Food Nutritional Quality:

A Pilot Study On Consumer Awareness*

by

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Abstract

Retail food demand studies are becoming increasingly concerned with the role of nutrition and health, yet consumer perceptions and attitudes are often ignored. The purpose of this pilot study is to determine consumer perceptions involving nutrition levels for selected foods. The influence of demographics and information about nutrition and health on perceptions toward meat items are determined. Results generally indicate that consumer perceptions toward fat and cholesterol levels in meats are based on the comparison of the animal sources, not the comparison of individual cuts or preparation techniques.

Recent efforts in the study of retail food demand have moved toward the role of nutrition and health. Several attempts have been made to measure the role that nutrition plays in food value or purchase habits (LaFrance (1983), Huffman (1988), Brown and Shrader (1990)). These studies use actual nutritional content of foods consumed to estimate demand impacts. However, it is possible that consumers perceive the nutritional elements of certain foods to be significantly different than actual levels. Differences between actual and perceived levels represent measurement error in these variables. Such errors may adversely affect the results of our demand studies.

Consumer misperceptions may be an especially important issue when a utility maximization model such as Lancaster's *Consumer Goods Characteristics Model* (CGCM) is used. In such a model, the utility function arguments are the characteristics of the goods not the goods themselves. If consumers misperceive the nutritional value of food products, such models should include the perceived levels of nutrition, not the

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actual levels. The CGCM has been used extensively in recent years. In particular, CGCM was used by Ladd and Suvannant (1976) to test if food prices were a sum of the values of certain nutrients; by Adrian and Daniels (1976) to estimate nutrient demand based in part on demographic variables; by Morgan, Metzen, and Johnson (1979) to estimate hedonic prices for breakfast cereal characteristics; and by Terry, Brooker, and Eastwood (1986) to estimate the demand for nutrients. Each of these studies used actual nutrition levels. If, however, perceived nutrition levels are different than the actual levels, the results and conclusions may be affected.

Results from these models vary widely. In the case of some nutrients, the implicit values can switch from significantly positive to significantly negative across models. Some of the variability may be associated with specification and differences in time periods. However, some variation may result from differences in perceptions which also change over time.

Models which do not directly specify nutrient levels may fall prey to another problem. Work by Brown and Schrader (1990) and later by Capps and Schmitz (1990) utilize an index of nutritional awareness. Models of this nature allow for consumer perceptions to be included. However, when results of these models are reviewed, the results are compared to actual data, not perceptions. These results may be compared to the wrong benchmarks. Thus perceptions need to be considered, regardless of the approach used.

Objectives

This pilot study attempts to determine if the consumer perception of the nutritional levels of foods is significantly different than its actual level. Furthermore, if it is determined that perceptions are different, attempts are made to determine which consumer groups tend to misperceive nutritional quality. To accomplish this purpose, an intercept survey was conducted in the Bryan/ College Station (B/CS), Texas area supermarkets.

This paper attempts to address two research challenges issued by Capps and Schmitz. The first challenge is to obtain data on health and nutrition information available to consumers and/ or attitudes of consumers toward health and nutrition. The second challenge is to assess the impacts of the source of nutrition and health information on food consumption.

Methodology

The measurement of nutritional perceptions of consumers can be accomplished in various ways. This study of the B/CS area represents a pilot effort to test whether such information may be important. A more detailed mail survey could not be conducted due to financial constraints. Use of an intercept survey in supermarkets is used as an alternative.

Several considerations about the B/CS area need to be observed in the development of this study. Both communities are of nearly the same size with a population between 50,000 and 60,000 each. Being the home of Texas A&M University, the College Station population is made up of many students and university employees. This contrasts the population of Bryan which is a more blue-collar environment. The northern area of Bryan is primarily composed of Hispanics and rural poor. Due to the differences between these two communities, sampling procedures are designed so that neither community is overly represented. Three area supermarkets were randomly selected without replacement for surveying locations.

