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Consumer Attitudes, Knowledge and Buying Habits Relative to Beef: An Arizona Case Study

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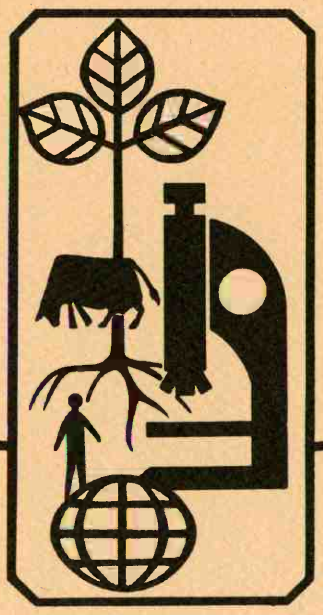

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Introduction

Understanding consumer behavior and attitudes toward beef is essential to the development of production and marketing policies and programs. There is a growing interest in the applicability of attitudinal research techniques for a broad range of marketing problems. Little research has been done however, on consumer attitudes relative to beef products and completed studies have generally been descriptive in nature.

In the last two to three decades more attention has been directed toward the use of behavioral studies in marketing research and marketing decision making processes. The completed studies generally show relationships between various characteristics of products analyzed and consumption patterns, but fail to determine the important factors influencing consumers' attitudes toward the products studied. Working [13] studied the demand for meat using regression analysis, and estimated coefficients for variables such as price and income but did not specifically study consumer attitudes. Works by Marible [6], and Thomas [11] attempted to analyze attitudes of consumers descriptively but did not use other analytic techniques. Two descriptive studies completed in Arizona in 1955 [8] and 1956 [2] assessed consumer preferences for beef and consumer acceptance for beef. A study completed by the USDA in 1969 described homemakers' opinions about selected meats in a nationwide survey [12]. In 1973 a study carried out in England described housewives' attitudes to meat [1].

Improved understanding of consumers' preferences in terms of kinds of meats and types of services should assist the industry in meeting consumer demands at a reduced cost. This knowledge should be of particular importance to both consumers and producers especially with the changes and developments occuring in the livestock and meat industries in recent years. For example, beginning in 1972, higher meat prices resulted in certain consumer reactions such as a greater use of alternatives and meat like substitutes. With higher relative prices for beef consumers tend to look for alternatives. In order to remain competitive, the beef industry needs to understand consumer tastes and preferences and changes in them in order to be able to provide products in a competitive manner at the lowest possible costs.

This study is intended to help provide information with respect to consumer habits and buying patterns in terms of beef and to isolate factors which tend to influence consumers' buying patterns.

Objectives

Specifically this study attempts to: 1) describe the Arizona market for beef in terms of consumer characteristics, preferences and purchasing habits; 2) construct a practical model to estimate the impact of certain non-price variables on the demand for beef in Arizona.

Methodology

The data for this study were collected in the metropolitan areas of Tucson and Phoenix and other major population centers in Arizona in the summer of 1973. A stratified random sample of 2300 households was selected with 1200 in the Phoenix area, 800 in the Tucson area, and 300 in other cities. For Phoenix and Tucson each city was divided into 6 regions by income class based on the Coles directory [4]. The sample was then drawn from within these classes in order to insure representation of all the income categories.

All questionnaires were sent by mail at the same time. A reminder letter was sent to nonrespondents and a second copy of the questionnaire was sent to those who did not respond to either the first mailing or the reminder letter. Additionally, for the Phoenix area, 197 personal interviews were completed from a sample of the nonrespondents for the mail survey.

The questionnaire was composed of 9 major sections covering the following types of information: 1) beef and other meat consumption patterns; 2) purchasing habits for beef and other meats; 3) types of advertising observed; 4) sources and types of information available or used; 5) types of service available and attitudes toward services; 6) attitudes relative to display and packages; 7) information about the handling and freezing of meat; 8) quality characteristics of beef; 9) income information and demographic characteristics of the household.

The data collected from the questionnaires were summarized to determine consumers' attitudes and behavior. These data were analyzed by regression analysis to measure quantitatively non-price factors affecting the demand for meat. Price was not considered since the data were collected in a relatively short period with price changes assumed to be relatively insignificant. Furthermore, consumers were asked for responses based on their usual reactions rather than those of a specific moment in time.

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Descriptive Analysis

Sample responses

A total of 867 observations were received with 670 responses to the mail questionnaires and 197 from the personal interviews. The personal interviews were selected from households in the Phoenix area that did not respond to the mail questionnaire. They were, therefore, considered to be representative of the non-respondents in the population of the Phoenix area.

A total of 256 responses were received from the Tucson area, 353 from the Phoenix metropolitan area and 61 from towns outside these centers. Since an additional 197 interviews were completed via personal interviewing in the Phoenix area, a total of 550 completed questionnaires were received from that region.

Because of the relatively low response to the mailed questionnaires, a number of tests were carried out to determine if there were significant differences between the responding groups. Via these tests, it was hoped to ascertain whether or not the responses could be treated as one sample representing the total population studies. Comparisons by districts were made between data received from the initial mailings, follow up letters, and second questionnaires. Data received in the Phoenix area via the personal interviews were also compared with those received via the questionnaires. In all of the tests no significant differences were found between the various groups. Therefore, it was decided to analyze the data as one sample. (For details on statistical procedures used see references 3, 5, 9, 10).

Various characteristics of the sample data were also compared with data available in the census and other statistical reports describing Arizona's population. These comparisons were made to provide a check on the reliability of the sample in representing the Arizona population. Percentage distributions in the sample were compared with the state population for ethnic groups, age of respondents and spouse, occupation, income, family size and years of schooling (Appendix A). In all comparisons differences were relatively small except in two instances, which are explainable. The respondents included only heads of households thus eliminating children and youth. The sample therefore, was weighted somewhat heavier in the age categories above 21 years. The exclusion of those under age 22 resulted in a smaller representation of the lower income levels, and of lower levels of education than existed in the total population. However, since few individuals under 22 are likely to be meat buyers their exclusion would not appear to affect the representativeness of the sample for the purposes of this study.

Demographic characteristics

Respondents were fairly evenly distributed in all age groups from 22 up (Appendix A, Table 2). The respondents were almost equally divided between males and females.

The average family size in the sample was 3.8 members[1]. There was an average per family of 1.12 children under 16 years of age and 0.45 children over 16 years of age. Fifty-one percent of the families had one or more children under 16 and 26 percent had one or more children over 16. (Table 1).

About 1.6 percent of the respondents had less than 12 years of education but most of these had some high school. Fifty percent had more than the equivalent of high school (Appendix A, Table 7).

There were 678 respondents employed with only 17 percent unemployed or retired. About one-third of the spouses of the respondents indicated they were employed. Based on the head of the household, 26.4 percent were classified as skilled or semi-skilled, and 22.4 percent as technical and administrative. Another 12 percent were in the category of business owners and white collar salespersons. About one-quarter of all respondents failed to indicate their occupation (Table 2).

[1] Includes other adults reported living with the family. If these are excluded to make the number comparable with census data, family size becomes 3.57.

Table 1. Children and Other Adults per Family, Arizona Sample, 1973.

