded by hand on IBM code sheets and later transferred to IBM cards which were used for further analysis. The column headings were entitled:

store	lamb and mutton ad
ye <b>a</b> r	veal ad
week	fish and seafood ad
day of the week	primary special
total ad	price of primary special
total meat ad	size of primary special
pork ad	secondary special
beef ad	price of secondary special
poultry ad	size of secondary special
cold meat ad	

Primary and secondary specials were recorded according to the product number by which they were listed in the Michigan State University Consumer Panel Diary. There were approximately fifty-nine different retail cuts listed under meat in the diary which would come under the definition of meat as used in this study. For more detail on how the data was recorded on IBM cards, refer to the code sheet in Appendix A.

A log was kept which contained a short summary of almost every ad. It contained comments on the important points in the ad and anything unusual about a particular ad. It also stated the procedure used for measuring irregularly shaped ads.

Meat Ad Space Compared with Food Ad Space

#### All Firms

In 1956 the seven firms and manufacturers of meat products used 110,117 column inches or about 626 full pages of food advertising space in the <u>Lansing State Journal</u>. Excluding the manufacturers' ads which were almost exclusively meat advertising 18.6 percent of this was for meat. (Table I) When firm G was excluded, meat advertising space was 17.6 percent of total food advertising space for the remaining combination grocery and meat stores. The percentage of the advertisements which was meat remained fairly constant throughout the year.

#### Individual Firms

The relation between meat advertising space and food advertising space is shown in Table I. Firm G which was primarily a meat market had sixty-one percent of its space for meat advertising. Meat advertising space was the lowest percentage of food advertising space for firm F. About thirteen percent of firm F's newspaper advertising space was for meat. Firm D was just a little higher. The rest of the firms fell in the range of fifteen to twenty-five percent.

Firm A used the most total meat advertising space. They used more than twice as much meat advertising space as firm G, the advertiser using the least total space in this study. Firm G's ads were generally smaller than those of the other firms studied. Also firm G had fewer ads. The total amount of meat advertising space varied from twenty to a little more than fifty-five thousand agate lines.

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## TABLE I

MEAT ADVERTISING SPACE RELATED TO TOTAL FOOD ADVERTISING SPACE, LANSING STATE JOURNAL, 1956

Store	Total Food Advertising Agate Lines	Total Meat Advertising Agate Lines	Meat Percent of Food
A	218,694	55,344	25.3
В	272,174	52,935	19.5
С	228,508	44,985	19.7
D	300,454	39,607	13.2
E	218,050	36,428	16.7
F	239,904	30,354	12.7
G	31,598	20,706	65,5
Total	1,509,382	280,359	18.6

#### Space Allocation among Meat Items

#### Broad Meat Groups

There was wide variation in the number of agate lines of advertising space going to the different meat groups. A meat group includes classifications such as beef, pork, poultry, etc. Table II shows the allocation of advertising space among the different meat groups. Pork received the most advertising space. Slightly more than one-third of all meat advertising space was for pork. Beef was second, receiving a little less than onefourth of the total space. Poultry received slightly less advertising space than beef. Cold meats, veal, fish, and lamb and mutton followed in that order.

#### Specials by Retail Cuts

Specials were recorded as the retail cuts which were advertised rather than as beef, pork, etc. There were about fiftynine retail cuts of fresh meat listed in the Michigan State University Consumer Panel Diary. About eighteen of these cuts were featured fairly regularly throughout the year. The allocation of meat advertising for specials among these items is shown in Table III. The space for specials includes space for both primary and secondary specials. Combining the two gave the best representation of the advertising of each of the meat items. The data in Table III contains the advertising space used by all the firms in this study for specials.

### TABLE II

# ALLOCATION OF MEAT ADVERTISING SPACE AMONG MEAT PRODUCTS. LANSING STATE JOURNAL, 1956

Meat Product	Space Agate Lines	Percent of Total
Pork	103,794	33.7
Beef	74,348	24.1
Poultry	67,591	22.0
Cold Meats	27,325	8.9
Veal	10,722	3.4
Fish	9,529	3.1
Lamb and Mutton	3,496	1.1
Other *	11,470	3.7
Total	307,897	100.00

<sup>\*</sup>Other includes brand advertisements and space which did not fall in one of the above categories.

## TABLE III

Product	Space Agate Lines
Broilers	31,412
Ham	21,290
Chuck roast	16,809
Turkey	14,473
Pork roast	13,701
Round and swiss steak	11,509
Ground beef	10,554
Bacon	7,785
Picnic hams	5,674
Veal roast	4,692
Spareribs	2.605
Stewing chicken	2,305
Weiners	1,976
Beef liver	1,325
Sirloin steak	1,325
Beef rib roast	1,267
Lamb roast	1,126
Veal chops and steaks	1,070

## ALLOCATION OF MEAT ADVERTISING SPACE AMONG MEAT ITEMS, LANSING STATE JOURNAL, 1956\*

'Includes only space as specials

Broilers were given more space than any of the other meat items. Ham was the second most featured item and chuck roast was next after ham. Turkey, pork roast, round and swiss steak, ground beef, bacon, picnic hams, veal roast, spareribs, stewing chickens, beef liver, sirloin steak, beef rib roast, lamb roast, and veal were next in that order.

The fact that broilers were priced favorably relative to other meats during 1956 may have been one of the reasons they were featured so often. They were found to be an item which drew a big response when featured at a special price. Large size advertisements could be used for broilers because they had a big enough sales volume to make the advertising cost per unit of sales relatively small.

Over the past several years there has been an uptrend in the consumption of broilers. The increased efficiency in the broiler industry in recent years has made possible the marketing of broilers at lower prices. Previously broilers were sort of a special treat and they were not usually served as frequently as some other meats. Because of increased efficiency, broiler production has increased rapidly and taken over a large place in the diet of the American consumer. Broilers are now rather uniform in quality. When they are advertised the consumer knows about what the product is in size and quality and how far it will go toward making a meal.

Next to broilers, ham received the most promotion. Ham is a product that had wide appeal. During Easter and New Years

there is a tremendous increase in the quantity of ham purchased. These are the times ham received the most newspaper advertising.

Chuck roast was the third most promoted item. It is an important item in the American diet and an item that sells in large volume throughout the year. Thus it is one which should draw the attention of a large number of the readers when advertised.

#### Advertising Patterns by Days of the Week

The food retailers in this study used the most advertising space on Wednesday and Thursday. There was usually about the same amount of food advertising space on these two days. Usually more firms had advertisements in the newspaper on Monday than any other day of the week but they were usually of a smaller size. Table IV shows the day of the week the stores in the study advertised and the approximate pair of a page they used each day. Bazley-Junedale was the only store that did not follow the practice of having some sort of advertisement in the Monday newspaper. Bazley-Junedale usually ran a small advertisement in the Sunday issue. National Market Basket was the only regular advertiser on Tuesday. Occasionally the A and P or Wrigley's ran an ad on Tuesday. A and P, Bazley-Junedale, Kroger, and Wrigley's were regular advertisers on Wednesday. The Thursday newspaper regularly contained National Market Basket, Schmidts, and Shop Rite advertisements. Occasionally Wrigley's had an advertisement in the Thursday paper. It was a rare occasion when there was a food advertisement on Friday of Saturday,
# TABLE IV

Store	Sunday	Monday	Tuesday	Wednesday	Thursday
A and P	1/2**	1/2	1/2**	1	
Bazley-Junedale	1/8			1/4	
Kroger		1/2		1	
National Market Basket		1/2	1/2		2
Schmidts		3/4			1
Shop Rite		1/3			1
Wrigleys		1/2	1**	1	

# DISTRIBUTION OF ADVERTISING SPACE BY THE DAY OF THE WEEK\*

\*Advertising space by pages

\*\*Appeared only occasicnally

Since retail food stores usually have their largest volume of sales on Friday and Saturday, the Wednesday and Thursday ads carried the store's story to the shopper in time for her to read it before she stocked up on groceries and meats.