Survey Design

This project focuses only on meat products to limit the length of the questionnaire while maintaining sufficient detail to accomplish the objectives. Meats are chosen since they represent a large portion of the consumer budget and are noted for numerous studies which consider possible structural change. Respondents are asked to select the meat with the highest level of cholesterol and highest level of fat in each of 20 pairs of meat and fish products. Pairings have been selected so as to test whether certain food categories (beef, pork, chicken, or fish) are perceived to be better or worse than other meat items. Both intra-group and inter-group comparisons are used. These comparisons are made for at-home prepared foods.

Two additional questions are included to gain insight into perceptions of fastfood burgers and fastfood chicken. Results from these questions are compared to cholesterol and fat levels for two major fastfood chains published by the West Suburban Dietetic Association (1987). Respondents are also asked general information about food purchase habits, sources of nutritional information, and demographic variables.

Methods of Analysis

The questions involving cholesterol and fat levels are the focal questions in this survey. The same meat pairings are used in both questions. These pairings are shown in Table 1. Percentages are calculated to determine the number of times that the right-hand choice is circled. Z tests are then conducted to determine if the percentage differs from 0.5. This test is calculated as

$$T = np^* \pm Z\sqrt{np^*(1-p^*)} \qquad (1)$$

where T is the upper and lower bound of the test statistic, n is the number of observations available, p^* is the hypothesized value (0.5), and Z is the Z statistic (1.6449). The null hypothesis is that the percentage equals 0.5 which would indicate that respondents guessed while the alternative is that they did not guess. If the actual percentage lies between the T values, then the null hypothesis cannot be rejected. For pairings where the null hypothesis is rejected, percentages greater than 0.5 indicate that respondents believe that the right-hand choice is higher in cholesterol or fat for the respective question. Similar responses statistically less than 0.5 indicate that respondents believe the left-hand choice is higher in cholesterol or fat. Most of the remaining questions in the instrument are either binary questions (yes or no) or various forms of scales. Descriptive statistics are calculated for these as either percentages for the binary or frequencies for the scales.

In addition to the univariate analysis above, a multivariate logit model is developed. Logit models are appropriate in the case of a binary dependent variable. The logit specifications circumvent the difficulties of the linear probability model via the use of monotonic transformations which will guarantee that predictions lie in the unit interval. The maximum likelihood technique is employed in the estimation. This model predicts the probability that the dependent variable will take on the value 1, given the values for the independent factors included. This model is used to predict the response for each pairing.

Meat items are categorized as 1) beef, 2) pork, 3) chicken, 4) fish, and 5) other. The "other" category includes beef wieners, fish sticks, and fried chicken. Upon review of the data, it became apparent that the creation of an "other" category would be necessary. This is done since responses to each of the items within the "other" group appear to be atypical when compared to items within their respective groupings.

These models consider how the consumer response to the questions regarding the cholesterol and fat content of meats is affected by alternative meat pairings. For example, in those pairings which involve a pork product paired against non-pork products, the model considers the effect of each of the alternative pairings (beef, chicken, fish and other) on the probability that the pork item is circled. These models also include sources of information as well as demographic variables. Similar analysis will be conducted for each meat group separately as well as separate analysis for cholesterol and for fat.

These considerations give rise to the model formulation:

$$\begin{aligned} MEAT_i = {} & \alpha_i + \beta_{1i}BEEF + \beta_{2i}PORK \\ & + \beta_{3i}CHIC + \beta_{4i}FISH + \beta_{5i}OTHER \\ & + \beta_{6i}\infty_1 + \ldots + \beta_{12i}\infty_7 + \beta_{13i}MALE \\ & + \beta_{14i}ETH_1 + \ldots + \beta_{17i}ETH_4 + \beta_{18i}AGE_1 \\ & + \ldots + \beta_{22i}AGE_6 + \beta_{23i}SNGL + \beta_{24i}SCH_1 \\ & + \ldots + \beta_{26i}SCH_4 \end{aligned}$$

where $MEAT_i$ equals 1 if the respondent chose $MEAT_i$, 0 otherwise; BEEF equals 1 if the other product compared with $MEAT_i$ is beef, 0 otherwise; PORK equals 1 if the other product compared with $MEAT_i$ is pork, 0 otherwise; CHIC equals 1 if the other product compared with $MEAT_i$ is chicken, 0 otherwise; FISH equals 1 if

