Assessing the Market Outlook for Rabbit Meat in Louisiana and Texas

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Empirical results from two-ordered probit models suggest that (a) men, Catholics, and blue-collar workers are more positive about rabbit meat than their corresponding counterparts are; (b) men, Catholics, and blue-collar workers are the major consumers of rabbit meat in Louisiana and southeast Texas; and (c) 11 percent of female consumers are willing to try rabbit meat. Rabbit meat is low in fat, sodium, and cholesterol, and high in protein, but its price is comparable to that of bone and skinless chicken breast. Therefore, any promotional efforts to expand consumption must emphasize the meat's nutritional attributes rather than its price.

Introduction

The farm crisis in the early 1980s heightened interest and awareness about the U.S. agricultural sector's vulnerability. At that time, much of the discussions and debates centered on finding ways to diversify agricultural production. Consequently, several research projects were undertaken to explore the potential of nontraditional enterprises to replace or complement traditional row crops and livestock. The following enterprises were thought to be good prospects for diversification of production agriculture: goats, rabbits, sheep, bees, fish, game birds, herbs, spices, and small fruits (Babb and Long, 1987; Bateman, Sollie, and Stenmark, 1987; Cheeke, 1986; Degner and Locasio, 1988; French, 1982; Haenlein, 1984; Hahn and Pepino, 1983; Lukefahr, Nwosu, and Rao, 1989). After the recession, the diversification momentum slowed but not among agricultural scientists at 1,890 institutions. These scientists have been working tirelessly to find economically viable alternative enterprises for small-limited-resource farmers.

Rabbits' attraction as a potential substitute or complement to traditional livestock rests on three premises. First, rabbits can be produced with relatively little capital. Second, the meat is rich in protein and lower in fat, sodium, and cholesterol than beef, pork, and mutton are (Cheeke, 1986; Costa, 1978; Lukefahr, Nwosu, and Rao, 1989). Third, Americans are becoming more health-conscious and ethnically diverse, and many are exhibiting greater willingness to try new and exotic

food products (Babb and Long, 1987; Senauer, Asp, and Kinsey, 1992). These premises reflect some of the changes that have occurred in U.S. food production and delivery during the past 20 years. In the past two decades, the U.S. food industry introduced a vast array of new food products in response to changes in consumers' demographics, lifestyles, real disposable incomes, and in their awareness about diet, health, nutrition, and food safety issues (Gallo, 1996; Kinsey and Senauer, 1997; Senauer, Asp, and Kinsey, 1992).

To date, much of the research on rabbits has centered on production practices. However, because consumer demand is such a powerful force in the food industry, more market assessment studies must be undertaken. These studies are vital because a very high percentage of new food introductions fail (Gallo, 1996). Rabbit meat's marketing success will depend on how well it competes in the highly developed vertically integrated meat sector. For these reasons, researchers caution against recommending new enterprises to farmers until thorough assessments are made of their marketing outlook (Debertin, 1986; Polopolus, 1987).

This caveat becomes more ominous because of the extremely high levels of technology within the U.S. food marketing system. Electronic scanning and data interchange is helping manufacturers, distributors, and retailers to monitor consumer purchasing behavior and to make informed decisions about supply. The food industry is now discussing a new concept—efficient consumer response (ECR). ECR will electronically link grocery retailers, wholesale distributors, and manufacturers and will improve the efficiency and effectiveness of the entire food distribution system (Kinsey and Senauer, 1997). Under the ECR network, slow-moving products can be removed quickly from shelves and

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production lines, and fast-moving commodities can be easily replenished. Within this dynamic framework, this study examines consumers' opinions (attitudes) about rabbit meat and their past consumption of the meat or interest in trying it.

Objectives

The study's objectives are to assess the extent to which socioeconomic, demographic, and geographic (SDG) factors influence (a) primary grocery shoppers' attitudes toward rabbit meat; (b) previous consumption or interest in consuming the meat; and (c) the marketing outlook for rabbit meat in Louisiana and southeast Texas.