# Variation in Meat and Grocery Advertising Space throughout the Year

#### Variation in All Food Advertising

An index of variation in all food advertising space by four-week periods is given in Table V. Each index number represents the percent food advertising space in that four-week period was of the average for all thirteen four-week periods. The amount of food advertising space throughout 1956 appeared to remain rather stable. The largest variations in grocery advertising were in the fourth and fifth four-week periods. Advertising space was twenty-eight percent greater than the yearly average during these periods. The least amount of advertising was done in period one. Period one was 26 percent below average

#### Variation in Advertising Space for All Meat

The amount of advertising space for all meat did not vary as much as did the amount of space for the various meat groups. Four-week periods four, nine, and twelve had the greatest amount of advertising space. Periods one, six and eleven had the least. Period one seemed to be a period of both low food advertising and low meat advertising. The broad periods of greater than the usual

INDEX OF VARIATION IN ADVERTISING SPACE IN 1956.

TABLE V

\*Percent of yearly average

amount of advertising space appeared to be around Easter, about the time school started in the fall, and the Thanksgiving and Christmas holiday periods.

### Variation in Advertising Space for Different Meat Groups

The amount of newspaper advertising space varied greatly from one part of the year to another for most of the broad meat groups. The amount of advertising space devoted to any one type of meat was probably influenced by prices, seasonal supplies, and people's eating habits.

Advertising space for pork varied from 61 percent of the mean to 157 percent of the mean. The fourth four-week period of the year had the heaviest advertising. The twelfth four-week period was second with 128 percent of the mean. These were periods of low price and seasonally heavy supplies of hogs on the market.

The four-week period of lowest advertising was period six. This was an early summer period when hog supplies are usually light and prices seasonally high. It is a period during which people usually eat less pork because of the higher temperatures.

Seasonal variation in the advertising of beef probably deviated from normal in 1956. The usual seasonal pattern seemed to be altered by a general upward trend in prices throughout 1956. Generally prices rise in the spring and early summer and then decline in the fall.

There was generally less advertising space for beef in the last part of 1956 than for the first part. It was below the

. 

yearly average from the sixth four-week period to the end of the . year. Advertising for beef was lowest in the eighth four-week period when it was fifty percent of the average. Beef received the most advertising in the third period. Advertising during that period was 183 percent of normal. The fifth four-week period was second highest at 128 percent of the average.

The amount of advertising space for poultry increased throughout 1956. Four-week periods one, two and three had less advertising space for poultry than any others. The greatest amount of advertising space was used for poultry in periods five, nine and twelve. The twelfth four-week period had the greatest amount of advertising for poultry. During that period it was 202 percent of the yearly average. Part of this large amount above the average can be credited to increased promotion of turkeys during the Thanksgiving period. During this period consumption of turkey was much higher than the average for the year. Advertising was one means of competing for customers at this time.

Cold meats received the most promotion during the summer months. During this period there is more of a demand for cold meats. The four-week periods seven and nine received the greatest amount of newspaper advertising for cold meats. Advertising was 205 percent of the yearly average in period seven. There was only a small amount of advertising of cold meats in the first and the last part of the year. Advertising in period ore was only twentyone percent of the yearly average.

Lamb and mutton were never featured very heavily. Perhaps this was because the volume sold in Lansing is comparatively small. Lamb and mutton were advertised most in four-week periods one, three and eleven. They were advertised least in periods five, six, and seven which was the summer season.

Veal was a relatively more important item than lamb and mutton as far as the amount of advertising space it received. Veal received about three times as much advertising space as lamb and mutton. The peak periods for advertising of veal were seven, ten and thirteen. Periods two, eleven and twelve received very little advertising for veal.

Advertising space for fish varied from one part of the year to another. The period which included lent received the greatest amount of advertising space for fish. Fish was advertised relatively little the last three periods of the year.

# Variation for Particular Meat Items Featured as Specials

Most of the firms in this study regularly featured some meat item as a special. Meat items which were specials were recorded under the classification of the particular retail cut. Otherwise advertisements for the retail cuts were recorded as beef or pork or one of the other broad meat groups.

Table VI shows the variation in advertising space for featuring different meat items as specials by four-week periods throughout 1956.

TABLE VI

VARIATION IN NEWSPAPER ADVERTISING SPACE FOR FEATURING MEAT PRODUCTS STATE JOURNAL, DURING 1956 AS SPECIALS IN THE LANSING

Broilers were the meat item receiving the most space for the year. The amount of advertising space for featuring broilers increased from period one through period five, then it decreased from period five to period nine. It increased again in periods nine and ter and decreased in periods eleven and twelve. The greatest amount of space was devoted to promoting broilers in periods four, five, and six and the least in periods one and two.

Ham was the second most advertised meat item. There were sizeable variations in the amount of advertising space devoted to featuring ham as a special. The most newspaper advertising of ham was done in the spring and in the fall. Period four which included Easter was the highest single period. Ham was featured least in period twelve. During the first seven four-week periods advertising for ham would alternate up and down from period to period. After period eight, advertising increased to a peak in period ten. It then decreased in eleven and twelve.

Chuck roast received the most special advertising of any beef item. The amount of advertising space for chuck roast alternated up and down from period to period, but there did not appear to be any broad seasonal pattern. Chuck roast received the most promotion in the third four-week period and the least promotion in the fourth four-week period.

Round and swiss steek were featured fairly often throughout the year. They appeared to receive less advertising during the summer months. Periods three and eight received the most advertising space.

Ground beef was featured most during the spring and summer months. It was featured least in the fall and winter months. Four-week periods four and seven were equal and were the periods of greatest advertising of ground beef.

Another poultry item receiving considerable advertising space was turkey. Turkey was an item featured in the last half of the year only. Advertising space for turkey was greatest in periods twelve and thirteen.

There were other meat items which received sizeable amounts of advertising space throughout the year but they were not featured as regularly as the items just described.

#### Summary

There were certain apparent patterns in meat and grocery advertising in Lansing during 1956. For instance, one meat item usually received more advertising space in a particular week than any of the other meat items featured that week. The following week a different meat item usually received the most advertising space. Many times several firms featured a particular meat item in the same week. During the weeks preceding Easter, Thanksgiving, and Christmas practically all firms featured the same meat item. But one firm rarely featured the same meat item for two consecutive weeks.

Certain meat products appeared to be more highly favored for advertising than others. Pork received more advertising space

than any other meat group. Beef was next with poultry following close behind.

Broilers were the most advertised meat item. Ham was second and chuck roast third.

The amount of advertising space for meat was lowest in the first fcur-week period of the year. The amount of space used for meat advertising continued to increase until about Easter and then decreased. There was a less than average amount of meat advertising space used during the summer. The amount of space used increased to above average about the time school started. Then it decreased to another low in period eleven. In periods twelve and thirteen it increased to above average again.

The firms studied followed a pattern of advertising regularly on certain days of the week. The largest food advertising sections were usually in the Wednesday and Thursday newspapers. The amount of newspaper advertising space used by each firm stayed about the same from week to week. The amount of food advertising space devoted to meat varied considerably among firms. For the seven firms in the study meat advertising space averaged about seventeen percent of food advertising space.

#### CHAPTER III

# RELATION BETWEEN MICHIGAN STATE UNIVERSITY CONSUMER PANEL MEAT PURCHASES AND NEWSPAPER ADVERTISING SPACE

The analysis presented in this chapter was an attempt to test the hypothesis that the week-to-week variations in the amount of advertising space for meat were directly related to the quantity of meat purchased. This general hypothesis was divided into two parts. The first sub-hypothesis was that the amount of newspaper advertising space featuring retail cuts as specials was directly related to the number of pounds of the meat item purchased. The second sub-hypothesis was that the amount of newspaper advertising space by a particular firm was directly related to the quantity of meat which was purchased at that firm.