Number of	Children under 16		Children over 16		Other Adults	
	No.	Percent	No.	Percent	No.	Percent
0	425	49.0	642	74.0	752	86.7
1	149	17.2	144	16.6	87	10.1
2	174	20.1	51	5.9	16	1.8
3	68	7.8	19	2.2	2	0.2
4	26	3.0	1	0.1	—	—
5	13	1.5	—	—	1	0.1
6	3	.3	1	0.1	—	—
7	1	.1	—	—	—	—
Non-response	8	.9	9	1.0	9	1.0

Means: Children under 16 = 1.12 per family
Children over 16 = 0.45
Other Adults = 0.24
Family = 3.81 members in the family, including other adults.

Table 2. Respondents in Arizona Sample, by Occupation, 1973

Type of Employment	Number of Respondents	Percent of Total
Top Managerial/Professional	28	3.2
Executive/Administrative	67	7.7
Technical/Minor Adm./Low Supervisor	194	22.4
Owner of Small Business	34	3.9
White Collar/Sales	76	8.8
Skilled and Semi-Skilled	229	26.4
Unskilled	2	0.2
Agriculture	4	0.5
Military	9	1.0
Non-response	224	25.9

Nearly all income levels were represented by the sample households (Table 3). However, 52.7 percent were between the level of $6,000 and $15,000. Twelve percent received less than $6,000 and 15 percent more than $21,000. Forty-three percent of the households indicated their income changed during the past year. From those with income changes, 75 percent had increases while the remainder experienced decreased income during theyear.

Table 3. Respondents in Arizona Sample, by Income Level, 1973.

Income Level	Number of Respondents	Percent of Total
0– 2,999	19	2.6
3,000– 5,999	69	9.3
6,000– 8,999	114	15.4
9,000–11,999	144	19.4
12,000–14,999	133	17.9
15,000–17,999	84	11.3
18,000–20,999	67	9.0
21,000–23,999	31	4.2
24,000–26,999	33	4.5
27,000–29,999	8	1.1
30,000–over	39	5.3

Gal. 3

Consumption patterns and expenditures for meat

Meat was consumed by 98.5 percent of the respondents. Beef was served most often by 89.5 percent, while chicken and pork were served next most frequently by 54.3 and 38.1 percent respectively. Processed meats, variety meats, and lamb were last in order of preference based on the number of times served. Nearly 50 percent of all the respondents apparently did not serve lamb.

Beef was served most often of all the meats, at all income levels, and the amounts served increased as incomes increased. Households with incomes between $6,000 and $15,000 served pork more often than those with either lower or higher income levels. Most households in the $6,000 to $15,000 income level indicated that chicken was the second most important in terms of frequency of serving. Lamb ranked somewhat higher in the lower income levels. As income increased, the variety meats (liver, kidney, tongue) tended to be served somewhat less. Processed meats (sandwich meat, sausage, salami, etc.) were served more often by higher income levels.

Pork tended to be served less as the age of the respondent increased, whereas chicken was served more often as age increased. Variety meats were served more often by people in the 30 to 50 year age category. As the respondents age increased less of both variety and processed meats were purchased.

Nearly 17 percent of the respondents served beef daily, 26.1 percent served beef 5-6 days per week, 43.3 percent 3-4 days per week and 14 percent served it twice a week or less. Most respondents served pork much less frequently than beef. Ground beef and beef steak were served most often (Table 4). Roasts and other types of beef cuts were generally rated third and fourth in terms of frequency of serving.

One or more members of the family were dieting in 35 percent of the households. However, only 26 percent considered dieting had limited their consumption of beef.

Table 4. Frequency of Serving by Type of Cut, Arizona Respondents, 1973.

Cut	Rank* 1	2	3	4	Not Used
	Number of Respondents				
Ground Beef	326	267	27	3	8
Beef Steaks	328	256	43	1	7
Beef Roasts	24	63	184	15	119
Others	8	32	70	80	51

*From most to least often served with 1 = most often, 4 = least often.

The average consumption of beef per family per week, for 655 respondents, was 6.3 pounds. This amounted to 115 pounds annually per person, on a carcass weight basis, and was very close to the esti-

mates reported in a University of Arizona, Agricultural Economics Department Report published in 1974 [7].

A fairly wide range in the amount of beef purchased per week per family existed. Over 54 percent of 655 respondents purchased between three and seven pounds per week. Eleven percent purchased less than three pounds and 5.8 percent reported purchases in excess of 13 pounds (Table 5). The highest levels are probably due to relatively large families and/or demands of those with higher income levels. Pork purchases averaged 2.3 pounds per family per week or about 50 pounds per capita, carcass weight basis. Sixty-three respondents indicated they did not purchase any pork. Poultry purchases averaged about 41 pounds per capita.

Most households spent between $1 and $15 per family per week on beef, with 40.8 percent of those responding spending between $5 and $10. Seventy-five percent spent between $1 and $5 per week per family on pork, 89 percent spent this amount on poultry, 52 percent on variety meats and 75 percent on processed meats (Table 6).

A strong relationship existed between the quantity of beef bought and income level. For families with incomes under $3,000 only 6 percent bought more than 6 pounds per week. The percentage of families buying more than 6 pounds increased gradually to between 50 and 60 percent for those with incomes in excess of $21,000. A similar relationship was observed with respect to pork purchases and income.

Attitudes relative to beef value

Nearly 70 percent of the respondents felt that they were not getting their money's worth in the meat they purchased. Beef prices were considered high relative to other foods by 71 percent of the respondents and 60 percent felt beef prices were high relative to other nonfoods. When asked to indicate those responsible for rising meat prices, 41.4 percent indicated government, 38 percent the packer, 31 percent the retail store, 20

Table 5. Meat Purchases, in Pounds, Per Family, Per Week, Arizona Respondents, 1973.

Pounds	Beef		Pork		Poultry		Variety* Meat		Processed† Meat	
	Number Respondents	Percent	Number Respondents	Percent	Number Respondents	Percent	Number Respondents	Percent	Number Respondents	Percent
0	1	0.2	63	12.8	26	4.4	202	46.8	99	21.2
1– 2.9	70	10.7	256	52.0	210	35.8	202	46.8	320	68.3
3– 4.9	172	26.2	132	26.8	270	46.1	19	4.4	40	8.6
5– 6.9	184	28.0	37	7.5	59	10.1	8	1.9	8	1.7
7– 8.9	80	12.2	1	0.2	13	2.3	—	—	1	0.2
9–10.9	83	12.6	3	0.6	8	1.4	1	0.2	—	—
11–12.9	28	4.3	—	—	—	—	—	—	—	—
13–14.9	9	1.4	—	—	—	—	—	—	—	—
15–16.9	17	2.6	—	—	—	—	—	—	—	—
17–18.9	1	0.2	—	—	—	—	—	—	—	—
19–20	9	1.4	—	—	—	—	—	—	—	—
20 & over	2	0.3	—	—	—	—	—	—	—	—
Total	656	100.0	492	100.0	586	100.0	432	100.0	468	100.0

*Liver, kidney, tongue
†Sandwich meat, sausage, salami, etc.

Table 6. Expenditures on Meat, Per Family, Per Week, Arizona Respondents, 1973.

