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# Assessing the Effectiveness of Consumers' Rankings of Selected Meat Attributes in Expanding Goat Meat Consumption in the Southern United States

Patricia E. McLean-Meyinsse

Results suggest that consumers of goat meat are more likely to rank taste, freshness, and cooking time as very important attributes when buying fresh meat. Those who have never eaten goat meat are more likely to regard appearance, presence of USDA label, and being boneless as very important drivers of their purchase decisions.

On a worldwide basis, more people eat goat meat than beef, chicken, or pork (Warner 2005). Research also suggests that goat meat is leaner, higher in iron, and lower in cholesterol than beef, pork, or skinless poultry. It also has a balanced proportion of saturated to unsaturated fatty acids and is a rich source of conjugated linoleic acid, which has been linked to reducing cancer, heart disease, and onset of diabetes (Warner 2005). Historically, U.S. demand for goat meat has been small, but in recent years domestic demand has been growing because of the meat's popularity in the African, Latin American, Caribbean, Chinese, Indian, and Middle Eastern communities; interest by other consumer groups; expanding goat production in California, Texas, North and South Carolina, Oklahoma, Tennessee, and the Northeast; rising imports of goat meat; greater coverage by mainstream news media; ready access to recipes for preparing goat meat; and increased willingness by chefs to offer goat meat at ethnic and upscale restaurants (ABC 7 News 2005; Nathan 2005; Warner 2005). The American Meat Goat Association contends that the U.S. market could support a herd of 15 million animals compared to the 2 million goats currently being raised (ABC 7 News 2005).

Scientists at Southern University have had goat projects for more than 20 years. Their research objectives are to find out if goats can become a viable enterprise for limited-resource farmers and to measure consumers' receptiveness to several valued-added forms of goat meat. Despite goat

meat's desirable health benefits, marketers must know consumers' attitudes toward the product in order for it to make a successful transition into the U.S. consumer-driven food industry. In general, consumption of a good or service will rise if current users expand consumption and/or nonusers increase their consumption. To expand a product's market share, marketers often examine current users and nonusers' assessments of similar products' characteristics and their receptiveness to additional product lines. To our knowledge, there has been no comprehensive study linking attributes used by consumers in purchasing meat to their decisions on whether to eat goat meat. This knowledge is critical if goat meat use is to expand beyond current consumers.

## Objectives

The study assesses whether users and nonusers differ in their importance rankings of selected meat attributes and in their willingness to buy value-added forms of goat meat, and examines the extent to which demographic, socioeconomic, and regional (DSR) factors, hierarchal rankings of the selected meat attributes, and buying intentions influence goat meat consumption. Because of the study's comprehensive approach to goat meat marketing, it will provide valuable insights on goat meat's growth potential in the United States.

## Materials and Methods

### *Consumer Survey*

The study's data were compiled from a stratified random sample of 1,421 telephone subscribers in Alabama, Arkansas, Florida, Georgia, Kentucky,

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McLean-Meyinsse is professor, Division of Agricultural Sciences, Southern University, Baton Rouge, LA.

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Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia during fall 1998. The survey was geared toward the primary grocery shopper or meal preparer in each household and was conducted by a private marketing firm. Respondents were asked to rank the importance of fat content, taste, freshness, price, appearance (types of cuts, packaging, etc), USDA label, being boneless, and cooking time when they bought fresh uncooked meat. They were asked to rank the attributes on a five-point Likert scale as follows: extremely important (5); very important (4); somewhat important (3); not very important (2); and not at all important (1). In the follow-up question, respondents were asked to identify the most important attribute they used when buying fresh uncooked meat from the list above or from their own preference list.

To measure prior consumption of goat meat, the interviewers asked respondents if they had ever tried the meat. Future purchase intentions were captured by asking respondents if they had the chance to buy goat roasts, patties, or nuggets; goat meat packaged with recipes and cooking instructions; or marinated, ready-to-cook forms of goat meat at their local grocery stores within the next month, would they definitely buy it (3), probably buy it (2), or not buy it (1).