Two sources were selected from which to secure the data needed to test the hypotheses. The source for measurements of meat advertising space was the <u>Lansing State Journal</u>. The selection of this source was discussed in Chapter II. The other source of data was the Michigan State University Consumer Panel which furnished weekly data on the price and quantity of meat purchased at each store.

This chapter is primarily a presentation of the statistical analysis. The conclusions and further interpretation are presented in Chapter IV.

## Procedures and Techniques Used

Simple graphic procedures were used to examine the relationship among meat purchases, meat prices, and advertising space. It was reasoned that a thorough analysis by the graphic method should precede the use of more complicated mathematical methods. Both multiple and simple correlation techniques were used to obtain more precise estimates of the relationship observed through graphic analysis.

Scatter diagrams of the relationship between pairs of variables on arithmetic scales were used to see if a linear relationship existed. A linear relationship between the explanatory and dependent variables was accepted as reasonable and practical.

The choice of variables to be included in the model was influenced by the nature of the consumer market for meat, and the availability of data. The equation chosen to explain the weekto-week variations in the quantity of different meats purchased expressed the weekly average quantity purchased per family of a particular meat as a function of the price of that meat, the prices of competing meats, temperature, and advertising.

Observations from forty-eight weeks of the year 1956 were used in the regression analysis. The major holiday weeks (Easter, Thanksgiving, Christmas, and New Years) were not included. It was noted that during these periods tremendous changes occurred in the quantities of different kinds of meats purchased. Due to customs developed over the years, Thanksgiving and Christmas are holidays

when poultry meats are traditionally served. At Easter ham has become a popular item. Because these holiday customs cause purchases of some meats to more than double and decrease the quantity of other meats purchased weeks 13, 47, 51, and 52 were not included in the regression analysis.

There were several strong arguments for the use of weekly observations. One argument was that retailers usually adjust meat prices on a weekly basis. Another argument for weekly data was that each week a different meat item was usually featured as a special. Also most families shopped for meat once a week or oftener.

Equations were set up to explain purchases of eight meat products. They were ham, pork roast, all pork, chuck roast, ground beef, round or swiss steak all beef, and broilers.

# Relation between Newspaper Advertising Space and Pork Purchases

### Ham

Ham was the pork item receiving the most advertising space as a special. Figure 1 shows the week-to-week relationship among the number of agate lines of advertising space for featuring ham as a special, the number of pounds of ham purchased by Michigan State University Consumer Panel members, and the average price per week paid for ham by consumer panel members.

There were twenty-three weeks in the year when ham received no advertising space as a special. In the other twenty-nine



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weeks of the year the amount of advertising space varied from a low of eighty-two agate lines in week twenty-four to a high of 4,070 agate lines in week thirteen which was the week preceding Easter. Due to a custom developed through the years ham has become a popular item at Easter. Week thirty-nine, the week of next to the highest amount of advertising, received 2,255 agate lines.

The quantity of ham purchased in week twenty-four amounted to .13 pound per person. In week thirteen (Easter) it amounted to .69 pound per person. In week thirty-nine purchases were at a rate of .18 pound per person. The quantity of ham purchased by consumer panel members varied from a low of .05 per pound per person in week ten to a high of .69 pound per person in week thirteen. Week fifty-two, which preceded New Years, was the week of second highest purchases with .42 pound per person. Exclusive of Easter and New Years, week thirty-five was the highest with the quantity purchased at .24 pound per person. There were 2,231 agate lines of advertising space featuring ham as a special in week thirty-five.

In most cases the weeks of larger than normal amounts of advertising space were weeks when larger than normal quantities of ham were purchased by consumer panel members. During these weeks prices also tended to be low. Weeks 21, 35, and 39 are good examples of when these relationships were observed. (See Figure 1)

The price of ham varied from a low of fifty-five cents a pound in week eight to a high of eighty-three cents a pound in week thirty-seven. Figure 2 shows the relationship between the quantity of ham purchased and the price of ham. In an attempt to determine if the demand for ham was different in weeks when there was an above average amount of advertising space, the weeks of over 400 agate lines of advertising space were distinguished from the other weeks of the year. The average amount of space per week was just less than 400 agate lines. The weeks of heavier advertising are represented by X's and the other weeks are represented by dots (Figure 2).

The quantity of ham purchased was extremely high during the weeks preceding Easter and New Years. If these two weeks are excluded, the scatter of observations for weeks of above 400 agate lines of advertising space seem to conform to a straight line demand curve above the curve that appears to fit the scatter for weeks of less than 400 agate lines of advertising. The slope of both curves appeared to be the same. This would indicate that in weeks of over 400 agate lines of advertising space, the quantity of ham purchased at various prices was greater than the quantity purchased at the same prices in weeks when there was less than 400 agate lines.

The regression equation representing the relationship between  $Y_6$  the quantity of ham purchased and  $X_1$  the price of beef,  $X_3$  the price of broilers,  $X_4$  temperature.  $X_8$  the price



of ham, and  $X_{15}$  advertising space featuring ham as a special, was as follows:

Quantity of ham  $(Y_6) = 26.5861 + .0089 X_1 - .0512 X_3 + .2070 X_4 - (.1292) (.4823) (2.1181)$   $.2007 X_8 + .0043 X_{15}$  (2.2725) (4.5526) $\overline{R} = .69$ 

The figures in parentheses represent the t values for the regression coefficients. According to the t test advertising space for ham was significant at the one percent level as a factor affecting the quantity purchased.<sup>1</sup> To express the relationships which are presented in arithmetic form by the regression equations in terms which are easier to interpret conversion, was made to percentage variations at the mean. This indicated that according to the regression coefficient a ten percent increase in the amount of advertising space for ham would have been associated with a 1.06 percent increase at the mean in the quantity purchased. On this basis an increase of 176 agate lines or one full page of advertising space by these seven retailing firms in the Lansing area would have been associated with an increase of 5.79 percent at the mean in the quantity purchased by the Michigan State University Consumer Panel.

<sup>&</sup>lt;sup>1</sup>With 43 d. f., t .01 - 2.696. With 43 d. f., t .05 = 2.017. Based on table of t values, George W. Snedecor, <u>Statistical Methods</u>, 4th ed. (Ames, Iowa: Iowa State College Press, 1946), p. 65.

The price of ham and temperature were both significant at the five percent level as factors affecting purchases of ham. The regression coefficients indicated a five cent per pound increase in the price of ham was associated with a 7.65 percent decrease at the mean in the quantity of ham purchased. Temperature appeared to have an opposite effect on the purchase of ham. According to the regression coefficient, an increase in the mean daily temperature from 63° F to 73° F was associated with an increase of 15.68 percent in the quantity of ham purchased.

A t test showed that the regression coefficients for the price of beef and the price of broilers were not significant at the five percent level. Although the price of beef did not appear to be significant its sign agreed with logical reasoning. It indicated an increase in the price of beef would have been assiated with an increase in the quantity of ham purchased. The negative coefficient for the price of broilers was questionable.

The coefficients of simple correlation between some of the variables are included to give an indication of the level of intercorrelation. Intercorrelation may be defined as correlation between explanatory variables.<sup>2</sup>

<sup>&</sup>lt;sup>2</sup>Karl A. Fox. and J. F. Cooney, <u>Effects of Intercorrelation</u> <u>upon Multiple Correlation and Regression Measures</u> (Washington, 25. D. C.: USDA, Agricultural Marketing Service, April 1954). Pamphlet.

The coefficient of simple correlation between the amount of advertising space for ham and the quantity purchased was .67 . There was a coefficient of simple correlation of -.41 between the price of ham and the quantity purchased. The coefficient of simple correlation between the price of ham and advertising was -.41 . The correlation coefficient between the price of ham and temperature was .36 .