Dollars	Beef		Pork		Poultry		Variety* Meat		Processed† Meat	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
0	1	.2	63	12.4	26	4.5	198	44.7	99	20.9
1– 4.99	171	26.3	383	75.4	514	88.6	232	52.4	357	75.5
5– 9.99	265	40.8	56	11.0	36	6.2	10	2.2	14	3.0
10–14.99	116	17.8	2	0.4	4	0.7	3	0.7	2	0.4
15–19.99	52	8.1	2	0.4	—	—	—	—	10.2	0.2
20–24.99	26	5.0	1	0.2	—	—	—	—	—	—
25–29.99	11	1.7	1	0.2	—	—	—	—	—	—
30–34.99	5	0.7	—	—	—	—	—	—	—	—
35–39.99	1	0.2	—	—	—	—	—	—	—	—
40–44.99	1	0.2	—	—	—	—	—	—	—	—
45 & over	—	—	—	—	—	—	—	—	—	—
TOTAL	649	100.0	508	100.0	580	100.0	443	100.0	473	100.0

*Liver, kidney, tongue, etc.
†Sandwich meat, sausage, salami, etc.

percent the feeder, and 19 percent the rancher or farmer (Table 7).

If beef prices were to increase and income remain the same, 51 percent of those responding would reduce their consumption of beef, 29 percent would make no change, and 16.3 percent would buy cheaper cuts (Table 8). Over 42 percent would reduce their purchases of pork. Only 8 percent would increase pork purchases. Thirty-two percent would increase their purchases of other meats and 46.7 percent would increase their purchases of other foods or vegetables. Twenty-five percent would reduce non-food items. Thus, as beef prices increase the major substitutes would be other foods or vegetables. Some would increase other meats but many would actually reduce pork purchases.

Table 7. Beliefs Relative to Responsibility for Beef Price Increases, Arizona Respondents, 1973.

Group Selected as Responsible	Number of Respondents	Percent of Total*
Packer	330	38.1
Rancher or Farmer	166	19.1
Retail Store	269	31.0
Feeder	174	20.1
Government	359	41.4
Consumer	155	17.9
Other	81	9.3
Don't Know	100	11.5

*Multiple responses permits total to exceed 100 percent.

Table 8. Indicated Changes in Purchases by Consumers, if Beef Prices Rise, Arizona Respondents, 1973.

Item Purchased	Expected Change in Purchases									
	None		Reduced		Increased		Buy Lower Quality		Buy Cheaper Cuts	
	No.	%	No.	%	No.	%	No.	%	No.	%
Beef	214	29.1	377	51.3	7	1.0	17	2.3	120	16.3
Pork	216	41.1	253	42.3	50	8.4	7	1.2	42	7.0
Other Meats	204	35.4	157	27.3	186	32.3	7	1.2	22	3.8
Other Foods such as Vegetables	240	40.5	56	9.4	277	46.7	9	1.5	11	1.9
Non-food	268	62.6	108	25.2	32	7.5	9	2.1	11	2.6

Purchasing habits

There were 46.5 percent of total respondents who purchased meat once each week (Table 9). Another 18.1 percent made purchases twice a week and nearly the same number, once in two weeks. Ground chuck was the most frequently purchased type of ground beef with hamburger beef second (Appendix B, Table 1). A relatively small number purchased extra lean or diet cut ground beef.

There were 85.6 percent of the households that purchased steaks. Round steak ranked highest in frequency of purchases by the largest percentage of the sample (Appendix B, Table 2). Sirloin was next with t-bone, chuck, rib, porterhouse and tenderloin in that order. As the respondents income increased the frequency of purchases of chuck steak decreased while rib steaks remained unchanged. The frequency of sirloin steak purchases increased up to about the $20,000 income level and then tended to decline. The same tendency occurred with respect to t-bone steak. Tenderloin steak purchases increased up to about $21,000 and then stabilized at that level. Round steak purchases increased for households up to $10,000 income, then decreased sharply. As expected, people tend to buy more expensive cuts of steaks as income increases. Beyond a certain income level they probably consume more steaks outside the home.

Although many people ranked roasts relatively low in terms of frequency of purchases, most of the respondents indicated that they did buy some roast (Appendix B, Table 3). On the basis of frequency of purchases, roasts were ranked as follows: Chuck roast, rump, sirloin tip, rib, blade cut and arm roast.[2]

Preferences in roasts as shown by purchase habits were related to income, as were steaks. Purchases of rib, chuck and blade roasts tended to increase up to about the $15,000 income level and then declined. Rump roasts were purchased at about the same level throughout the various income categories. Sirloin tip roasts were purchased most by those in the $15,000 to $20,000 income category. The purchase of roasts for those with incomes above $20,000 was infrequent. About two-thirds of all respondents indicated a preference for boneless roasts.

Factors affecting choice of cuts at the store

Respondents indicated the decision as to the type of cut to purchase was made in the store by 51.6 percent,

[2]It is possible there are seasonal influences on preferences for various cuts. Since this was a cross sectional, rather than time series study the seasonal impact, if any, has not been isolated.

Table 9. Frequency of Purchases of Meat by Household, Arizona Respondents, 1973.

	Daily	5 to 6 Times per Week	3 to 4 Times per Week	Twice a Week	Once a Week	Once in Two Weeks	Once a Month	Non-Response	Total
Number of Households	16	5	57	157	403	161	26	42	867
Percent	1.8	.6	6.6	18.1	46.5	18.6	3.0	4.8	100.0

while 43.7 percent made their decision before they entered the store. The higher the income level the greater the tendency to make decisions before entering the store. This would suggest higher income consumers either had more information before entering the store or were less prone to be influenced by price and store advertising.

Price, absence of desired cuts and display of other cuts were given as the three major causes of consumers changing their decisions after they entered the store (Table 10). Price was indicated as an influencing factor by 83 percent of the total sample, 63 percent checked absence of desired cuts or types of cuts. Advice from the butcher and other food and non-food expenditures had a relatively low level of importance in terms of decisions after respondents entered the store.

Table 10. Factors Affecting Consumer Decision Relative to Meat Purchases after Entering the Store, Arizona Respondents, 1973.

Factor	Number of Respondents	Percent*
Price	722	83.3
Absence of desired cut or types	549	63.3
Advice from butcher	112	12.9
In stores advertising	151	17.4
Display of other cuts or types	348	40.1
Other food expenditures	129	14.9
Other non-food expenditures	45	5.2
Other reasons	52	6.0

*Multiple choices permit total to exceed 100 percent.

Consumer satisfaction with beef characteristics

Respondents were asked to rank a number of factors in terms of relative importance with respect to the quality and other characteristics of beef they purchase. Color of meat, tenderness and marbling were given as the most important characteristics (Table 11). Next in importance were the amount of bone and the outside fat. Other characteristics as keeping quality and appearance of package were ranked relatively low in importance.

The color of the meat, color of fat, marbling, and appearance of the package all increase in importance with the level of education. Tenderness and the amount of outside fat decreased in importance as the level of education increased.

The respondents generally seemed to be satisfied with beef purchased. Many felt however, there was an excess of both bone and outside fat.

Most people ranked beef or pork as good sources of energy, vitamins and protein (Table 12). There were 36.6 percent of the respondents ranking beef as good in terms of freedom from diseases. For pork, 16.5 percent rated it as good, 18.3 percent fair, and 11 percent poor. Fifty percent of the respondents in the sample believed there were no health problems associated with eating beef, but only 28 percent thought this was true of pork. Reasons for beef or pork being considered unhealthful included eating too much, chemicals used in feeding, cholesterol, diseases of animals and lack of sanitation.