Table 1. Meat pairings used in cholesterol and fat comparisons.

a)	Beef Wieners	or	Ground Sirloin
b)	T Bone Steak	or	Rump Roast
c)	Ground Sirloin	or	T Bone Steak
d)	Beef Wieners	or	Lean Hamburger
e)	Bacon	or	Pork Sausage
f)	Pork Chops	or	Cured Boneless Ham
g)	Fried Chicken	or	Roasted Chicken **Dark meat**
h)	Roasted Chicken **Dark meat**	or	Roasted Chicken **Light meat**
i)	Shrimp	or	Fish
j)	Shrimp	or	Fish Sticks
k)	Ground Sirloin	or	Pork Chops
l)	T Bone Steak	or	Cured Boneless Ham
m)	Rump Roast	or	Bacon
n)	Cured Boneless Ham	or	Roasted Chicken **Dark meat**
o)	Ground Sirloin	or	Fried Chicken
p)	Pork Chops	or	Fish Sticks
q)	Lean Hamburger	or	Fish
r)	Roasted Chicken **Dark meat**	or	Fish Sticks
s)	T Bone Steak	or	Shrimp
t)	Cured Boneless Ham	or	Fish

the other product compared with $MEAT_i$ is fish, 0 otherwise; OTHER equals 1 if the other product compared with $MEAT_i$ is one of the other meat products (i.e. beef wieners, fish sticks, fried chicken), 0 otherwise; and i equals BEEF, PORK, CHIC, FISH, or OTHER. Demographic and information variable descriptions are presented in Table 2.

It is necessary to omit the meat item which is being analyzed since only intergroup comparisons are used. Furthermore, one more meat group must be omitted from the equation to avoid perfect collinearity among the meats and the intercept term. The base results are for a white, married female in her twenties with a BS or BA degree and no nutritional information sources. The binary variables included in this model show the effect of respondents who "deviate" from this base. Data for this analysis consist of individual responses from all 75 surveys for each pairing which involves the meat item in question compared to meat items which are not part of the same group.

Results

Demographics

Seventy-five surveys were collected during the period from April 4 through April 11, 1990. Thirty-seven percent of the respondents are male and 63 percent are female. In terms of race, 84 percent are white, six percent are hispanic, six percent are black, one percent are oriental, and three percent are of other races. Thirty-nine percent of the respondents are within the range of 20 to 29 years of age; 23 percent within 30-39; 13 percent within 40-49; 13 percent within 50-59; 11 percent at least are 60; and only one percent under 20. Forty-five percent are single; 43 percent are married; six percent are widowed or widower; and six percent are divorced. Roughly 41 percent of the respondents have attended or are still attending college. Seventeen percent have attended or are still attending graduate school, about 25 percent have completed a Bachelors degree and another 17 percent have indicated reaching high school at most. With regards to the gross annual income, 44 percent of the respondents have annual income under 15,000; 19 percent within 30,000-44,999; 18 percent within 15,000-29,999; eight percent within 60,000-74,999; six percent within 45,000-59,999; and five percent with at least 75,000. Eighty percent and 73 percent of the respondents are the principal food shoppers and principal meal planners in their households, respectively. The average number of adults per household is 1.7 while the average number of children per household is 2.5.

Nutrition Awareness

Roughly 85 percent of the respondents consider themselves nutritionally aware. When asked where they receive health and nutrition information, 71 percent indicated sources as newspaper/magazine articles; 69 percent as food labels; 36 percent as radio/TV; 20 percent as advertisements; 15 percent as in-store displays; and 8 percent as nutrition-oriented classes. About 19 percent indicated getting health and nutrition information from either family/friends or physicians. One percent do not receive any information about health and nutrition at all. Most of the respondents find label information to be either *sometimes* or *usually* helpful in determining nutritional food value.[1]

When asked to compare fastfood burgers to fastfood chicken, assuming that the same amount is eaten and that no side orders are involved, most of the respondents think that cholesterol and fat consumed would be lower for chicken or about the same. Actual response frequencies are shown in Table 3. However, based upon calculations for a major fastfood chain in each of these foods, fat and cholesterol consumption would be 75 and 40 percent less for burgers, respectively.