Procedures

The study's data were compiled from a random sample of 1,002 telephone subscribers in seven metropolitan statistical areas (MSAs) in Louisiana and two MSAs in southeast Texas during February 1993. The data were collected from primary grocery shoppers and included a number of issues related to meat purchasing and consumption decisions. Regarding rabbit meat, shoppers were asked to give their opinions about the meat and their consumption or likely consumption of it. These opinions were used as a proxy for shoppers' attitudes and were recorded on a five-point scale as follows: (5) very positive; (4) somewhat positive; (3) neutral/no opinion; (2) somewhat negative; and (1) very negative. To ascertain consumption or likely consumption of rabbit meat, shoppers also were asked if they (5) had already tried; (4) were very likely to try; (3) were somewhat likely to try; (2) were not very likely to try; and (1) definitely would not try rabbit meat. Data also were compiled on shoppers' SDG characteristics (gender, age, household size, educational levels, marital status, religion, employment status, race, household income, and geographic location).

Model Specification and Variables

The response categories are discrete; therefore, the ordered probit model technique was used to estimate the models and to generate the maximum likelihood estimates. The models examined whether SDG characteristics influenced the probability of shoppers' attitudes toward rabbit meat *(ATTRABB)* and the likelihood of consumption or interest in

consuming it in future consumption *(CONRABB)*. The models, *ATTRABB* and *CONRABB*, are specified as follows:

(1) $y^* = \beta' x + \varepsilon, \quad \varepsilon \sim N[0, 1];$
       $y = 0 \text{ if } y^* \leq 0;$
       $y = 1 \text{ if } 0 < y^* \leq \mu_1; \text{ and}$
       $y = 2 \text{ if } \mu_1 < y^* \leq \mu_2.$

In the equation above, y^* is the unobserved vector, and y is the observed vector. The observed vector, y, represents grocery shoppers' attitudes and consumption or interest in consuming rabbit meat. It lies between y^* and a cutoff utility vector, μ; x is a matrix of primary grocery shoppers' SDG characteristics, while ε is the error term, assumed to be normally distributed with a mean of zero and a standard deviation of 1. The unknown parameters, βs and μs, are estimated by the maximum likelihood procedure for the ordered probit model contained in *LIMDEP* (Greene, 1995). The probabilities that enter the log-likelihood function are as follows:

(2) $\text{Prob}(y = 0) = \Phi(-\beta' x);$
       $\text{Prob}(y = 1) = \Phi(\mu_1 - \beta' x) - \Phi(-\beta' x); \text{ and}$
       $\text{Prob}(y = 2) = \Phi(\mu_2 - \beta' x) - \Phi(\mu_1 - \beta' x).$

$\Phi(\cdot)$ represents the cumulative standard normal distribution function for $\varepsilon\varepsilon$ and $\mu_2 > \mu_1 > 0$ must hold. For estimation purposes, the five response categories for attitudes were reduced to three categories—negative, neutral, and positive—and those categories for consumption or likely consumption were also reduced to three as well—have tried, likely to try, and unlikely. These changes do not affect the results because the length between each response category is meaningless. The selection of explanatory variables is based on consumer-behavior literature; however, no *a priori* assumptions are made on the directions of the signs of the coefficients. The explanatory and dependent variables, their definitions, and summary statistics are shown in Table 1.

Descriptive Statistics

From Table 1, primary grocery shoppers had the following characteristics. About 81 percent lived in Louisiana; 75 percent were women; shoppers' average age was 42 years old; average household size was about three persons; 86 percent had at least

Table 1. Variable Definitions and Summary Statistics.

Variable Definition	Variable Name	Mean	Std.Dev.
Explanatory Variables			
Louisiana=1; Texas=0	*AREA*	0.8070	0.3949
Female=1: Male=0	*GENDER*	0.7486	0.4341
Age	*AGE*	42.0000	2.8934
Household Size	*HSIZE*	2.8653	1.4702
≥ High School=1; 0 otherwise	*EDUC*	0.8620	0.3451
Married=1; 0 otherwise	*MARD*	0.6655	0.4721
Catholic=1; 0 otherwise	*CATH*	0.3726	0.4838
White collar=1; 0 otherwise	*WCOLL*	0.4691	0.4993
Caucasian=1; 0 otherwise	*WHITE*	0.7935	0.4050
≥$50,000=1; 0 otherwise	*INCOME*	0.1953	0.3966
Dependent Variables			
Attitude: negative = 0; neutral = 1; positive = 2	*ATTRABB*	0.8608	0.9172
Consumption or Likelihood: unlikely = 0; likely = 1; have tried = 2	*CONRABB*	1.3917	0.8600

a high-school diploma; 37 percent were Catholics; 67 percent were married; 47 percent held white-collar jobs; 79 percent were Caucasians; and less than 20 percent had household incomes of at least $50,000.