### Pork Roast

The week-to-week relationship among the amount of advertising space for featuring pork roast as a special, the number of pounds of pork roast purchased by Michigan State University Consumer Panel members, and the average price per week paid by consumer panel members is shown in Figure 3.

There were twenty-three weeks in the year when there was no advertising space for pork roast as a special. In the other twenty-nine weeks the emount of advertising space varied from a high of 1,582 agate lines in week two to a low of eighty-six agete lines in week three. The quantity of pork roast purchased by consumer panel members amounted to .15 pound per person in week two. In week three it amounted to .13 pound per person. The quantity of pork roast purchased by consumer panel members throughout the year varied from a high of .21 pound per person in week eleven to a low of .02 pound per person in week twenty-four. There were 1,424 agate lines of advertising space featuring pork roast in week eleven. In week twenty-four there was no advertising space for



featuring pork roast as a special. This gives an indication that the weeks when the larger quantities of pork roast were purchased were associated with sizable amounts of newspaper advertising space for pork roast.

The regression equation representing the relationship between  $Y_7$  the quantity of pork roast purchased and  $X_1$  the price of beef,  $X_3$  the price of broilers,  $X_4$  the temperature,  $X_9$  the price of pork roast, and  $X_{16}$  the amount of advertising space for featuring pork roast as a special was as follows:

Quantity of pork roast

 $(Y_7) = 6.8982 + .2185 X_1 + .0553 X_3 - .2475 X_4$ (1.2069) (.8794) (4.3700) - .2485 X\_9 + .0037 X\_{16} (4.4975) (5.0926)  $\overline{R} = .87$ 

A t test indicated that advertising space was a highly significant factor in the equation explaining the quantity of pork roast purchased. According to the regression coefficient a ten percent increase in the amount of advertising space for pork roast would have been associated with a 1.15 percent increase at the mean in the quantity purchased. On this basis an increase of 176 agate lines or one full page in the amount of advertising space would have been associated with a 7.15 percent increase at the mean in the quantity of pork roast purchased.

The price of pork roast and temperature were significant at the one percent level as factors affecting purchases of pork

roast. The regression coefficient indicated that a five cent a pound increase in the price of pork roast would have been associated with a 12.98 percent decrease at the mean in the quantity purchased. The average price paid for pork roast varied from a low of thirty-five cents a pound in week eleven to a high of fifty-eight cents a pound in week twenty-three. The effect of temperature also appeared to be negative. According to the reggression coefficient a rise in the mean daily temperature from 63° F to 73° F would have been associated with a 25.86 percent decrease in the quantity of pork roast purchased.

There was a coefficient of simple correlation of .67 between the number of agate lines of advertising space featuring pork roast and the quantity purchased. The coefficient of simple correlation between the price of pork roast and the quantity purchased was -.79. The correlation coefficient between the price of pork roast and advertising was -.41.

# All Pork

Pork was the meat group receiving the largest number of agate lines of newspaper advertising space. It received almost ten percent more advertising space than beef. The weekly relationship among the number of agate lines of advertising space for pork, the number of pounds of pork purchased per person by Michigan State University Consumer Panel members, and the average price per pound paid by consumer panel members is shown in Figure 4.

The amount of advertising space for all pork varied from a low of 522 agate lines in week forty-seven (Thanksgiving) to a



high of 8,875 agate lines in week thirteen (Easter). Week fifty-one (Christmas) had the second highest amount of advertising for all pork. If these two holiday periods are excluded the greatest amount of advertising was 3,350 agate lines in week thirty-five.

In week forty-seven the quantity of pork purchased by Michigan State University Consumer Panel members was .59 pound per person. In week thirty-five pork purchases were .79 pound per person. The quantity of pork purchased per week throughout the year varied from a low of .48 pound per person in week twentyfour to a high of 1.31 pound per person in week thirteen (Easter). There were 595 agate lines of advertising space for pork in week twenty-four, the week when the smallest quantity of pork was purchased.

During 1956, the average price paid by consumer panel members for pork varied from a low of forty-five cents a pound in week one to a high of sixty cents a pound in week thirty-seven.

The regression equation representing the relationship between  $Y_5$  the quantity of pork purchased and  $X_1$  the price of beef,  $X_2$  the price of pork,  $X_3$  the price of broilers,  $X_4$  the temperature, and  $X_{14}$  advertising space for pork was as follows:

Quantity of pork

 $(Y_5) = 80.4368 + .1255 X_1 - .5457 X_2 + .0803 X_3$ (.1987) (1.7078) (.3703) - .3510 X\_4 + .0045 X\_{14} (1.6612) (3.7899)  $\overline{R} = .67$  Advertising was significant at the one percent level as a factor affecting purchases of pork. According to the regression coefficient a ten percent increase in the amount of advertising space for pork would have been associated with an increase of 1.19 percent at the mean in the quantity purchased.

Although the t value of the regression coefficient for the price of pork was not large enough to be significant at the five percent level it was large enough to indicate some importance. The sign of the coefficient was correct according to logical reasoning. It indicated an increase in the price of pork would have been associated with a decrease in the quantity purchased.

The regression coefficient for temperature was not significant. However, the sign of the regression coefficient was correct according to logical reasoning. It indicated an increase in the temperature above 63° F would have been associated with a decrease in the quantity of pork purchased.

The t test showed that the regression coefficients for the price of beef, and the price of broilers were not significant at the five percent level. The signs indicated that an increase in the price of either one of these meat products would have been associated with an increase in pork purchases.

There was a coefficient of simple correlation of .55 between the amount of advertising space for pork and the quantity purchased. The coefficient of simple correlation between the price of pork and the quantity purchased was -.53 . The correlation coefficient between the price of pork and advertising was -.22. The correlation coefficient between the price of pork and the price of beef was .51.

It appeared from the analysis that weeks of larger than normal purchases were associated with sizable amounts of advertising space for pork.

Relation between Advertising Space and Beef Purchases

## Chuck Roast

Chuck roast was the retail cut of beef which received the most advertising space as a special. Figure 5 shows the week-toweek relationship among the amount of advertising space for featuring chuck roast as a special, the number of pounds per person purchased by Michigan State University Consumer Panel members, and the average price per week paid by panel members for chuck roast.

There were nineteen weeks during which there was no advertising of chuck roast as a special. During the remaining thirty-three weeks the amount of advertising space featuring chuck roast varied from a low of twenty-seven agate lines in week six to a high of 1,330 agate lines in week thirty-six. Among the weeks in which there was no advertising space the quartity of chuck roast purchased varied from a low of .07 pound per person to a high of .18 pound per person. During the weeks when chuck roast was featured as a special the quantity purchased per person varied from a low of .11 pound in week thirty-six to a high of .23 in week twelve. The average price of chuck roast in week thirty-six was forty-five cents a pound. In week twelve the average price was

forty cents a pound. The average weekly price varied from forty cents a pound in week twelve to fifty-seven cents a pound in week forty-four. There was an upward trend in the price of chuck roast throughout the year and a downward trend in purchases.

It appeared from Figure 5 that the amount of advertising space featuring chuck roast varied inversely with the price of chuck roast. It also appeared the quantity of chuck roast purchased was closely related to the price of chuck roast.

Figure 6 shows the relationship between the number of pounds of chuck roast purchased by consumer panel members and the average price per week paid for chuck roast. The weeks when there were over 325 agate lines of advertising space were distinguished from the other weeks in the year in an attempt to determine if the positior of the demand schedule was any different in the weeks of an average amount of advertising space for chuck roast. The average amount of advertising space for chuck roast per week was 325 agate lines. The weeks when there were over 325 agate lines of advertising space featuring chuck roast are represented by the X's and the weeks when there were 325 agate lines or less are represented by the dots. There was little evidence shown in Figure 6 to indicate that the demand curve was shifted by an above-average amount of advertising.