Food Consumption

One of the objectives of this research is to determine if nutritional awareness affects intergroup consumption levels. Thus consumers are asked if they have altered their consumption of select food groups as a result of nutritional information. Response frequencies are given in Table 4. Results are as expected with the majority of respondents indicating that they have decreased their consumption of beef, pork, eggs, and sweet

Table 2. **Listing of demographic and information variables**

Variable	Name	Description
Information	LBLS	1 if get health and nutrition information from food labels; 0 otherwise
(INF_1-INF_7)	CLSS	1 if from nutrition classes; 0 otherwise
	PRT	1 if from newspaper/magazine articles; 0 otherwise
	ADS	1 if from advertisements; 0 otherwise
	RTV	1 if from radio/television; 0 otherwise
	DISP	1 if from in-store displays; 0 otherwise
	OTHSO	1 if from other sources; 0 otherwise
SEX	MALE	1 if male; 0 otherwise
ETHNICITY	BLCK	1 if black; 0 otherwise
(ETH_1-ETH_4)	HISP	1 if hispanic; 0 otherwise
	ORIEN	1 if oriental; 0 otherwise
	OTHN	1 if other race; 0 otherwise
AGE	AGE1	1 if age is under 20; 0 otherwise
(AGE_1-AGE_5)	AGE2	1 if age is within 30-39; 0 otherwise
	AGE3	1 if age is within 40-49; 0 otherwise
	AGE4	1 if age is within 50-59; 0 otherwise
	AGE5	1 if age is 60 and over; 0 otherwise
SINGLE	SNGL	1 if single; 0 otherwise
SCHOOLING	SCH1	1 if education level is high school or less; 0 otherwise
(SCH_1-SCH_3)	SCH2	1 if attended or attending college; 0 otherwise
	SCH3	1 if attended or attending graduate school; 0 otherwise

desserts and increased consumption of fish, chicken, fruits, and vegetables.

Respondents' Perception of Meats

Regarding the selection of meats with the higher level of cholesterol, Z tests revealed that 17 out of the 20 answers for these pairs are not guesses. When compared to actual levels published by Kratzer et al., ten of these 17 non-guess responses are wrong. Similar Z tests for fat show that 15 of the 20 answers are not guesses and that seven of these 15 are incorrect. Those respondents which answered each of the twenty subparts on average answered just under half of them correctly. Thus perceptions seem to be different than actual levels.

Multivariate Analysis

The maximum likelihood estimates of the logit model is presented in Table 5. For the logit models based on cholesterol comparisons, the McFadden R-squares range from 0.0825 for pork to 0.2686 for beef while the percentage of correct classifications range from 71 percent for fish to 79 percent for pork. For the fat comparisons, the McFadden R-squares range from 0.0974 for pork to 0.3066 for beef while the percentage of correct classifications range from 80 percent for pork to 84 percent for fish.

Chi-square tests indicate limited significance for demographic and information variables. Demographic variables and information sources are significant only in the beef equations. Ethnicity, age, and education levels are not significant in any of the models.

With these logit results, one can partially order consumer perceptions for these meat groups in terms of cholesterol and fat content. To do this, consider the pork equation. The intercept in this equation corresponds to beef. When asked about cholesterol, the probability that the pork item is circled decreases when pork is compared with a meat from the other category relative to when pork is compared to a beef item. This probability increases relative to a beef item when pork is compared with a fish or chicken item. Further, fish is of a higher magnitude than chicken which would indicate that fish is perceived to be lower in cholesterol than chicken. Since no comparison between pork and pork is included, a position for pork in this ordering must come from another equation. Both fish and other meats contain beef as an item and pork as an intercept. In both cases the coefficient on beef is positive, indicating that beef is perceived to be lower in cholesterol than pork. In the fish equation, other meats is significantly positive relative to pork which is the intercept. This indicates that pork is viewed as higher in cholesterol than other meats. Although the beef, and chicken equations counter this statement, these coefficients are not significant. Thus these meats may be ordered from highest to lowest in terms of cholesterol as pork, other, beef, chicken and fish. A similar approach for fat yields the same ordering as found for cholesterol.