Table 12. Consumer Opinion Relative to Value of Beef and Pork to Health, ArizonaRespondents, 1973.

	Good	Fair	Poor	Don't Know	Non-Response
A. Beef					
Source of energy	60.3	12.6	0.9	9.0	17.2
Source of vitamins	41.5	19.6	3.2	12.5	23.2
Source of protein	76.2	0.4	0.5	5.5	13.4
Free of diseases	36.6	10.0	2.3	27.3	23.8
B. Pork:					
Source of energy	39.5	19.0	3.5	1.6	36.4
Source of vitamins	27.4	23.1	5.5	16.3	27.7
Source of protein	45.7	17.1	3.1	11.9	22.3
Free of diseases	16.5	18.3	11.0	26.0	28.3

Respondents were asked to give their opinions with respect to beef and pork in terms of cholesterol level. Replies were obtained from 80 percent of all respondents of which nearly 20 percent thought cholesterol levels were high for beef, 62 percent thought they were moderate or satisfactory and 18 percent indicated that they were low. By comparison over 76 percent felt that the cholesterol level in pork was high, 20 percent felt it was moderate and only 2 percent that it was low.

Table 11. Importance of Various Beef Characteristics to Arizona Respondents, 1973.

Characteristic	Rank* 1	2	3	4	5	6	7	8	Non-Response
	Percent of Respondents Selecting Characteristic by Rank of Importance								
Color of the meat	33.4	12.9	11.9	9.6	7.5	3.2	.9	.5	20.1
Color of the fat	3.5	9.5	7.5	9.8	13.5	11.8	9.1	8.0	27.4
Tenderness	20.1	13.4	11.1	11.0	7.5	7.5	2.2	2.5	24.8
Bone, amount and distribution	9.2	16.7	18.1	13.7	9.3	7.5	2.5	1.3	21.7
Amount of fat outside	7.5	13.8	15.2	13.7	11.4	8.4	3.9	1.5	24.4
Marbling	13.7	11.1	9.3	11.1	9.0	12.0	5.6	3.2	25.1
Keeping quality	3.5	2.1	2.3	3.5	8.8	11.4	29.4	8.2	30.1
Appearance of package	1.7	1.5	2.1	2.6	5.6	6.7	12.0	37.5	30.1

*Highest to lowest importance with 1 = highest, 8 = lowest.

There were 60.8 percent of the respondents that were acquainted with beef grades. However, when given a broad list of choices, only one-third of those recognized the true grade names, and 29 percent recognized a mixture of true and spurious grades. There were over 500 respondents that attempted to rank grades in terms of quality. Prime was ranked by 74 percent as number 1, while most of the remainder indicated that USDA Choice was ranked number 1. USDA Choice was ranked number 2 in terms of quality by 76 percent while 23 percent ranked USDA Prime as number 2. Only about one-fourth of the respondents selected a number 3 ranking, but of those who did the majority of them placed USDA Good in this category. Thus, it would appear a considerable number of people would not attempt to rank the various grade names, but of those who did, the rankings were fairly accurate by name. When asked to give the first and second preferences with respect to the various grade levels, the consumers tended to be split between USDA Choice and USDA Prime. A few respondents put USDA Good as either their first or second choice.

Color photographs of Prime, Choice, Good, Standard and Commercial steaks were shown to consumers during personal interviews in the Phoenix area. Individuals were shown the pictures and then asked to rank them according to grades. (A total of 100 responses were received). For the Prime cut more individuals ranked it Choice than Prime and almost as many ranked it Good or Standard as Prime. Seven percent rated the Prime cut as Commercial. Twenty-five percent ranked the Choice cut correctly. However, an equal number placed the Choice cut as Prime and as Good. Nearly 13 percent rated it as Standard and 8.8 percent as Commercial. For the Good cut, 28 percent placed it as Prime, 13 percent as Choice and 18.4 percent as its correct category. Twenty percent of the interviewees ranked the Standard cut above the true level, 80 percent ranked the Commercial cut above its true level, with 13.6 percent indicating that it was a Prime cut, and 11.2 percent that it was Choice.

Photographs may make the choice somewhat more difficult than with actual cuts. However, the above results would suggest that consumers do not recognize meat cuts by the traditional grades when they are not marked. In fact, there is some evidence to suggest that consumers have a preference for the lower quality grades when asked to choose by appearance alone.

Consumer attitudes to frozen beef

Nearly 60 percent of the respondents had a freezer in addition to a refrigerator. Most indicated they had the freezer for both convenience and savings. A very small percentage bought beef by the carcass or half carcass.

Nearly 70 percent of the respondents put their meat in the freezer after they purchased it. Of those individuals who froze their meat 22 percent froze all of it and 45 percent froze three-quarters. Less than 40 percent repackaged the meat before they froze it. Few people seemed to have any knowledge of the temperatures at which their meat was being kept in storage. Most failed to recognize the importance of care in preparation and handling for freezing, especially the desirability of rewrapping in proper freezing paper.

Despite the large percentage that froze purchased meat, 60 percent of the respondents said they would not buy pre-frozen meat. No decisive reasons were given for not accepting pre-frozen beef, although color, moisture, appearance of package and visibility of meat were the characteristics most frequently chosen as being unacceptable (Table 13). Attitudes with respect to pre-frozen meats did not appear to be related to income but there was an indication that an increased proportion would consider pre-frozen meat as their education level increased.

Table 13. Attitudes Toward Characteristics of Pre-Frozen Beef, Arizona Respondents, 1973.

	Acceptable	Not Acceptable	Don't Know	Non-Response
	Percentage of Respondents			
Color	23.2	18.9	12.0	45.9
Flavor	23.6	13.3	13.6	49.5
Degree of Tenderness	21.9	11.0	15.5	51.6
Moisture	16.8	15.1	13.6	54.5
Appearance of Package	19.3	15.9	13.4	51.4
Visibility of Meat	21.2	21.9	11.1	45.8
Uniformity of Product	14.3	11.5	16.3	57.9
Others	4.0	4.8	3.8	87.4

Table 13.

Beef alternatives

Pork, poultry, variety meats and processed meats were treated as alternatives to fresh beef. The factor selected by the greatest number of respondents as influencing their choice of pork as an alternative to beef was variety of diet, with variety in flavor next in importance followed by price (Table 14). For poultry the most frequently chosen factor was price, with variety in diet and variety in flavor next most important. For variety meats and processed meats variety in diet was the most important factor. Lower price and variety in flavor were about equal in importance in choosing variety meats. With processed meats, the second most important factor was convenience while variety in flavor ranked third in importance.

Consumers were also asked about meat substitutes or imitation meats. Nearly one-third of the respondents did not know about meat substitutes and of those who did 13.8 percent had used them at some time. The use of substitutes was shown to be positively related to the level of education. It was also positively related to the level of income up to about $15,000 but beyond that level consumption began to decline. Uses of meat substitutes also increased up to about age 50, then began to decline. Nearly 53 percent of the households

responding said that they would not use a substitute for beef[3] while 34.6 percent would use some.

Few people seemed to have adequate knowledge about meats substitutes. This was undoubtedly due to the fact that so many had not actually tried available products and many did not even know about them. This situation will undoubtedly change in the future as producers of substitute meat products increase their advertising and educational campaigns and as they improve the flavor and quality of their products.