The regression equation representing the relationship between  $Y_2$  the quantity of chuck roast purchased and  $X_2$  the price of pork.  $X_3$  the price of broilers,  $X_4$  the temperature,  $X_5$  the price of chuck roast, and  $X_{11}$  advertising space devoted




to featuring chuck roast as a special was as follows:

Quantity of chuck roast

$$(Y_2) = 41.1052 - .0208 X_2 + .0111 X_3 - .3070 X_4$$
  
(.2001) (.1384) (4.2268)  
- .4961 X\_5 - .10001 X\_{11}  
(4.5345) (.1476)  
 $\overline{R} = .79$ 

The t value of the regression coefficient was not large enough to show that advertising was significant as a variable affecting the quantity purchased. The sign of the coefficient did not agree with logical reasoning. The sign indicated an increase in advertising would have been associated with a decrease in the quantity of chuck roast purchased.

The price of chuck roast was significant at the one percent level as a factor affecting the quantity purchased. The regression coefficient indicated a five cent per pound increase in price would have been associated with a 15.61 percent decrease at the mean in the quantity of chuck roast purchased.

The t value for temperature showed it was significant at the one percent level as a factor affecting the quantity purchased. According to the regression coefficient an increase in the mean daily temperature from 63° F to 73° F would have been associated with a decrease of 19.33 percent at the mean in the quantity purchased.

According to the results of the t test the regression coefficients for the price of pork, and the price of broilers were not significant. The regression coefficient of the price of broilers agreed with logical reasoning, indicating an increase in the price of broilers would have been associated with an increase in the quantity of chuck roast purchased. It appeared doubtful that the negative sign on the coefficient for the price of pork represented a true structural relationship. The negative sign indicated an increase in the price of pork would have been associated with a decrease in the quantity of chuck roast purchased.

There was a coefficient of simple correlation of -.64 between the price of chuck roast and the quantity purchased. The coefficient of simple correlation between temperature and the quantity of chuck roast purchased was -.58. The correlation coefficient between advertising and the price of chuck roast was -.40. The correlation coefficient between the price of pork and the price of chuck roast was -.64.

### Round and Swiss Steak

Figure 7 shows the week-to-week relationship among the number of agate lines of newspaper space featuring round or swiss steak as a special, the number of pounds of round and swiss steak purchased per person by consumer panel members. and the average price per week paid by Michigan State University Consumer Panel members.



There were twenty-three weeks in the year when there was no newspaper advertising space for round or swiss steak as a special. During the remaining twenty-nine weeks the amount of advertising space varied from a low of seventy-four agate lines in week thirty to a high of 1,256 agate lines in week ten. The quantity of round and swiss steak purchased by consumer panel members varied from a low of .04 pound per person in week fortyseven (Thanksgiving) to a high of .13 pound per person in week twenty-three. The quantity of round and swiss steak purchased by consumer panel members in week ten, the week of greatest advertising, amounted to .12 pound per person. The amount of advertising space for steak in week twenty-three, the week when the largest quantity was purchased was 399 agate lines.

The price for steak varied from fifty-nine cents a pound in week eleven to seventy-six cents a pound in week forty-one.

The regression equation representing the effect of  $X_2$ the price of pork,  $X_3$  the price of broilers,  $X_4$  the temperature,  $X_7$  the price of steak, and  $X_{13}$  advertising space featuring round or swiss steak as a special, on  $Y_4$  the quantity of steak purchased by consumer panel members was as follows:

Quantity of round and swiss steak

 $(Y_4) = 22.2279 + .0138 X_2 + .0630 X_3 + .0364 X_4$ (.1457) (1.2520) (.6715) - .2600 X\_7 + .0011 X\_{13} (3.2824) (1.5992)  $\overline{R} = .56$ 

Although the t value of the regression coefficient for advertising was not large enough to show it was significant at the five percent level as a factor affecting the quantity of steak purchased, the sign of the coefficient agreed with logical reasoning. It indicated an increase in the amount of advertising space would have been associated with an increase in the quantity of steak purchased. Advertising appeared to have more effect on purchases of steak than chuck roast but the regression coefficients were non-significant in both cases.

The t test showed the price of steak was significant at the one percent level as a factor affecting the quantity purchased. According to the regression coefficient a five cent a pound increase in price would have been associated with a 15.30 percent decrease at the mean in the quantity of steak purchased.

The regression coefficients for the price of pork, and the price of broilers were not significant at the five percent level. However, their signs agreed with logical reasoning which would indicate that a rise in the price of these competing meats would be associated with an increase in the quantity of steak purchased.

There was a coefficient of simple correlation of -.56 between the price of steak and the quantity purchased. The coefficient of simple correlation between advertising and the quantity of steak purchased was .23. The correlation coefficient between advertising and the price of steak was .04. There was a relatively high correlation coefficient of .66 between the price of steak and

the price of pork. It seemed possible that the intercorrelation between the price of steak and some of the other independent variables was great enough to seriously affect the regression results.

### Ground Beef

Ground beef was one of the more highly featured beef items. Figure 8 shows the week-to-week relationship between the number of agate lines of newspaper advertising space for featuring ground beef as a special, the number of pounds of ground beef purchased by consumer panel members, and the average price per week paid by consumer panel members for ground beef.

There were twenty-one weeks throughout the year when ground beef received no advertising space as a special. The amount of advertising space for ground beef in the remaining thirty-one weeks varied from fifty agate lines in week forty-five to 1,140 agate lines in week twenty-eight. The quantity of ground beef purchased by consumer panel members varied from a low of .33 pound per person in week fifty-two (New Years) to a high of .47 pound per person in week thirty-nine. Ground beef received no advertising space as a special in either week thirty-nine or week fifty-two. Week twenty-eight, the week of greatest advertising, panel members purchased a quantity of ground beef which amounted to .42 pound per person.

The average price per week for ground beef varied from forty to forty-three cents a pound. From week seven to week



fifty-two the average price per week varied less than one-half cent a pound.

The equation explaining how the number of pounds of ground beef purchased by consumer panel members  $Y_3$  was related to  $X_2$ the price of pork,  $X_3$  the price of broilers,  $X_4$  the temperature,  $X_6$  the price of ground beef, and  $X_{12}$  the amount of advertising space devoted to featuring ground beef as a special was as follows:

Quantity of ground beef

A t test showed advertising was not significant as a factor affecting the quantity of ground beef purchased by the consumer panel. It is doubtful if the negative coefficient represents the actual effect of advertising on consumer purchases of ground beef.

A t test showed that the price of ground beef was significant at the five percent level as a factor affecting the quantity of ground beef purchased. According to the regression coefficient a five cent per pound increase in the price of ground beef would have been associated with 10.38 percent decrease at the mean in the quantity purchased. The t value for the price of pork showed it was significant at the one percent level. The regression coefficient indicated a five cent per pound increase in the price of pork would have been associated with a 6.31 percent increase at the mean in the quantity of ground beef purchased.

The regression coefficients for the price of broilers and temperature were not significant at the five percent level. The negative sign for the temperature coefficient indicated an increase in temperature tended to reduce the quantity of ground beef purchased. It is doubtful whether the negative sign for the coefficient of the price of broilers represented the actual effect of a rise in the price of broilers on the quantity of ground beef purchased.

There was a coefficient of simple correlation of -.03 between advertising and the quantity of ground beef purchased. The coefficient of simple correlation between the price of ground beef and the quantity purchased was -.09. There was a correlation coefficient of -.45 between the price of ground beef and advertising. There was a correlation coefficient of .54 between the price of pork and the quantity of ground beef purchased. It appeared that intercorrelation among variables was great enough to seriously affect the regression results for ground beef.