No clear patterns appear in determining the impacts of information sources. For instance, advertising, radio and television, and store displays tend to decrease the probability that all the meat items with the exception of beef will be selected as higher in cholesterol and in fat. Males tend to rate beef as higher in cholesterol and fat and rate chicken as higher in fat but the other groups as lower. Single people, on the other hand, tend to rate fish as lower in cholesterol and rate beef, chicken, and other meats as lower in fat. Ethnicity and education have mixed results as well.

Limitations

The survey instrument requires approximately 10 minutes to complete. This length makes it difficult to complete for parents who come to the store with small children. Thus, parents accompanied by small children are not surveyed. Furthermore, since grocery stores are used, males, especially married males, are undersampled, despite efforts to counter this problem during the sampling process. Customers at specialty-food and health-food stores are also not sampled. This failure may result in the omission of the most nutrition conscious consumers. Moreover, this study is conducted in a local area; thus, results cannot be generalized to regional or national levels.

Table 3. Response frequencies for perceived cholesterol and fat consumption in the case of fastfood burgers and chicken.

	Cholesterol	Fat
60% less for chicken	3	6
40% less for chicken	14	10
20% less for chicken	15	20
About the same	25	18
20% less for beef	2	4
40% less for beef	2	3
60% less for beef	1	0
No response	13	14

Table 4. Food consumption response frequencies as a result of nutrition awareness

	Increased	Decreased	Not Changed
Beef	2	38	29
Pork	3	41	25
Fish	44	2	24
Chicken	48	3	20
Eggs	3	44	21
Fruits	43	1	26
Vegetables	46	1	24
Sweet Desserts	1	43	26

Table 5. Impacts of alternative pairings and demographic variables on the probability of the selected meat group being selected as highest in cholesterol or highest in fat. [a]

	CHOLESTEROL					FATS				
	BEEF	PORK	CHICKEN	FISH	OTHER	BEEF	PORK	CHICKEN	FISH	OTHER
BEEF		INT		0.8066	2.7055*		INT		0.6712	2.2648*
				(0.5590)	(0.3876)				(0.7445)	(0.3727)
				0.1071	0.5209				0.0374	0.3666
PORK	INT		INT	INT	INT	INT		INT	INT	INT
CHIC		0.2660			2.3548*		0.7545			2.2036*
		(0.4348)			(0.4561)		(0.4662)			(0.4820)
		0.0225			0.4534		0.1141			0.3567
FISH	2.4231*	0.5297			1.3717*	2.8577*	1.5245*			1.9752*
	(0.3447)	(0.5017)			(0.4526)	(0.3584)	(0.6401)			(0.4916)
	0.3096	0.0448			0.2641	0.6106	0.2305			0.3197
OTHER	-0.2522	-0.1676	-0.1775	1.3379*		-0.4705	-0.6292	-0.4771	1.4100*	
	(0.3163)	(0.3900)	(0.7036)	(0.4701)		(0.3087)	(0.3704)	(0.8419)	(0.6353)	
	-0.0322	-0.0142	-0.0133	0.1777		-0.1005	-0.0951	-0.0617	0.0787	

[a]Reported values are coefficient, standard error and the associated change in probability. Missing coefficients imply that results are not available. INT implies that this meat is included as the intercept, * indicates that the coefficient is significant at $\alpha = 0.05$, and (.) indicates that standard error is not available since coefficient estimate is based on one observation.

Table 5. continued.