#### Variable Selection and Definitions

Economic theory suggests that food demand or consumption decisions are influenced by economic and noneconomic factors. Economic factors capture food prices, prices of related products, and personal disposable incomes, while noneconomic factors fall under the umbrella of tastes and preferences and include age distribution, household size, geographical location, and attitudes toward health, nutrition, biotechnology, and food safety (Bernard, Pan, and Sirolli 2005; Boland and Schroeder 2002; Chen et al. 2002; Fuez et al. 2004; Harrison and Han 2005; Lusk and Fox 2002; Onyango and Nayga 2004; Pen-son et al. 2006). Consumption patterns will change if one or more of these factors change (Variyam and Blaylock 1998). Economic theory also suggests that consumers' choices are linked to their perceived benefits and costs associated with the particular activity. Therefore respondents will consume goat meat products if their perceived benefits from eating

the meat outweigh the perceived costs of doing so. Thus we hypothesize that consumption decisions are simultaneously influenced by DSR factors, meat attributes, and availability of new products.

For estimation purposes, the five response categories for importance rankings were reduced to three—not important (1 and 2), somewhat important (3), and very important (4 and 5)—and the three categories for buying intentions were reduced to two—not buy and probably or definitely buy. The explanatory variables are age, household size, education, marital status, household income, race, gender, geographic location, important meat attributes, and availability of valued-added products. Age (AGE) is a continuous variable; household size (HSIZE) represents the number of persons in each household. The other explanatory variables are binary: education (COLLEGE=1/0); marital status (MARRIED=1/0); household income of at least \$75,000 (HINCOME=1/0); race (BLACK=1/0); other race (OTHRACE=1/0); gender (FEMALE=1/0); geographical region (each state=1/0); most important attribute (each attribute=1/0); willingness to buy goat roasts, patties, or nuggets (GOATSLCT=1/0); willingness to buy the meat with cooking instructions (GOATRECP=1/0); and willingness to buy marinated, ready-to-cook forms (GOATMAR=1/0). The reference variables omitted from the model are Caucasians (WHITE=1/0), region (VIRGINIA=1/0), and other important factors (IOTHER=1/0).

#### Models

The test statistic for two means (independent and large samples) was used to make inferences about the mean rankings and buying decisions of users and nonusers, and the chi-square statistic was used to determine whether response categories were independent of user groups. Because a respondent either tried ( $y = 1$ ) or did not try ( $y = 0$ ) goat meat in the survey, the dependent variable is binary (1/0). Therefore the binomial logit (BL) was used to estimate the relationship between dependent and explanatory variables. The BL model can be expressed as

$$(1) y^* = \beta'x + \varepsilon, \varepsilon \sim N[0,1].$$

The vector  $y^*$  is unobserved. However,  $y = 1$  (tried) if  $y^* > 0$  and  $y = 0$  (not tried) if  $y^* \leq 0$  are

observable. The vector of parameters,  $\beta$ , captures the effects of changes in  $x$  on the probability of trying;  $x$  is the matrix of independent variables; and  $\varepsilon$  is the vector of random stochastic errors. The cumulative logistic-distribution function for the BL is written as

$$(2) \text{Prob}(Y = 1) = \frac{e^{\beta'x}}{1 + e^{\beta'x}}.$$

#### Results and Discussion

Tables 1 and 2 show how users (312) and nonusers (1,109) of goat meat rank the selected meat attributes and their willingness to buy value-added forms of goat meat. Based on the importance indices (Table 1), freshness is ranked as the most important factor when buying meat, followed by appearance and taste. The other attributes are only marginal contributors. Mean rankings do not statistically significantly differ between users and nonusers for fat content, price, appearance, USDA label, or for

cooking time, but differ for taste, freshness, and boneless.

Users rank freshness and taste higher than do nonusers, but the latter group prefers their meat to be boneless. Users also are more likely than are nonusers to buy goat roasts, patties, or nuggets and to buy the meat if it were marinated or packaged with recipes and cooking instructions.

Based on the chi-square results in Table 2, price and fat content are independent of the two groups' importance rankings, but taste, freshness, appearance, USDA label, boneless, and cooking time are dependent. Nonusers regard appearance, USDA label, and being boneless as very important factors when buying fresh meat, while users place greater importance on taste, freshness, and cooking time. At least 30 percent of users and at least nine percent of nonusers would probably/definitely buy valued-added forms of goat meat if they were available in the near future.