## All Beef

The relationship among the weekly changes in the amount of newspaper advertising space for all beef, the quantity of beef

purchased per person by Michigan State University Consumer Panel members, and the average price per pound paid for beef by panel members is shown in Figure 9. In most weeks the amount of advertising space and the quantity of beef purchased appeared to move in the same direction from week to week.

The amount of advertising space used for beef varied from a low of ninety-five agate lines in week thirteen (Easter) to a high of 3,528 agate lines in week fifty. In week thirteen a quantity of beef amounting to .93 pound per person was purchased by consumer panel members. In week fifty the quantity of beef purchased amounted to 1.07 pound per person. The quantity of beef purchased throughout the year varied from a low of .75 pound per person in week fifty-two (New Years) to a high of 1.12 pounds per person in week twenty-three. In week fifty-two 335 agate lines of newspaper advertising were used for beef. In week twenty-three 2,232 agate lines of newspaper advertising space were used for beef.

The average price paid for all beef varied from a low of forty-nine cents a pound in week sixteen to a high of fifty-six cents a pound in week thirty-five. The price of beef was on a general upward trend throughout the entire year of 1956.

The regression equation which expressed the quantity of beef purchased  $Y_1$  as a function of  $X_1$  the price of beef,  $X_2$ the price of pork,  $X_3$  the price of broilers,  $X_4$  the temperature, and  $X_{10}$  advertising space for all beef products was as follows:



Quantity of beef purchased

 $(Y_1) = 73.7507 - .1112 X_1 + .3398 X_2 + .2389 X_3$ (.2207) (1.3730) (1.3781) - .6422 X\_4 + .0036 X\_{10} (3.7982) (3.9720)  $\overline{R} = .67$ 

Advertising was significant at the one percent level as a factor affecting the quantity of beef purchased. The regression coefficient indicated an increase of ten percent in the amount of advertising space for beef would have been associated with an increase of .56 percent at the mean in the quantity of beef purchased.

According to the t test the price of beef was not significant. However, the sign of its coefficient appeared logical. It indicated an increase in the price of beef would have been associated with a decrease in the quantity of beef purchased by the consumer panel.

The t value for temperature showed it was significant at the one percent level. According to the regression coefficient an increase in the mean daily temperature from  $63^{\circ}$  F to  $73^{\circ}$  F would have been associated with a decrease of 6.40 percent at the mean in the quantity of beef purchased.

The price of pork and the price of broilers were not significant as factors affecting the quantity of beef purchased. Although the regression coefficients were not significant their signs agreed with logical reasoning. Their signs indicated a rise in the price of these competing products would have been associated with an increase in the quantity of beef produced.

There was a coefficient of correlation of .53 between advertising and the quantity of beef purchased. The correlation coefficient between the price of beef and the quantity purchased was -.37, and between the price of beef and advertising it was -.35. The correlation coefficient between the price of beef and the price of pork was .51.

The results of advertising in the regression analysis for all beef were not consistent with the results for the individual beef items. The regression coefficient for advertising proved to be significant as a factor affecting the quantity of all beef purchased. However, the regression coefficient for advertising, as a factor affecting purchases of individual beef items, was non-significant. Furthermore, the negative advertising coefficients were evidence of this inconsistency. It appears possible that intercorrelation contributed to the inconsistency observed.

## Relation between Newspaper Advertising Space and Broiler Purchases

Broilers received more advertising space as a special than any other product studied. The week-to-week relationship among the amount of advertising space featuring broilers as a special, the number of pounds of broilers purchased per person by Michigan State University Consumer Panel members. and the average price per week paid by panel members for broilers is shown in Figure 10. There were thirteen weeks in the year when broilers received no advertising space as a special. In the other weeks of the year the amount of



advertising space for broilers varied from a high of 3,249 agate lines in week twenty-four to a low of sixty-nine agate lines in week thirty-six. In week twenty-four the quantity of broilers purchased amounted to .37 pound per person. In week thirty-six the quantity of broilers purchased amounted to .15 pound per person. The quantity of broilcrs purchased throughout the year varied from a low of .09 pound per person in week nine to a high of .37 pound per person in week thirty-seven. In week nine there was no advertising space featuring broilers as a special. In week thirty-seven there were 2,085 agate lines of advertising space featuring broilers as a special. The price of broilers generally tended downward throughout the year. The quantity of broilers purchased appeared to increase during the year especially during the summer.

It appeared from Figure 10 that the amount of advertising space featuring broilers as a special was related to the number of pounds purchased by consumer panel members.

Figure 11 illustrates the change in the quantity of broilers purchased by consumer panel members as the price changed. Weekly purchases of broilers in pounds per person is plotted on the vertical axis and the average weekly price per pound paid by consumer panel members is plotted on the horizontal axis. The weeks of above 600 agate lines of advertising space were distinguished from the weeks of less than 600 agate lines of advertising space in an attempt to determine if the slope or position of the demand schedule was different in the weeks when there was an above average



amount of advertising featuring broilers as a special. There was an average of 600 agate lines of advertising per week for broilers. The weeks with more than 600 agate lines of advertising space for broilers were represented by X's and the weeks of less than 600 agate lines of advertising space were represented by dots.

The X's between a price of forty-one cents and fifty-one cents per pound would indicate a much flatter demand curve than the X's between a price of thirty-one cents and forty-one cents per pound. Apparently a price decrease from fifty-one cents to forty-one cents per pound did not increase purchases nearly as much as a decrease in price from forty-one cents to thirty-one cents per pound. The slope of the demand curve for weeks of above average advertising appeared to be the same but the demand curve for the weeks of heavier advertising appeared to be above the demand curve for the other weeks. When the price of broilers was above forty-three cents a pound there appeared to be a less direct relationship between the amount of advertising space and the quantity purchased.

The regression equation which expressed the quantity of broilers purchased  $(Y_8)$  as a function of  $X_1$  the price of beef,  $X_2$  the price of pork,  $X_3$  the price of broilers,  $X_4$  the temperature, and  $X_{17}$  advertising space devoted to featuring broilers as a special was as follows:

Quantity of broilers

 $(Y_8) = 10.4805 + .0110 X_1 + .3260 X_2 - .3260 X_3$ (.0378) (2.5600) (2.6259) + .1005 X\_4 + .0044 X\_{17} (.9973) (6.2085)  $\overline{R} = .89$ 

Advertising space for broilers proved to be a highly significant variable in the equation. The regression coefficient for advertising space indicated a ten percent increase in the amount of advertising space featuring broilers as a special would have been associated with an increase of 1.49 percent at the mean in the quantity purchased. An increase of 176 agate lines or one full page in the amount of advertising space for broilers would have been associated with an increase of 4.11 percent at the mean in the quantity purchased.

The regression coefficient for the price of broilers was significant at the five percent level. It indicated a five cent per pound increase in the price of broilers would have been associated with a decrease of 8.66 percent at the mean in the quantity of broilers purchased.

The price of pork was also significant at the five percent level as a factor affecting the quantity of broilers purchased. According to the regression coefficient a five cent a pound increase in the price of pork would have been associated with a 9.57 percent increase at the mean in the quantity of broilers purchased. A t test of the regression coefficients showed the price of beef, and temperature were not significant at the five percent level. Although they were not significant their signs agreed with logical reasoning. Their signs indicated that a rise in the price of beef would have been associated with an increase in the quantity of broilers purchased, and that an increase in the temperature above 63° F would have been associated with an increase in the quantity of broilers purchased.

The coefficient of simple correlation between advertising and the quantity of broilers purchased was .79. There was a coefficient of simple correlation of -.71 between the price of broilers and the quantity purchased. The correlation coefficient between the price of broilers and advertising was -.54.