	CHOLESTEROL					FATS				
	BEEF	PORK	CHICKEN	FISH	OTHER	BEEF	PORK	CHICKEN	FISH	OTHER
LBLS	-0.6134	-0.1503	0.1212	0.2062	0.6226	-0.2807	0.1785	0.2093	-0.163	-0.0883
	(0.3279)	(0.3924)	(0.6518)	(0.4790)	(0.3272)	(0.3460)	(0.4140)	(0.8163)	(0.5979)	(0.3537)
	-0.0784	-0.0127	0.0091	0.0274	0.1199	-0.0600	0.0270	0.0271	-0.0091	-0.0143
CLSS	-0.1929	0.4515	0.1246	0.6794	-0.5599	-0.1208	0.2393	-0.1778	0.6678	-0.5005
	(0.5251)	(0.5759)	(1.1942)	(0.7025)	(0.4744)	(0.5118)	(0.6036)	(1.3529)	(0.8331)	(0.4901)
	-0.0247	0.0382	0.0093	0.0903	-0.1078	-0.0258	0.0362	-0.0230	0.0373	-0.0810
PRT	-1.0376*	0.0165	-0.0320	1.2045*	0.4388	-0.7683*	-0.0892	0.3881	1.3421	0.2561
	(0.3184)	(0.3451)	(0.7183)	(0.5693)	(0.3266)	(0.3219)	(0.3627)	(0.8370)	(0.7943)	(0.3559)
	-0.1326	0.0014	-0.0024	0.1600	0.0845	-0.1642	-0.0135	0.0502	0.0749	0.0414
ADS	0.2323	-0.9659*	-0.1663	0.3842	0.5418	0.2717	-0.9578*	0.0132	-0.2864	1.2030*
	(0.3789)	(0.4527)	(0.6746)	(0.6201)	(0.4711)	(0.3875)	(0.4655)	(0.8789)	(0.7678)	(0.5582)
	0.0297	-0.0816	-0.0125	0.0510	0.1043	0.0581	-0.1448	0.0017	-0.0160	0.1947
RTV	0.6046	0.4303	0.9960	-0.7465	-0.5715	0.2702	0.1265	0.9340	-0.0771	-0.2404
	(0.3278)	0.3687)	(0.5556)	(0.4709)	(0.3344)	(0.3389)	(0.3756)	(0.6758)	(0.5897)	(0.3642)
	0.0773	0.0364	0.0746	-0.0992	-0.1100	0.0577	0.0191	0.1208	-0.0043	-0.0389
DISP	0.2015	0.9891	-1.3333	-1.3527	-0.4432	0.5889	0.1958	-0.1991	-1.1754	-0.7604
	(0.4770)	(0.5198)	(1.0605)	(0.8161)	(0.5073)	(0.4811)	(0.5215)	(1.1599)	(1.0119)	(0.5245)
	0.0258	0.0836	-0.0999	-0.1797	-0.0853	0.1258	0.0296	-0.0257	-0.0656	-0.1231
OTHSO	-1.1006*	-0.3792	1.0440	0.7776	-0.2812	-0.7214	0.2558	0.6843	1.5239*	-0.5901
	(0.4280)	(0.4702)	(0.6432)	(0.4512)	(0.3983)	(0.4171)	(0.5354)	(0.7142)	(0.6210)	(0.4291)
	-0.1406	-0.0320	0.0782	0.1033	-0.0541	-0.1541	0.0387	0.0885	0.0850	-0.0955

Table 5. continued.