The BL model's results are presented in Table 3. Sixteen of the variables have statistically signifi-

**Table 1. Mean Importance Rankings of Selected Meat Attributes and Willingness to Buy Valued-Added Forms of Goat Meat.**

Attributes	Users			Non-users			t-value <sup>b</sup>
	Mean rankings	Most important (%)	Importance index <sup>a</sup>	Mean rankings	Most important (%)	Importance index <sup>a</sup>	
Fat content	1.3237	9	11.9133	1.2561	7	8.792	1.3105
Price	1.2885	5	6.4425	1.2362	6	7.4172	1.0515
Taste	1.8462	13	24.0006	1.7818	11	19.5998	2.0500** <sup>c</sup>
Freshness	1.8974	42	79.6908	1.8404	42	77.2968	2.0577**
Appearance	1.7821	17	30.2957	1.7827	18	32.0886	-0.0146
USDA label	1.5000	7	10.5000	1.5564	5	7.7820	-0.0175
Boneless	0.7885	0.3	0.2366	0.9531	1	0.9531	-3.0843***
Cooking time	0.7212	1	0.7212	0.7574	1	0.7574	-0.6699
Nuggets	0.3397			0.0929			8.7427***
Recipe	0.3429			0.1208			7.7547***
Marinated	0.3109			0.1199			9.4887***

<sup>a</sup> (Mean Importance Rankings) x (Most Important Attributes) x (100).

<sup>b</sup> Tests for differences between the mean rankings.

<sup>c</sup> \*\* and \*\*\* imply statistical significance at the 5- and 1-percent levels of probability, respectively.

**Table 2. Goat Meat Consumption, Importance Rankings, and Willingness to Buy Valued-Added Forms of Goat Meat.**

Attributes	No	Yes	$\chi^2$
Total	0.7804	0.2196	
Fat content			
Not Important	0.2353	0.2115	1.8959 <sup>a</sup>
Somewhat Important	0.2732	0.2532	
Very Important	0.4914	0.5353	
Price			
Not Important	0.2182	0.1955	1.0832
Somewhat Important	0.3273	0.3505	
Very Important	0.4545	0.4840	
Taste			
Not Important	0.0812	0.0417	6.2905**
Somewhat Important	0.0560	0.0705	
Very Important	0.8629	0.8878	
Freshness			
Not Important	0.0685	0.0353	5.4475*
Somewhat Important	0.0225	0.0321	
Very Important	0.9089	0.9327	
Appearance			
Not Important	0.0766	0.0513	10.9277***
Somewhat Important	0.0640	0.1154	
Very Important	0.8593	0.8333	
USDA label			
Not Important	0.1614	0.1571	8.9328**
Somewhat Important	0.1208	0.1859	
Very Important	0.7178	0.6571	
Boneless			
Not Important	0.3688	0.4744	11.4317***
Somewhat Important	0.3093	0.2628	
Very Important	0.3219	0.2628	
Cooking time			
Not Important	0.4851	0.5385	6.3795**
Somewhat Important	0.2723	0.2019	
Very Important	0.2426	0.2596	
GOATSLCT			
Not Buy	0.9071	0.6603	118.2927*** <sup>b</sup>
Probably/Definitely	0.0929	0.3397	
GOAT RECP			
Not Buy	0.8792	0.6571	85.3008***
Probably/Definitely	0.1208	0.3429	
Marinated			
Not Buy	0.8801	0.6891	65.4589***
Probably/Definitely	0.1199	0.3109	

\*, \*\*, and \*\*\* statistical significance at the 10-, 5-, and 1-percent levels of probability, respectively.