Table 14. Factors Influencing Choice of Alternatives to Beef, Arizona Respondents, 1973.

	Pork	Poultry	Variety Meats	Processed Meats
	Percent of Respondents*			
Variety of Diet	50.5	60.1	24.9	21.7
Better Appearance	4.5	6.3	2.1	2.2
Lower Price	13.3	63.6	17.2	9.9
Variety in Flavor	35.3	34.0	16.0	15.8
More Flavorful	9.8	8.3	3.7	2.9
More Healthful	2.5	15.1	11.9	1.5
Seasonal Preference	8.8	8.9	5.0	6.3
Convenience	10.0	16.5	6.7	19.8

*Multiple responses result in totals exceeding 100 percent.

Store service, display and packaging

Forty-six percent of the respondents in the survey had a preference for butcher service, 30.2 percent preferred self-service and 18.3 percent had no preference. Many of the consumers choosing butcher service used the same reasons for their choice as did those who chose self-service (Appendix B, Table 4). However, a few factors tended to stand out in each case. The most important factors for selecting butcher service were availability of kind and size of cuts, freshness of meat and ability to see the product. The highest ranked factors for those choosing self-service was convenience, availability of type and size of cut and price advantage.

One-third of the respondents indicated many of the services considered important were not offered by the stores visited (Appendix B, Table 5.) This was especially true for services such as advice on storing, cooking, and preparation and packaging of meats. For those respondents indicating that the services were available, a large proportion either never or very seldom used them; some used them occasionally, but very few used them frequently.

The services rated important by the greatest number of respondents were personalized cutting, information on the types of cuts and meats to buy, and the amount of meat to buy (Appendix B, Table 6). About 50 percent of those responding considered cooking information, and advice on storing and freezing as not important. Nearly 75 percent considered information on new ideas unimportant.

[3]They were not asked if changes in price relationships would change this response.

Only 15.3 percent of the respondents would accept standardized packages, 41.7 percent would not and 41.5 percent did not know. Respondents indicated a dislike for standardization and what they considered would limit selection. Some disliked pre-packaged meat. Those favoring standardized packages were largely concerned with convenience. Clear plastic or film wrap was preferred by a majority for reasons of meat visibility. There were 26 percent that preferred butcher paper as a convenience for freezing, even though it is not recommended wrapping material for this purpose.

Advertising and information availability

Consumers were asked to rank several sources of information in Arizona regarding beef selection, storage, freezing, defrosting, cooking, carving and nutritive values. Food editors were chosen by 39.3 percent of those responding, as being a reliable source of information on the above items (Table 15). Nearly 35 percent chose grocery store meat department personnel and butcher shop personnel, 14 percent public utility companies, 11.9 percent the Arizona Beef Council and 10.3 percent the County or State Extension Service. Food editors were selected by the greatest number as the single most important source of information.

Forty-six percent selected magazines as the most important source of new ideas or recipes; 32.5 percent, newspapers and 17 percent, on-package or in-store recipe cards. Only 3.1 percent checked meat department personnel; 7.2 percent, TV and 1 percent, radio as sources of this type of information.

Table 15. Sources Considered the Most Reliable for Information About Beef Use and Care, Arizona Respondents, 1973.

	Number of Respondents	Percent of Total Sample*
Food Editors	341	39.3
Public Utility Company	123	14.2
County or State Extension Service	89	10.3
Arizona Beef Council	103	11.9
Grocery Store Meat Department Personnel	175	20.2
Butcher Shop Personnel	126	14.5
Meat Packers	38	4.4
Others	101	11.6
None of the Above	225	26.0

*Multiple answers result in totals exceeding 100 percent.

Consumers were asked to rank, by level of their knowledge, such factors as nutrition, saving money, cuts, grades, party recipes, everyday recipes, care and storage of beef (Table 16). The areas of greatest knowledge appeared in nutrition and everyday recipes. A fairly large number also seemed to feel that they were fairly knowledgeable with respect to saving money. The subject areas with the lowest knowledge level were in beef grades, party recipes and care and storage of beef. Individuals with less than 12 years of education seemed to have little knowledge with respect to grades or the care and storage of meats.

Table 16. Knowledge Level of Consumers Relative to Certain Factors Concerning Beef, Arizona Respondents, 1973.

	Rank*							
	1		2		3		4	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Nutrition	242	28.6	144	18.0	130	17.4	100	13.9
Saving Money	137	16.2	175	21.8	140	18.7	103	14.3
Cuts	118	14.0	129	16.1	135	18.0	123	17.1
Grades	62	7.3	115	14.4	97	13.0	115	16.0
Party Recipes	3	0.4	13	1.6	13	1.7	29	4.0
Everyday Recipes	229	27.1	93	11.6	116	15.5	73	10.1
Care and Storage	54	6.4	133	16.6	118	15.8	176	24.5
Total	845	100.0	802	100.0	749	100.0	719	100.0

*Rank of knowledge levels from highest to lowest with 1 = highest, 4 = lowest.

Relatively few respondents seemed to be dissatisfied with the amount and kind of information available to them on meat preparation, meat freezing, meat cooking, meat storage, meat specials, party ideas, new recipes, etc. Between 65 and 75 percent considered information on these subjects as either good or excellent.

Less than one-fourth of the households questioned had beef cooking experience in school. Of those with cooking experience in school, most was obtained at high school level. About two-thirds of those with formal cooking education felt that it was helpful in making decisions with respect to the preparation and use of beef.

Advertising of beef in newspapers was observed by 61.2 percent of the respondents. Only 12.3 percent had observed beef advertising on television, 7.7 percent in magazines, 6.1 percent on billboards, and 5.2 percent on the radio.

Over 68 percent of all households indicated that they shopped for bargains but as family income rose fewer people did so. This may be a function of the fact that food becomes a less important part of the budget as the income goes up, resulting in a more inelastic demand for beef. They are, therefore, not especially interested in shopping for bargains, but want to obtain quality and therefore buy in stores where they find the quality that best suits their needs. The newspaper was also given (by 59.5 percent of the respondents) as the major source of information relative to beef specials. Flyers were the most important source for 13.4 percent while TV and radio were relatively unimportant. About one-third indicated that none of the sources of information were important to them.

After the individual entered the store, over 50 percent were influenced by labels and 43.9 percent by in-store signs. Only 12.7 percent were influenced in their decision by meat department personnel.

Analysis of Non-Price Factors Affecting the Demand for Beef

The data described in Section 1 of this report were further analyzed in an attempt to isolate and evaluate the importance of special variables influencing the consumption of beef. Multiple regression analysis was carried out to try to estimate the effect of various non-price factors on the demand for beef. Assuming certain non-price factors are important to beef consumption, their isolation should prove useful to policy makers and industry decision makers. Price was excluded as a factor since the data were collected in a relatively short period of time and it was, therefore, assumed to be relatively constant. Furthermore, consumer responses were expected to reflect usual patterns of behavior and not just those associated with the specific time of their response.

Procedures

From the responses to the questionnaire, 344 variables were identified. From these variables, 83 were selected which were considered to have significant effect on the quantity of beef bought.