Sixty-eight percent of grocery shoppers were negative or had no opinion about rabbit meat, while 32 percent had favorable opinions about the meat. The favorable rating was evenly split between somewhat positive and very positive (16 percent) about rabbit meat. Nineteen percent of shoppers would definitely not try rabbit meat; eight percent were unlikely to try it; twelve percent expressed interest in the meat; and 61 percent had eaten the meat previously (Tables 2 and 3).

Results and Discussion

The estimated coefficients, standard errors, marginal effects, chi-square value, and other goodness-of-fit measure for shoppers' attitudes toward rabbit meat are shown in Table 4. The model's chi-square value (35.88) is statistically significant, implying good predictive power of the 10 selected variables. The positive and statistically significant coefficient (0.3699) for μ_1 confirms that the response categories are ordered. The attitude model predicted 53 percent of the responses correctly. The results further suggest that gender, religion, and employment status statistically and significantly affect the probability of shoppers being positive, negative, or neutral about rabbit meat. Attitudes are invariant to geographical area, age, household size, educational attainment, marital status, race, and household income levels.

Greene (1993) mentions the difficulties involved in trying to draw inferences from the estimated coefficients generated by the ordered probit model and suggests that the marginal effects and

Table 2. Grocery Shoppers' Attitudes Toward Rabbit Meat by Response Categories.

Response Category	Percentage
Very Negative	44
Somewhat Negative	12
Neutral/No Opinion	12
Somewhat Positive	16
Very Positive	16

Source: Survey Results.

Table 3. Consumption or Likely Consumption of Rabbit Meat by Response Categories.

Response Category	Percentage
Definitely, Would Not Try	19
Not Very Likely to Try	8
Somewhat Likely to Try	8
Very Likely to Try	4
Have Already Tried	61

Source: Survey Results.

Table 4. Estimates and Marginal Effects for Shoppers' Attitudes Toward Rabbit Meat.

Variable	Estimated Coefficient	Standard Error	Marginal Effect		
			Negative y=0	Neutral y=1	Positive y=2
CONSTANT	0.5788***	0.2147	0.2309	-0.0149	-0.2160
AREA	0.6663	0.1038	0.0266	-0.0017	-0.0249
GENDER	-0.4165***	0.0969	-0.1662	0.0107	0.1555
AGE	-0.0253	0.0160	-0.0101	0.0006	0.0094
HSIZE	0.0209	0.0328	0.0083	-0.0005	-0.0078
EDUC	-0.1483	0.1192	-0.0592	0.0038	0.0554
MARD	-0.0341	0.0962	-0.0136	0.0009	0.0127
CATH	0.1606*	0.0865	0.0641	0.0041	-0.0600
WCOLL	-0.2287**	0.0926	-0.0913	0.0059	0.0854
WHITE	-0.0511	0.1071	-0.0204	0.0013	0.0191
INCOME	0.0243	0.1097	0.0097	-0.0006	-0.0091
μ_1	0.3699***	0.0310			

Note: *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.
Log likelihood = -864.22. Log likelihood, restricted = -882.16. Model Chi-Square (10) = 35.88***.
Percentage Correctly Predicted = 53.

predicted probabilities are better tools for making inferences. The marginal effects measure the change in probabilities resulting from a unit change in one of the regressors while holding other regressors at their sample means. For variables with statistically significant coefficients (*GENDER*, *CATH*, and *WCOLL*), marginal effects in Table 4 suggest that men (16 percentage points), Catholics (6 percentage points), and non-white collar (NWC) workers (9 percentage points) are more positive about rabbit meat than their corresponding counterparts are.