<sup>a</sup>  $\chi^2(2, 0.10) = 4.605$  <sup>b</sup>  $\chi^2(1, 0.10) = 2.706$

**Table 3: Binomial Logit Model's Results for Consumption of Goat Meat**

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects <sup>a</sup>	Standard Error
CONSTANT	-4.2145***	0.5255	-0.6228***	0.0732
AGE	0.0261***	0.0050	0.0039***	0.0007
HSIZE	0.1436***	0.0541	0.0212***	0.0080
COLLEGE	0.1610	0.1561	0.0238	0.0231
MARRIED	0.1123	0.1609	0.0166	0.0238
HINCOME	-0.0805	0.2131	-0.1189	0.3149
BLACK	0.3706*	0.2104	0.0548*	0.0310
OTHRACE	0.7621***	0.2685	0.1126***	0.0397
FEMALE	-0.8152***	0.1540	-0.1205***	0.0225
ALABAMA	0.6698	0.4264	0.0990	0.6287
ARKANSAS	0.3064	0.5527	0.0453	0.0817
FLORIDA	0.4588	0.3430	0.0678	0.0506
GEORGIA	0.7925***	0.3748	0.1171***	0.0552
KENTUCKY	0.2926	0.4709	0.0432	0.0696
LOUISIANA	0.6802*	0.3780	0.1005*	0.0557
MISSISSI	0.9373*	0.4820	0.1385*	0.0711
NCAROLIN	-0.1556	0.4231	-0.0230	0.0625
OKLAHOMA	0.7033	0.4472	0.1039	0.0659
SCAROLIN	-0.7436	0.5833	-0.1099	0.0857
TENNESSE	1.0070***	0.3870	0.1488***	0.056
TEXAS	1.1197***	0.3251	0.1655***	0.0477
IFATMEAT	0.8881**	0.3842	0.1312***	0.0564
IPRICMEAT	0.5964	0.4266	0.0881	0.0629
ITASTMEAT	0.9216**	0.3612	0.1362**	0.0530
IFRSHMEAT	0.7771**	0.3229	0.1148**	0.0474
IAPPRMEAT	0.7152**	0.3468	0.1057**	0.0510
ILABLMEAT	1.0684***	0.4091	0.1579***	0.0610
IBONEMEAT	0.1091	1.1838	0.0161	0.1749
ITIMEMEAT	0.7210	0.9051	0.1066	0.1336
GOATSLCT	1.1682***	0.2591	0.1726***	0.0385
GOATRECP	0.3919	0.3148	0.0579	0.0465
GOATMAR	0.0338	0.2880	0.0050	0.0426
Log likelihood	-637.2671			
$\chi^2(31)^b$	221.3672***			

\*, \*\*, and \*\*\* imply statistical significance at the 10-, 5-, and 1-percent levels of probability, respectively.

<sup>a</sup> Marginal effects for the continuous variable, AGE, is computed as the derivative of the logistic cumulative distribution function, while holding the remaining explanatory variables at their sample means. For binary variables, marginal effects are computed as the difference between the probabilities of the two values, 1 and 0.

<sup>b</sup> The null hypothesis that  $\beta_1$  through  $\beta_n = 0$  is rejected.

cant coefficients suggesting that they influence the probability of goat meat consumption. The results suggest that goat meat consumers are more likely to be older; to live in multiple-person households; and to be African-Americans, other races, men, and residents of Georgia, Louisiana, Mississippi, Tennessee, and Texas. With respect to meat attributes, these respondents are more likely to rank fat content, taste, freshness, appearance, or USDA label as the most important factor when buying meat than they are to rank IOTHER. The probability of buying goat roasts, patties, or nuggets appears higher than other value-added forms of the meat.

Based on the marginal effects for the variables with statistically significant coefficients, a 54-year-old consumer is four percent more likely to have eaten goat meat than is a 44-year-old consumer. Respondents in multiple-person households are two percent more likely to have eaten goat meat than are those in single-person households. African-Americans and other races are five and 11 percent more likely, respectively, to have tried goat meat than are Caucasians.

Women are 12 percent less likely to have eaten goat meat than are men. Georgia residents are 12 percent more likely to have tried goat meat than are those living in Virginia. Louisiana residents are 10 percent, Mississippi residents 14 percent, Tennessee residents 15 percent, and Texas residents 17 percent more likely to have eaten goat meat than are Virginia residents. Consumers are 13, 14, 11, 11, and 16 percent more likely to rank fat content, taste, freshness, appearance, and USDA label, respectively, as the most important factor when buying meat than they are to rank other factors. Goat roasts, patties, or nuggets are 17 percent more likely to be bought than are other value-added forms of the meat

### Conclusions

This study explored strategies to expand goat meat consumption in the southern United States. The results suggest that users and nonusers regard traditional meat attributes as important factors when making meat-buying decisions. Therefore these factors must be considered when developing strategies to market goat meat. In terms of valued-added forms, goat roasts, nuggets, or patties appear to have the edge over marinated forms of goat meat even if the marinated forms were packaged with recipes and

cooking instructions. This finding suggests that convenience is still a powerful force in food-purchase decisions. When DSR factors are considered, the most likely consumers of goat meat are older, live in multiple-person households, and are non-Caucasians, men, and residents of Georgia, Louisiana, Mississippi, Tennessee, and Texas. These consumers want low-fat, fresh, and tasty meats; wide selections or packages (appearance); and meats that have USDA inspection stamps. From the results, the future seems promising for goat roasts, patties, or nuggets. These last results are insightful to our food scientists and to other scientists trying to develop value-added forms of goat meat or strategies to expand consumption.

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