The initial selection criteria were somewhat arbitrary. Attempts were made to find groups of questions and to select those questions which would be most representative of a particular variable. Questions for which households responded that the characteristics or factors were relatively unimportant were deleted as were those designed to obtain consumers' opinions more closely related to services than to beef consumption. While it is recognized some information may be lost by this selection procedure it was considered economically necessary to reduce the magnitude of the computations.

Scattergrams were constructed for the selected variables. The A intercept, the B slope value, the R^2 and the level of significance for each of these variables were calculated. From the correlation matrix composed of the simple correlation coefficients between each independent variable and the dependent variable, a final decision was made relative to the exclusion or inclusion of any variable for further analysis. When the simple correlation coefficient value was less than .01 the variable was considered to demonstrate weak correlation with relatively insignificant effect on the dependent variable and therefore, was excluded.

Three stepwise multiple regression analyses were run with different sets of variables in order to: 1) exclude multicollinearity among the independent variables, 2) obtain the best set of variables to explain the variation in the dependent variable, 3) obtain a demand

function for beef which would be statistically significant at the .05 level. The dependent variable was:

Y = Consumption of beef in pounds per family per week.

The independent variables which entered the final equation were:

X_1 = frequency of beef servings per month
X_2 = pounds of chicken purchased per week
X_3 = number of children in the family under 16
X_4 = number of children in the family over 16
X_5 = income level
X_6 = pounds of variety meat bought per week
X_7 = the household purchases steak
X_8 = occupation of the respondent
X_9 = consumer satisfaction with the level of marbling
X_{10} = no one in the household is on a diet
X_{11} = the household uses synthetic or substitute meats
X_{12} = pounds of processed meat bought per week
X_{13} = level of education
X_{14} = the respondent knows or recognizes beef grades

All "yes" or "no" answer questions were treated as dummy variables. The form of the estimated equation was as follows:

$$Y = 6.36514 - 1.01599X_1 + .40689X_2 + .57467X_3 + .90888X_4 + .29206X_5 + .40985X_6 - .27428X_7 + .10211X_8 - .11867X_9 - .62476X_{10} - .58348X_{11} + .19987X_{12} - .05771X_{13} + .30776X_{14}$$

Evaluation of the analysis

The test indicated that the coefficients for all variables entering the equation were statistically significant at the 95 percent confidence level. The F test made with respect to the equation as a whole indicated that the model was also significant. The R^2 value of 0..3959 indicated that the equation's variables explained 39.6 percent of the variation of the dependent variable.

A check for intercorrelation between the independent variables was also made. The highest correlation coefficient between any two variables was found to be –0.38672 or r^2 value of .15 (Appendix C, Table 1). The greatest degree of inter-relationship was found between income, employment and education. However, since the level of r^2 was a .15 or less, it was decided to consider all variables in the final form of the equation as having no significant interdependency and therefore no multicollinearity problem.

Most of the coefficients and their signs appear as expected. The negative coefficient on X_1, the frequency of beef servings in the household, was derived as a result of the data collection and coding procedures. The values for X_1 were classified such that 1 indicated daily servings of beef, 2 represented five to six servings a week, 3 was three or four servings a week, and so on up to 8 or less than once a month. Therefore, the coefficient of -1.01599 must be interpreted as meaning that as the number of servings drop, for example from daily to 5 to 6 times per week, the reduction in beef puchased by that household would be just over one pound.

An increase in consumption of chicken, by one pound per household per week, results in an increase in the amount of beef consumed by 0.4 pounds (X_2). This relationship between beef and chicken could reasonably be expected from cross section data. Substitution would likely still be found for time series data, as the product price relationships change.

The addition of one child in the household under the age 16, adds 0.57 pounds of beef per week to the household's consumption (X_3). The addition of one child in the family over 16 years of age adds 0.90 pounds per family per week to consumption of beef (X_4).

An income increase of $3,000 results in an increase in beef consumption of 0.29 pounds per household per week (X_5). The income elasticity for beef was estimated at 0.24 indicating that for each percentage increase in incomes there is a 0.24 percent increase in beef consumption.

The addition of one pound of variety meat (X_6) is associated with an increase of 0.4 pounds in the consumption of beef per family per week. Households buying steak (X_7) purchased less beef per week than those that did not. This may be explained by the fact that higher income people tend to eat more meat in restaurants. Also, low income people who buy steak probably have to reduce their purchases of other cuts of beef. According to the model, if consumers buy steak they reduce their total purchases of beef by 0.27 pounds per family per week.

The lower the level of skill in the occupation (X_8) all other factors equal, the more beef tends to be bought. A possible explanation may be that people of lower skills tend to eat more at home and to buy less expensive beef cuts. Another possible contributing factor might be the use of food stamps, which reduce meat costs to lower income households.

Consumers that are less satisfied with marbling in beef (X_9) tend to buy less beef. Marbling was somewhat more important than other characteristics of beef such as color, fat content, and bone quality. Households with members dieting (X_{10}) tended to consume more beef. If there are no members in the household dieting, beef consumption is reduced by 0.6 pounds per week. This probably suggests that the diets emphasize protein, thus the tendency to consume more beef.

Families consuming substitute beef products (X_{11}) consume about 0.6 pounds less beef per family per week than those who do not. Families consuming processed meats (X_{12}) consume 0.2 pound per week more beef. The more years of education (X_{13}) the lower the consumption of beef. The fact that consumers tend to purchase less beef as their educational level increases, might be explained as follows: 1) people with higher education tend to be less biased relative to the

importance of beef as a component of the daily diet, 2) people with higher education tend to be more inclined to use synthetic meat or other substitutes for beef. It should be noted, however, that the coefficient for this particular variable was very low. Families that recognize beef grades (X_{14}) buy 0.3 pounds more beef per week than those not recognizing the grades, which may be explained by the fact that they are better acquainted with beef and thus influenced by advertising with grade names.

An example estimate of consumption using the model

Since some of the variables have dichotomous answers it is only possible to approximate a mean estimate of consumption based on the model. However, an estimate can be made for the more typical situation using the following assumptions:

1) Beef is served 3 to 4 times per week (category 3)
2) 2.5 pounds of chicken are purchased per week
3) There are 1.115 children in the family under 16 years
4) There are 0.454 children in the family over 16 years
5) The income level is $10,000 (category 4)
6) Two pounds of variety meats are purchased per week
7) The family buys steak
8) The occupation is "white collar/sales" (category 5)
9) The consumer is fairly satisfied with marbling (category 3)
10) There are no members in the family dieting
11) The family does not use synthetic or substitute meats
12) The family consumes or purchases 2 pounds of processed meat per week
13) The level of education is 12 years
14) The respondent does not know the beef grades

The resulting values in the model are:

$$Y = 6.36514 - 3.03797 + 1.0172 + 0.64076 + 0.412595 + 1.16825 + 0.8197 - 0.27428 + 0.51055 - 0.356 - 0.62476 - 0 + 0.39974 - 0.69252 + 0 = 6.338$$

Thus, the average family as described by the variables in the model consumed or purchased 6.338 pounds of beef per week or the equivalent of 86.47 pounds of retail cuts per person per year at the prevailing price levels. Using a 0.75 conversion factor, the purchases amount to 115.29 pounds of carcass equivalent. This is almost the same as other estimates made for Arizona beef consumption in 1973 [7].