	CHOLESTEROL					FATS				
	BEEF	PORK	CHICKEN	FISH	OTHER	BEEF	PORK	CHICKEN	FISH	OTHER
MALE	0.4493	-0.5125	-0.1917	-0.1363	-0.0184	0.5635	-0.5167	1.0143	-0.4553	-0.6067
	(0.3205)	(0.3593)	(0.6660)	(0.4072)	(0.3335)	(0.3363)	(0.4004)	(0.8127)	(0.5213)	(0.3627)
	0.0574	-0.0433	-0.0144	-0.0181	-0.0035	0.1204	-0.0781	0.1311	-0.0254	-0.0982
BLCK	0.4071	-0.5674	-0.0163		-0.0938	-0.1977	-0.3094	0.6477		-0.2772
	(0.8677)	(0.8959)	(1.1459)		(0.7289)	(0.9681)	(0.9271)	(1.2946)		(0.7660)
	0.0520	-0.0480	-0.0012		-0.0181	-0.0422	-0.0468	0.0837		-0.0449
HISP	0.5597	-0.1172	-1.6182	1.0166	-0.3632	0.5649	-0.5384	-0.2579	0.1735	-0.5006
	(0.7190)	(0.8827)	(1.3650)	(1.0940)	(0.8653)	(0.7556)	(0.9508)	(1.5088)	(1.2909)	(0.9044)
	0.0715	-0.0099	-0.1212	0.1350	-0.0699	0.1207	-0.0814	-0.0333	0.0097	-0.0810
ORIEN	-1.6594	1.3259			-0.6292	-0.7222	0.7907			-0.8244
	(1.1562)	(1.1925)			(1.0461)	(0.9376)	(0.9986)			(1.0223)
	-0.2121	0.1121			-0.1211	-0.1543	0.1196			-0.1335
OTHN	0.7910	-0.4366	-32.7260	-33.9170	-0.8907	-0.5147	1.5334	-0.2676	-31.7980	-1.7708
	(0.8127)	(1.0035)	(.)	(.)	(0.8758)	(0.9093)	(1.1203)	(1.9347)	(.)	(0.9722)
	0.1011	-0.0369	-2.4519	-4.5056	-0.1715	-0.1100	0.2318	-0.0346	-1.7743	-0.2866
AGE1	-32.8330	33.2900			0.4445	0.4625	-0.3469			0.3054
	(.)	(.)			(1.0636)	(0.8689)	(0.9705)			(0.9972)
	-4.1957	2.8136			0.0856	0.0988	-0.0524			0.0494
AGE2	-0.0688	-0.5291	1.7206	0.6459	0.1909	-0.2100	-0.1782	0.2192	2.5629*	-0.3578
	(0.5240)	(0.5766)	(0.9481)	(0.8646)	(0.5764)	(0.5510)	(0.6019)	(1.1054)	(1.2553)	(0.6375)
	-0.0088	-0.0447	0.1289	0.0858	0.0368	-0.0449	-0.0269	0.0283	0.1430	-0.0579

Table 5. continued.

	CHOLESTEROL					FATS				
	BEEF	**PORK**	CHICKEN	FISH	OTHER	BEEF	PORK	CHICKEN	FISH	OTHER
AGE3	0.3371	0.1949	1.5405	1.2820	-0.9643	0.0594	0.0799	1.4115	3.2358	-1.6499*
	(0.6512)	(0.7010)	(1.0811)	(1.1514)	(0.6112)	(0.6826)	(0.7028)	(1.1270)	(1.7093)	(0.7139)
	0.0431	0.0165	0.1154	0.1703	-0.1857	0.0127	0.0121	0.1825	0.1806	-0.2671
AGE4	-0.1114	1.5897	0.7298	0.2262	0.0485	0.6570	0.5716	-0.1064	1.7989	-1.3658
	(0.6581)	(0.9024)	(1.4327)	(1.0062)	(0.7290)	(0.6823)	(0.8306)	(1.5249)	(1.3353)	(0.7974)
	-0.0142	0.1344	0.0547	0.0301	0.0093	0.1404	0.0864	-0.0138	0.1004	-0.2211
AGE5	-0.2337	0.6562	1.4721	0.2508	0.0248	-0.7042	0.9085	1.8013	0.9712	-1.0841
	(0.7881)	(0.8393)	(1.5183)	(1.0293)	(0.6988)	(0.8353)	(0.8835)	(1.5779)	(1.3186)	(0.7916)
	-0.0299	0.0555	0.1103	0.0333	0.0048	-0.1504	0.1374	0.2329	0.0542	-0.1755
SNGL	0.1318	0.1856	1.6951	-0.1868	0.0320	-0.0033	0.5738	-0.0255	1.3512	-0.5539
	(0.5100)	(0.5721)	(1.1867)	(0.8256)	(0.5506)	(0.5430)	(0.6482)	(1.3209)	(1.1397)	(0.6222)
	0.0168	0.0157	0.1270	-0.0248	0.0062	-0.0007	0.0867	-0.0033	0.0754	-0.0897
SCH1	-0.4979	1.0684	1.0505	-0.6157	-0.2562	-0.3360	1.3851	2.0531	-1.0278	-1.2394*
	(0.6439)	(0.7731)	(0.8595)	(0.8376)	(0.5326)	(0.6474)	(0.7964)	(1.0385)	(1.0249)	(0.5838)
	-0.0636	0.0903	0.0787	-0.0818	-0.0493	-0.0718	0.2094	0.2654	-0.0573	-0.2006
SCH2	-0.3094	0.1185	0.4347	0.5538	0.0885	-0.0165	0.3875	0.8152	-0.1931	-0.6970
	(0.4217)	(0.4863)	(0.6450)	(0.5159)	(0.4431)	(0.4288)	(0.5118)	(0.8835)	(0.6624)	(0.5255)
	-0.0395	0.0100	0.0326	0.0736	0.0170	-0.0035	0.0586	0.1054	-0.0108	-0.1128
SCH3	0.3473	0.1153	-1.4004	0.4379	0.1175	0.2918	-0.3042	0.9874	-1.3350	-0.0282
	(0.5091)	(0.5571)	(1.2600)	(0.7464)	(0.4775)	(0.5211)	(0.5755)	(1.3681)	(1.1252)	(0.5654)
	0.0444	0.0097	-0.1049	0.0582	0.0226	0.0623	-0.0460	0.1277	-0.0745	-0.0046