It appeared from the analysis that the amount of advertising space was more closely related to the quantity purchased for broilers than for any of the other meats studied. An increase in advertising space from one week to the next seemed to be associated with an increase in the quantity of broilers purchased. In half of the cases, even in weeks in which the price rose from the previous week, increased advertising space was associated with an increase in the quantity of broilers purchased.

## Relation between Newspaper Advertising Space and "All Meat" Purchases

In an attempt to get a better understanding of the aggregate effect of newspaper advertising space on the quantity of "all meat"

purchased, newspaper advertising space for beef, pork, and poultry was combined and compared to the quantity of "all meat" purchased by the Michigan State University Consumer Panel. "All meat" included beef, pork, and broilers. It omitted cold meats, lamb and mutton, veal, turkey, and seafoods.

The week-to-week relationship among the number of agate lines of advertising space for "all meat," the number of pounds of "all meat" purchased by Michigan State University Consumer Panel members, and the average price of "all meat" purchased by the consumer panel is shown in Figure 12. The amount of advertising space varied from a low of 1,689 agate lines in week one to a high of 9,447 agate lines in week thirteen (Easter). Week fifty-one (Christmas) had the second highest amount of advertising space. Excluding these two weeks which were influenced by Easter and Christmas, week forty-five was the week of highest advertising with 7,590 agate lines.

The quantity purchased amounted to 1.87 pounds per person in week one. In week thirteen a quantity amounting to 2.38 pounds per person was purchased. The quantity purchased in week fortyfive amounted to 1.88 pounds per person. The quantity purchased throughout the year varied from a low of 1.50 pounds per person in week forty-seven (Thanksgiving) to 2.38 pounds per person in week thirteen (Easter). The quantity purchased in week fortyseven would have been considerably larger had turkey been included. The quantity purchased in week thirteen was larger because of increased ham purchases at Easter.



The regression equation used to represent the relationship expressed the quantity of "all meat"  $Y_0$  as a function of  $X_1$  the price of "all meat,"  $X_2$  the temperature, and  $X_3$  advertising space for "all meat." The equation was as follows:

Quantity of "all meat" purchased  $(Y_0) = 197.1232 - .1387 X_1 - .6867 X_2 + .0009 X_3$ (.7100) (2.3081) (.8911)  $\overline{R} = .43$ 

Although advertising and the price of "all meat" were not significant at the five percent level as factors affecting the quantity of "all meat" purchased the signs of their regression coefficients agreed with logical reasoning. Their signs indicated an increase in the amount of advertising space would have been associated with an increase in the quantity purchased, and an increase in the price of "all meat" would have been associated with a decrease in the quantity purchased.

Temperature was a significant variable at the five percent level. According to the regression coefficient for temperature an increase in the mean daily temperature from 63° F to 73° F would have been associated with a decrease of 3.66 percent in the quantity of "all meat" purchased.

## Relation between Newspaper Advertising Space and Meat Purchases among Firms

Only four percent of the Michigan State University Consumer Panel families bought all their meat from one store during  $1956.^2$ About one-third of the families reported buying meat from two or more sources during half of the weeks of the year. There was considerable variation from week to week in the source of major meat purchase. This plus the fact that a large number of families bought meat from more than one source each week indicated that each store must maintain a competitive meat merchandising policy. Newspaper advertising appears to be one of the most widely used means of promoting a store and its products.

The number of agate lines of meat advertising space and the number of pounds of meat purchased are shown for each firm in Table VII. The amount of meat advertising space varied from a low of 20,706 agate lines at firm G to 55,344 agate lines at firm A. The average amount used by firms A through G was 40,051 agate lines. The quantity of meat purchased varied from a low of 3,397 pounds at firm B to 13,158 pounds at firm E. Consumer panel members purchased 30,288 pounds of meat at independent stores.

The consumer panel purchased about twelve percent of their meat at firm A which had twenty percent of the total newspaper advertising space for meat. They purchased about thirteen percent of their meat at firm G which had seven percent of the total meat

<sup>&</sup>lt;sup>2</sup>James Shaffer, <u>Consumer Shopping Patterns for Meat by Michi-</u> <u>State University Consumer Panel Families in 1956</u>, Quarterly Bulletin <u>Agr. Exp. Sta.</u>, <u>Michigan State University</u>, <u>East Lansing</u>, <u>Summer</u>, 1958. (In press).

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# TABLE VII

# NEWSPAPER ADVERTISING SPACE AND MICHIGAN STATE UNIVERSITY CONSUMER PANEL MEAT PURCHASES BY FIRMS, 1956

Firm	Meat Ad Space Agate Lines	Quantity Purchased in Pounds	Percent of Ad Space	Percent of Quantity Purchased
A	55,344	6,913	19.75	11.76
В	52,935	3,397	18.89	5 <b>.79</b>
C	44,985	6,162	16.05	10.49
D.	39,607	11,686	14.12	19.89
E	36,428	13,158	12,99	22.39
F	30,354	9,677	10,82	16.46
G	20,706	7,773	7.38	13.22
Total	280,359	58,766	100.00	100.00

advertising space. The largest portion or about twenty-two percent of the meat purchased by the panel came from firm E which had thirteen percent of the total newspaper advertising space for meat.

Table VII indicated that the firms in this study could be separated into two groups on the basis of the relation between the quantity of meat they sold to consumer panel members and the amount of meat advertising space they used. Firms D, E, F, and G appeared to be in one group. Firms A, B, and C were in the other groups which appeared to use more advertising space in proportion to their volume of sales.

The variation in the number of stores among firms appeared to be one cause of the difference. Firm A had two stores and firm B, which started business in the area during 1956, had only one store in the Lansing area. Firm B which used the most advertising space appeared to have advertised liberally as a means of drawing customers to their new store.

It would seem that with other things being equal several stores in different locations would have a larger combined sales volume than a single store. A firm with several stores can use one ad for all of them while a firm with a single store in the area must use an equal amount of advertising space for one store if it is to compete effectively. An equal amount of advertising space by a single store would make the proportion of sales per unit of advertising less for that firm than for the firm with several stores.

Table VIII shows the results of a simple correlation analysis which tested the relationship between weekly expenditures for meat by the consumer panel at each firm and the amount of meat advertising space for that firm. The simple correlation coefficients for all except firm B were too small to be significant at the five percent level. The negative correlation coefficients for firms A, B, and E did not agree with logical reasoning. It was felt that Table VIII indicated no significant relation between the amount of newspaper advertising by a firm and the quantity of meat purchased there.

The results of the analysis did not support the hypothesis that the amount of advertising space by a firm was directly related to the quantity of meat purchased at that firm. However, it was not felt that this analysis offered any conclusive proof that it did not pay any individual firm to advertise.

<sup>&</sup>lt;sup>3</sup>With 45 d. f. r. = .288 is significant at the five percent level. Based on table of significance levels for correlation coefficients, George W. Snedecor, <u>Statistical Methods</u>, 4th ed. (Ames, Iowa: Iowa State College Press, 1946), p. 149.

# TABLE VIII

# SIMPLE CORRELATIONS BETWEEN NEWSPAPER ADVERTISING SPACE AND EXPENDITURES FOR MEAT BY MICHIGAN STATE UNIVERSITY CONSUMER PANEL, SEVEN FIRMS, 1956

Firm	Correlation Coefficient		
A	-,15		
В	32		
С	.10		
D	.09		
E	-,15		
F	11		
G	.16		

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#### CHAPTER IV

### SUMMARY AND CONCLUSIONS

This study was directed toward determining the relation of newspaper advertising to the week-to-week variations in consumer purchases of different meats. It had been indicated previously that weekly variations in retail sales of meat were not adequately explained by price changes. The nature of the consumer market suggested that advertising might be a significant factor influencing these short term variations in meat sales. An investigation indicated the largest share of the food-store advertising expenditure went for newspaper advertising.