There is no doubt that a much more complete explanation of the variability of the consumption of beef might be obtained by having more precise and complete data. It is also conceivable that since some time did elapse over the period during which the data were collected, changes in price did affect the nature of the consumption patterns and responses of the people involved in the survey.

The fact that the model explained only about 40 percent of the variation in the consumption of beef indicated that more information is needed. For example, more information on the effects of advertising which did not appear in this study could be obtained. Such things as religion and season of the year may have influenced responses. Additionally, the particular time of the year during which this information was collected was rather harsh in terms of the beef industry. Consumers were unhappy with the level of beef prices and producers were unhappy with the fact that the government was controlling prices. The market, in effect, was not functioning normally. Furthermore, a good deal of study should be done as to why consumers react the way they do and why they respond as they do to particular kinds of questions.

Summary and Conclusion

This study attempts to provide information on the attitudes and purchasing habits of consumers relative to beef in Arizona. The first objective of the study was to describe and define the characteristics of beef consumers. A second objective was to isolate and estimate the impact of certain non-price variables influencing the demand for beef in Arizona.

The results indicate that beef is the most desired meat product and no real alternatives were observed in the market at the existing price levels. The main reasons for consuming other meats were to provide variety in diet and flavor although price was cited as an important factor in poultry consumption.

Respondents generally were satisfied with the beef purchased. However, many indicated there was too much bone to lean. Based on responses received consumers ranked beef color, tenderness and marbling as the most important beef characteristics influencing their decision to buy.

A majority of the respondents indicated they believed they were not getting their money's worth from beef. Beef prices were considered high, and the high prices were attributed to the government, packers, retailers, feeders, and farmers or ranchers, in that order. Respondents selected price, absence of cuts, and display of cuts as major factors influencing their choice of meat or meat cuts after entering the store.

Advertising of beef in newspapers was observed by 61.2 percent of the respondents. For television, magazines, billboards and radio the response was 12.3, 7.7, 6.1, and 5.2 percent, respectively. Food editors and store personnel were the most frequently selected as reliable sources of information.

The regression model produced 14 statistically significant variables. Per capita consumption near mean levels of the variables was estimated at 115.3 pounds. This was very close to estimates provided by other means, for the same period. Income elasticity for beef was estimated at 0.24.

Some unexpected results were demonstrated by the model. Beef consumption was positively related to

chicken purchases. A fairly significant negative relationship existed between steak consumption and total beef consumption. A fairly large negative coefficient was also found for those purchasing substitute meats, suggesting the potential for competition from this area as beef prices rise.

The results of this study should provide some insights to the industry for future action as illustrated in the following examples. Since income elasticity in general is relatively low, growth in demand associated with given increases in incomes can be expected to be slower in the future. The greatest growth in demand will arise from rising incomes at the lower income levels.

Consumers seem to be poorly informed on many aspects relative to beef. Fairly large numbers did not know about health characteristics of beef. For example, 27 percent of those responding indicated they did not know if beef was free of diseases. Many were unable to properly identify grades, when shown color pictures of cuts of beef representing various grades errors in rankings were very high. Many consumers said they would not buy frozen beef, yet most placed purchased beef in a freezer with limited knowledge relative to the conditions of storage. These and other examples suggest areas where added information should improve both consumer acceptance of beef and the efficiency of merchandising methods.

In-store services of a number of types were considered important by consumers. However, in adjusting to new merchandising methods which may require elimination of some services it is of significance to note that most respondents rarely used the services cited as important.

Consumption of substitute meats was relatively small, since few consumers used or knew about them, however the impact was relatively large on those who did purchase such products. The industry needs to be aware of the potential competition from this source and to understand the implications.

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APPENDIX A

Table 1. Population Distribution by Ethnic Groups, Maricopa and Pima Counties, and Arizona Respondents, 1973.

Ethnic Group	Arizona Respondents	Maricopa County*	Pima County*
	Percent		
White	97.0	95.0	94.0
Black	2.8	3.0	3.4

*Source: Valley National Bank Arizona Statistical Review, 30th Annual Edition, 1974.

Table 2. Population Age Distribution, Maricopa and Pima Counties, and Arizona Respondents, 1973.

Age (years)	Arizona Respondents	Maricopa County*	Pima County*
	Percent		
22–30	17.3	16.6	19.0
31–40	22.5	17.3	18.0
41–50	18.8	16.9	16.5
51–60	18.2	16.9	16.0
61–over	17.2	20.1	22.0
Not Given	6.0	—	—

*Source: Same as Appendix Table 1

Table 3. Population Distribution by Occupation, Arizona Respondents 1973 and Arizona 1970.

Occupation	Arizona Respondents	Arizona*
	Percent	
White Collar	50.0	51.2
Blue Collar	35.4	32.4
Farm Workers	0.6	2.9
Services	11.8	13.5

*Source: General Social and Economic Characteristics, United States Summary, 1970 Census of Population PC(1)–C1, U.S. Summary, 1972.

Table 4. Income Distribution, Arizona Respondents 1973 and Arizona 1970.

	Arizona Respondents	Arizona*
Median	$10,900.00	$10,097.00
Percent less than poverty level ($4,000.00)	11.9	11.5
Percent with over $15,000.00	24.0	22.4

*Source: Same as Appendix Table 3.

Table 5. Income Level Distribution, Arizona Respondents 1973 and Arizona 1970.

Income Level	Arizona Respondents	Arizona*
Dollars	Percent	
0– 2999	2.6	10.6
3000– 5999	9.3	16.9
6000– 8999	15.4	14.6
9000–15000	37.1	40.0
25000	23.5	14.6
50000–over	7.5	4.0

*Source: Same as Appendix Table 3.

Table 6. Family Size, Arizona Respondents 1973 and Arizona 1970.

	Arizona Respondents	Arizona*
Mean Family size	3.57	3.63
Number of children under 18	1.57**	2.49
Percent of families which had children under 18	51.0	55.4

*Source: Same as Appendix Table 3.
**The sample included only children under 16.

Table 7. Education Level Arizona Respondents 1973 and Arizona 1970.

Years of School Completed	Arizona Respondents	Arizona**
	Percent	
Elementary:		
1–4	0.7	3.6
5–7	1.1	4.0
7	0.3	2.5
8	5.8	11.0
High School:		
1–3	8.2	17.0
4	33.4	32.6
College or University:		
1–3	26.7	18.3
4–More	23.8	11.0

*Source: Same as Appendix Table 3.

APPENDIX B

Table 1. Rank of Type of Ground Beef According to the Frequency of Purchases, Arizona Respondents 1973.

	Rank by Frequency of Purchase*					
Type of Cut	1	2	3	4	Not Purchasing	Non-Response
Ground Chuck Percent	34.0	23.0	0.9	1.0	17.0	14.0
Ground Round Percent	19.0	24.0	14.0	2.0	24.0	18.0
Ground Beef Percent	31.0	15.0	10.0	5.0	20.0	19.0
Extra Lean or Diet Ground Beef Percent	12.0	8.0	6.0	7.0	42.0	26.0

*Rank from most to least with 1 = most and 4 = least.

Table 2. Rank* of Cuts of Steaks According to the Frequency of Purchases, Arizona Respondents 1973.