Table 5. continued.

	CHOLESTEROL					FATS				
	BEEF	PORK	CHICKEN	FISH	OTHER	BEEF	PORK	CHICKEN	FISH	OTHER
CONST	-0.6289	1.0472	-3.4059*	-3.1759*	-1.3329	-0.9079	0.6353	-3.9634*	-5.0647*	1.1574
	(0.7436)	(0.7931)	(1.2054)	(1.1797)	(0.7514)	(0.7772)	(0.8371)	(1.4253)	(1.8802)	(0.8703)
	-0.0804	0.0885	-0.2552	-0.4219	-0.2566	-0.1940	0.0961	-0.5124	-0.2826	0.1874
R-Sqr.	0.2686	0.0825	0.1120	0.1201	0.1855	0.3066	0.0974	0.1466	0.1381	0.1638
Percent Correct	0.7833	0.7878	0.7669	0.7051	0.7591	0.8126	0.7977	0.7987	0.8362	0.8074
Chi-Square										
MEAT	70.932*	1.919	0.064	8.121*	54.195*	91.734*	12.953	0.321	5.245	38.978*
DEMO	40.126*	18.430	13.407	18.694	21.045	24.403	14.243	18.830	13.918	20.038
INF	18.897*	8.127	9.647	12.123	11.920	10.021	5.026	4.345	7.382	11.020
ETH	4.035	1.885	1.406	0.864	1.452	1.570	2.633	0.282	0.018	3.874
AGE	1.153	8.118	4.458	1.865	6.171	5.512	2.453	6.801	5.782	7.201
SCH	2.322	1.988	3.423	2.460	0.506	0.701	3.859	4.202	2.582	5.102

The last major limitation in this paper involves the selection of pairings for the cholesterol and fat questions. As a result of creating the other category, comparisons across beef and chicken, as well as chicken and fish could no longer be accomplished. Results without the other category would be misleading since the pairing which would be available is not representative while the addition of other pairings would have made the survey longer. In a full scale sample, this could be avoided by creating different survey forms so that more pairings could be included without increasing the length of the survey instrument.

Conclusions

One of the key objectives of this paper is to identify, in a definitive fashion, the perception of the respondents on the aggregate meat products. It appears that consumers do not distinguish the nutritional and health characteristics of individual cuts. They rather distinguish characteristics based on the animal source and level of processing. Demographic variables and sources of information do not appear to play a major role in determining these perceptions.

Results from this paper must be used with care, since a small region and relatively small sample are used. The finding that consumers distinguish among meats, not individual cuts has a lot of implications for food labeling and for product advertising. For instance, promotion is one of the primary concerns of the various meat industry councils. These meat industry councils may use the results of this analysis as an aid in making important advertising or labeling decisions. Furthermore, the fastfood questions indicate a potential problem in the perceptions of meats in the away-from-home market which may have important implications in the restaurant and fastfood industries. Based on this and other findings, a more thorough investigation is warranted.

Endnote

[1]The mean response for this was 3.4 and a standard deviation of 1.1 when the values 0 through 4 are assigned to the categories: not sure, rarely, seldom, sometimes, and usually, respectively.

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