The estimated probabilities, determined from equation 2, for being positive about rabbit meat are 0.4801, 0.3783, and 0.3974, respectively, for men, Catholics, and NWC workers. Those probabilities for being negative about the meat are 0.5398, 0.4761, and 0.5478 for women, non-Catholics, and white-collar (WC) workers, respectively. From these results, 48 percent of male shoppers held a favorable opinion about rabbit meat; however, the meat had a high negative among 54 percent of women, 48 percent of non-Catholics, and 55 percent of WC workers. The "consumption" model (Table 5) is statistically significant and predicts 64 percent of the responses correctly. The results suggest that gender and employment status influence the likelihood of consuming or interest in consuming rabbit meat. For example, a change from a female to a male grocery shopper increases the probability of rabbit meat's consumption by 12.33-percentage points. There is a 7-percentage point increase in the likelihood that more NWC workers have eaten rabbit meat than have WC workers. The corresponding probabilities for having eaten rabbit meat are 0.7224 for male shoppers and 0.6628 for NWC workers. In general, if shoppers were positive about rabbit meat, they were more likely to have eaten it.

Table 5. Estimates and Marginal Effects for Consumption of and Likely Consumption of Rabbit Meat.

Variable	Estimated Coefficient	Standard Error	Marginal Effect		
			Unlikely $y=0$	Likely $y=1$	Have Tried $y=2$
CONSTANT	0.9453***	0.2311	0.2977	0.0542	-0.3518
AREA	0.0283	0.1099	0.0089	0.0016	-0.0105
GENDER	-0.3313***	0.1032	-0.1043	-0.0190	0.1233
AGE	0.0055	0.0163	0.0017	0.0003	-0.0020
HSIZE	0.0287	0.0349	0.0090	0.0016	-0.0107
EDUC	-0.1985	0.1303	-0.0625	-0.0114	0.0739
MARD	0.0078	0.1046	0.0245	0.0045	-0.0289
CATH	0.1094	0.0899	0.0345	0.0063	-0.0407
WCOLL	-0.1780*	0.0952	-0.0560	-0.0102	0.0662
WHITE	0.0306	0.1148	0.0096	0.0018	-0.0114
INCOME	-0.0374	0.1135	-0.0118	-0.0021	0.0139
μ_1	0.3153***	0.03056			

Note: * and *** indicate significance at the 0.10 and 0.01 levels, respectively. Log likelihood = -765.77. Log likelihood, restricted = -776.29. Model Chi-Square (10) = 21.05**. Percentage Correctly Predicted = 64.

In assessing the market for an infrequently consumed commodity, such as rabbit meat, the actions of both users and nonusers must be evaluated. The market for rabbit meat will expand if current users consume more or if nonusers start eating the meat. Based on the predicted probabilities for the "likely" category, 11 percent of female shoppers and 13 percent of NWC workers indicate some willingness to try rabbit meat. An additional 9 percent of men and 11 percent of WC workers indicated some interest in trying rabbit meat in the future.

Summary and Conclusions

American consumers are more ethnically diverse than they were previously, and many are willing to try new and exotic food products. The food industry has been very responsive to changing consumer demographics and needs. Future successes will continue to rest heavily on market execution. Therefore, producers and marketing firms will need to know how consumers feel about a product before full-scale production and delivery. Market assessment studies provide this valuable information. Because U.S. food consumption patterns vary regionally, this study was undertaken to assess the marketing outlook for rabbit meat in Louisiana and southeast Texas. In so doing, it documents how primary grocery shoppers' SDG characteristics affect their attitudes toward rabbit meat and their consumption or likely consumption of the meat and proposes promotional strategies for expanding the meat's consumption.

The results suggest that the probability of being positive about rabbit meat is associated with gender, religion, and employment status and that the likelihood of eating rabbit meat is influenced by gender and employment status. Although men and NWC workers are likely consumers of rabbit meat, 11 percent of the women and 13 percent of the WC workers indicated some interest in trying rabbit meat in the future. These groups are the most likely targets for marketing and promotional efforts.

Rabbit meat looks like dressed chicken leg quarters, but its price is comparable to boneless and skinless chicken breasts. The meat is also white, and it has desirable nutritional attributes. Given its price disadvantage to chicken, any marketing strategy to promote rabbit meat must focus on its nutritional attributes (low fat, low sodium, low cholesterol, high protein) rather than price.

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