Type of Steak	1	2	3	4	5	6	7	Not Purchased	Non-Response
	Percent of Total Sample								
Chuck	12.3	13.0	8.2	7.2	3.9	2.3	0.8	30.4	21.8
Rib	11.3	12.7	11.2	8.3	4.2	1.3	0.6	29.1	21.5
Sirloin	20.1	17.2	12.9	8.5	3.6	1.2	0.3	16.8	19.4
Tenderloin	3.3	3.8	2.8	2.5	2.4	2.7	3.9	53.1	25.4
T Bone	12.5	14.4	11.3	7.4	5.1	1.5	0.3	27.6	20.0
Round	26.1	18.2	13.7	6.7	4.0	1.2	—	11.6	18.5
Porterhouse	4.0	5.3	4.4	5.0	3.5	3.2	2.4	47.8	24.5

*Ranked from 1 to 7, with 1 representing the greatest amount purchased.

Table 3. Rank of Cuts of Roast According to the Frequency of Purchases, Arizona Respondents 1973.

	Rank by Frequency of Purchase*							
	1	2	3	4	5	6	Not Purchased	Non-Response
	Percent							
Rib Roast	11.0	8.0	8.0	7.0	4.0	2.0	36.0	24.0
Chuck Roast	41.0	21.0	11.0	4.0	1.0	0.5	9.0	12.5
Blade Cut	5.0	12.0	10.0	8.0	4.0	1.0	37.0	13.0
Rump Roast	18.0	21.0	11.0	8.0	3.0	1.0	20.0	18.0
Sirloin Tip	13.0	15.0	10.0	4.0	4.0	2.0	31.0	21.0
Arm Roast	4.0	4.0	6.0	3.0	2.0	3.0	50.0	28.0

*Rank from most to least with 1 = most and 4 = least.

Table 4. Factors Influencing Consumer Preference for Self Service or Butchr Service, Arizona Respondents 1973.

Rank*	Desired Cuts Available	Size of Desired Cuts Available	Meat is Fresher	More Convenient	More Variety	Price Advantage	Can See Meat	Advice More Available
	Self Service Percent							
1	8.6	5.3	1.4	9.9	0.6	3.6	7.1	0.1
2	3.1	7.7	1.4	4.1	3.5	2.5	3.9	0.7
3	3.7	3 3	1.2	4.4	1.8	2.6	3.0	0.1
4	2.1	2.1	1.7	3.2	2.6	1.6	2.3	0.1
5	1.6	1.4	2.0	1.1	3.0	1.5	1.0	0.1
6	0.7	1.0	2.0	0.5	1.7	1.4	1.8	0.2
7	0.7	0.2	1.2	0.7	0.8	2.4	1.7	0.5
8	0.0	0.0	0.1	0.2	0.0	0.2	0.0	6.1
	Butcher Service Percent							
1	19.0	14.3	9.1	2.7	2.8	2.4	12.6	4.3
2	8.1	15.2	5.8	2.3	2.5	2.4	6.1	2.3
3	6.1	7.1	7.1	1.7	1.8	1.7	6.2	2.9
4	0.4	2.3	4.1	3.2	4.5	1.4	5.3	3.9
5	1.0	1.6	3.0	3.8	5.5	8.4	2.6	3.5
6	0.8	0.2	1.0	4.4	6.1	3.3	2.3	2.1
7	0.8	0.8	1.4	3.8	2.9	3.7	3.0	3.1
8	0.1	0.2	0.5	2.4	0.9	5.8	0.2	6.1

*Ranked from highest to lowest in terms of importance with 1 = highest, and 8 = lowest.

Table 5. Frequency of Use of Various Store Services, Arizona Respondents 1973.

Service	Never	Seldom	Occa-sionally	Frequently	Not Offered	Non-Response
	Percent of Respondents					
Prepare Special Cuts	13.8	15.3	23.1	9.8	35.2	2.8
Prepare Special Weights of Cuts	15.8	12.3	17.0	9.3	43.2	2.3
Meat Grinding	19.7	10.7	13.1	6.6	47.0	2.8
Prepare Special Packaging	19.3	9.3	6.3	3.7	58.6	2.8
Advice on Cooking	20.4	7.5	5.3	1.1	64.1	1.5
Advice on Storing	20.6	6.1	3.5	0.7	68.0	1.0
Other	3.0	0.7	0.9	0.2	93.8	1.4

Table 6. Importance of Various Store Services, Arizona Respondents 1973.

Service	Very Important	Important	Not Important	Non-Response
	Percent of Respondents			
Cooking	13.7	15.7	26.6	43.9
Type of Meat to Buy	17.2	19.8	19.4	43.9
Type of Cut to Buy	19.4	22.0	17.2	41.4
Amount of Meat to Buy	14.1	16.6	23.5	45.7
Personalized Cutting Service	18.3	20.3	18.8	42.3
New Ideas	3.2	9.5	34.4	52.8
Advice on Storing	8.9	17.3	23.3	50.3
Advice on Freezing	9.8	16.6	23.4	49.9

APPENDIX C

Table 1. Simple Correlation Coefficients Matrix.

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}
X_1	1.00000	.08910	−.04763	−.03056	−.12057	.06241	−.03153	−.08083	.02107	.06762	.00352	−.09442	−.07049	−.08700
X_2	.08910	1.00000	.18391	.18662	.04396	.35242	.00543	−.06313	.03324	−.15186	.08499	.14801	.05246	.00748
X_3	−.04763	.18391	1.00000	.00480	.07750	.16222	−.06577	00561	−.07867	.01331	.03690	.20766	.03987	.00591
X_4	−.03056	.18662	.00480	1.00000	.12719	.13031	−.03285	−.01341	−.03666	−.07392	.05345	.09202	.01112	.00242
X_5	−.12057	.04396	.07750	.12719	1.00000	−.01881	−.06426	−.38672	−.16407	−.11202	.02206	.0055	.38521	.26367
X_6	.06241	.35242	.16222	.13031	−.01881	1.00000	−.04477	−.02547	.03324	−.02089	−.03987	.16935	−.09245	−.07269
X_7	−.03153	.00453	−.06577	−.03285	−.06424	−.04477	1.00000	.01583	.10061	−.01715	−.05110	−.05852	−.05170	−.02099
X_8	−.08083	−.06313	.00561	−.01341	−.38672	−.02547	.01583	1.00000	.12792	.00854	−.02088	.17175	−.36653	−.17577
X_9	.02107	.03324	−.07867	−.03666	−.16407	.03324	.10061	.12792	1.00000	.02372	.01619	−.00439	−.19493	−.17630
X_{10}	.06762	−.15186	.01331	−.07392	−.11202	−.02089	−.01715	.00854	.02372	1.00000	−.16452	−.07814	−.07762	−.13681
X_{11}	.00352	.08499	.03690	.05345	.02206	−.03987	−.05110	−.02088	.01619	−.16452	1.00000	.10279	.13231	.06319
X_{12}	−.09442	.14801	.20766	.09702	.00055	.16835	−.05852	.17175	−.00439	−.07814	.10279	1.00000	−.05377	−.01305
X_{13}	−.07049	.05246	.03978	.01112	.38571	−.09245	−.05170	−.36653	−.19493	−.07762	.13231	−.05377	1.00000	.19954
X_{14}	−.08700	.00748	.00591	.00242	.26367	−.07269	−.02099	−.17577	−.17630	−.13631	.06319	−.01305	.19954	1.00000