The <u>Lansing State Journal</u>. the only local daily newspaper in the market area. was the source of data on newspaper advertising for meat. Measurements of ad space for different meats by seven of the largest food retailing firms in Lansing were recorded and tabulated using IBM.

Data on meat purchases were obtained from the Michigan State University Consumer Panel records kept by the Department of Agricultural Economics. Michigan State University. The consumer panel consisted of about 250 families selected to be representative of the Lansing area. Since 1955 purchases at seven specified firms and "Independents" have been reported each week. "Independents" were all other grocery and meat markets which were combined for convenient recording by IBM.

Subsequent analysis revealed that the seven selected firms had over three-fourths of the food advertising space in the <u>Lansing</u> <u>State Journal</u>, and that they received about two-thirds of consumer panel expenditures for meat.

All the data were tabulated by weeks, by firms, and by meat groups. Simple graphic techniques were applied to determine the relationship between the number of agate lines of advertising space, the number of pounds of meat purchased, and the average price of the meat. The shape and position of the demand curve for meat in weeks of above average advertising were compared with the demand curve for weeks when advertising activity was average or below. Correlation analysis was used when a more precise measure of the relationship was needed. Both simple and multiple correlation techniques were used.

The selection of the variables in the equations used to explain variations in weekly purchases of different meats were determined by the nature of the consumer market and the availability of data. Since the quantity of meat purchased by individual families in the panel was determined by retailers' prices along with many other complex forces facing consumers, quantity appeared to be a logical choice for the dependent variable. The regression equations expressed the average quantity of meat purchased weekly as a function of the price of the meat, the price of competing meats, the temperature, and advertising. Temperature was included because previous studies indicated it was important as a seasonal demand shifter.

Observations from forty-eight weeks of the year 1956 were used. Observations for Thanksgiving, Easter, Christmas and New Years weeks were omitted from the regression analysis because of extreme changes in demand and advertising activity during these times.

Investigation of newspaper advertising by retail food stores revealed certain typical patterns. It was found that the amount of newspaper advertising for meat varied seasonally. The pattern indicated that the amount of advertising space for meat was less than average during the first month of the year. It increased around Easter and then decreased when the warmer temperatures of summer arrived. It increased again with the commencing of school in the fall. Then there was another low period about October. During the period including Thanksgiving and Christmas the amount of advertising space increased to above average.

Seasonal variations differed among the meats studied. As an example advertising for pork roast decreased during the summer while advertising for cold meats increased.

The advertisements of any particular firm nearly always appeared on the same day or days from week to week. Food advertising sections of the newspaper were nearly always largest on Wednesday and Thursday. Often several firms featured the same item as a special in a given week. However, rarely did the same firm feature a particular product as a special for two consecutive weeks.
Increased advertising appeared to be related to increases in the quantity purchased for broilers. ham, pork roast, and all pork. The regression coefficients for advertising in the multiple regression equations explaining the quantity of these products purchased were all significant at the one percent level. The signs of these coefficients were all positive indicating an increase in the amount of advertising space would have been associated with an increase in the quantity of the particular meat product purchased.

For beef the results of the analysis did not give conclusive evidence that advertising was directly related to the quantity purchased. The regression coefficient for advertising proved to be significant as a factor affecting the quantity of all beef purchased. However, the regression coefficient for advertising was non-significant for the individual beef items. The negative signs of the coefficients for chuck roast and ground beef were contrary to logical reasoning. Furthermore, there were high simple correlation coefficients between the explanatory variables. A previous investigation of the effects of intercorrelation upon multiple correlation and regression measures revealed that an increase in the level of intercorrelation can cause the values of the partial regression coefficients to become very unstable and become smaller relative to their standard error. Thus it appeared probable that the relationship between the amount of advertising and the quantity of beef products purchased was complicated by intercorrelation. The continued upward trend and small variation in the price of beef throughout the year apparently

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resulted in less advertising and a smaller volume of beef sales. Although the effect of advertising may not be as large for beef products as some other meats the results of this analysis do not appear adequate to show it does not pay to advertise beef products.

The paragraphs immediately following give the percentage variation at the mean computed by converting the partial regression coefficients for advertising from absolute to percentage terms.

For broilers the regression coefficient of advertising indicated that at the mean value for each variable a ten per cent increase in the amount of advertising space was associated with a 1.5 percent increase in the quantity of broilers purchased by Michigan State University Consumer Panel members. From a graphic analysis it appeared the demand for broilers was more inelastic in weeks of above average advertising activity and low prices.

For ham the regression coefficient of advertising indicated that at the mean value for each variable a ten percent increase in the amount of advertising space was associated with a 1.1 percent increase in the quantity of ham purchased.

For pork roast the regression coefficient of advertising indicated that at the mean value for each variable a ten percent increase in the amount of advertising space was associated with a 1.2 percent increase in the quantity of pork purchased.

For all beef the regression coefficient of advertising indicated that at the mean value for each variable a ten percent increase in the amount of advertising space was associated with a .6 percent increase in the quantity of beef purchased. Although

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a t test showed the regression coefficient for advertising of steak was not significant at the five percent level the positive coefficient indicated an increase in advertising of steak would have been associated with an increase in the quantity purchased.

A comparison of the amount of newspaper advertising space and the quantity of meat purchased at each firm indicated certain firms used more advertising space in proportion to the quantity of meat they sold to the consumer panel than others. A simple correlation analysis between newspaper advertising space and the expenditures for meat by the consumer panel at each of seven firms resulted in no significant correlation coefficients.

The results of the analysis failed to support the hypothesis that the amount of newspaper advertising space by a firm was directly related to the quantity of meat purchased at that firm. However, it should not be inferred from these results that it was not worthwhile for any individual firm to advertise.

This study was confined to analyzing the effects of newspaper advertising on the weekly variations in the quantity of meat purchased in one market area. These results should not be be construed to apply to the effects of advertising on the total demand for meat. This study reveals only the week-to-week effects of advertising on consumer demand for different meats and it is not suggested that the same effects occur on the annual demand. Neither

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should it be inferred that these results would be obtained from advertising other products.

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APPENDIX

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#### APPENDIX

# IBM MARK SENSING CODE FOR MEAT ADVERTISING in the <u>State Journal</u>, Lansing, Michigan

Card Column	Item	Explanation	Code
1	Name	Assigned initial	<pre>1 (A) A &amp; P 2 (B) Bazley-Junedale 3 (K) Kroger 4 (M) Market Basket 5 (S) Schmidts 6 (SR) Shop Rite 7 (W) Wrigleys 8 Manufacturers</pre>
2-5	Year, week, and day	Sec code	2 - '52 Ol Wk. l Sunday 3 - '53 2 Monday 4 - '54 3 Tuesday 5 - '55 4 Wednesday 6 - '56 5 Thursday 7 6 Friday 7 Saturday
6-8	Total ad size	Column inches	2 full pages 352 1 full page 176 3/4 page 132 1/2 page 88 1/4 page 44
9-12	Total meat ad	Agate lines	Actual measurement
13-15	Total pork ad	·· ··	11 II
16-18	Total beef ad	•• ••	n n
19-21	Total poultry ad	<b>11</b> 11	11 TI
22-24	Total cold meats ad	11 11	11 11
25-27	Total lamb and mutton ad	11 11	11 11
47-50	Total fish and seafood ad	II II	11 11

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### On Back of Card

Card <u>Column</u>	Item	Explanation	Code
1-3	Total veal ad	Agate lines	Actual measurement
4-6	Special (primary)	Product number	Last 3 digits from Panel diary
7-8	Price of special	Cents per pound	Actual price
9-11	Size of special	Agate lines	Actual measurement
12-14	Secondary special	Product number	Last 3 digits from Panel diary
15-16	Price of secondary special	Cents per pound	Actual price
17-19	Size of secondary special	Agate lines	Actual measurement

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