# Targetable Market Segments for Natural Pork Products

American Agricultural Economics Association Annual Meeting, August 8-11, 1999, Nashville, Tennessee
Selected Paper

Jennifer Grannis
Colorado State University
Department of Agricultural and Resource Economics
Fort Collins, CO 80523
Phone: (970)-491-6730
Fax: (970)-491-2067
email: jgrannis@lamar.colostate.edu
Primary contact

Dawn Thilmany
Colorado State University
Department of Agricultural and Resource Economics
Fort Collins, CO 80523

**Abstract**

A survey of consumers established willingness to pay for natural pork products. Probit estimation was used to define targetable market segments for ham and pork chops. High-income, frequent pork consumers, and those most concerned about the use of growth hormones and antibiotics, are most likely to purchase natural pork products.

**Targetable Market Segments for Natural Pork Products**

Retail sales of organic foods have grown tremendously in recent years, from $178 million in 1980 to $3.5 billion in 1996. Consumers seem especially interested in naturally produced fruits, vegetables, dairy and meat products. There are several premium beef products marketed in supermarkets, including some natural and organic brands, but there are few branded or natural pork products. Colorado pork producers have witnessed the success of the branded beef products, and they intend to bring a branded natural pork product to the retail market. This study will determine what production practices are most important to consumers, thereby enabling producers to develop a production and marketing plan for new pork products.

The objective of this study is to define market segments for a natural, regionally produced line of pork products to assist Colorado producers in developing a viable marketing plan. Gaining a space on a grocery store shelf is often the most difficult step in selling a product. This study will allow the producers to enter the grocery store with a well-defined description of their consumers and a distinct plan for marketing and packaging their product.

The paper will discuss the survey, data and model used to determine consumer demand for natural pork. In addition to discussion of how the study was designed, the next section discusses several methods used to assure consistency in the estimates and more reliable interpretation of the results. The results of the study are presented as marginal effects, and used to define viable target markets for natural pork. The general findings are also discussed in the context of previous research on organic, natural and meat marketing. Finally, the paper concludes with discussion of marketing implications and plans for future research.

## The Data and Model

A survey of consumers in Colorado, Utah and New Mexico explored consumer's willingness to pay for natural locally produced pork products. Twenty-two hundred primary grocery shoppers were surveyed from the National Family Opinion database, and fourteen hundred useable responses were collected (a slightly greater than 60% response rate).

Respondents chose from a scale of ten, incrementally increasing premiums for hypothetical pork chops and ham. Consumers also ranked their relative concern about antibiotics, growth hormones and various other attributes to determine what characteristics established during production, and highlighted in marketing materials and the product label, would make the products most attractive to customers. Past shopping information was collected, including weekly expenditures on all grocery products, consumption of pork, consumption of beef, past consumption of natural beef, and primary store used for meat purchases. Additional and detailed sociodemographic information was provided by the NFO.

The variables included in the analysis are based on various other studies conducted on organic, natural and meat markets. In addition to drawing on previous findings in the agribusiness literature, the survey design benefited from suggestions from several Colorado focus groups and the NFO survey team. A description of the variables included in the estimation, reported with the sample means, is found at the end of the paper.

A lifestage variable was included that combines age, children, and employment. This variable is a product of the NFO survey design. The lifestage variable describes a marketable segment of consumers by demographics as they are grouped for advertising and marketing purposes. Thus, a variable explicitly related to age, family situation and size was not included in the final model. There were a couple of other unique variables included in the models.

Respondents were asked to rank the relative importance of several attributes related to how livestock is raised. A variable representing the average rank of the four most important attributes (HORMANT) was included, in both first and second stage estimations. The four variables averaged for HORMANT are: "No Hormones," "No use of antibiotics," "Grazing managed to protect streams," and "Grazing managed to protect endangered species.[1]"

## Estimation

The targetable market segments for the two pork products were determined by estimating a two stage probit model with four equations (one for each type of product at both 10 and 20% premiums). The dependent variable in the first stage is one or zero depending on whether the consumer would or would not purchase the local, natural pork product, at normal or premium prices. In the second stage, the dependent variable is one if the consumer would purchase the pork product at a premium. Since both models have a binary dependent variable, the estimation should limit the predictions to values between one and zero, so a probit model is appropriate.

Given that some consumers may not consume the locally produced natural pork at normal prices, a two-step probit estimation is appropriate. The survey was worded so that the consumer could choose to not purchase the product, purchase at a one-cent premium, or purchase at one of nine higher premiums. The first stage estimation predicts the likelihood that consumers would choose to purchase the product at any price at or above prevailing market prices, so it predicts only the probability that the natural product will be purchased. In the second stage, the one cent premium is treated as willingness to pay no premium for the product. Two equations, representing the largest premium market segments, are then estimated. For pork chops, these

[1] The remaining attributes are listed in descriptive statistics at the end of the paper.

premiums are ten and twenty percent, and for ham, they are 8.8 and 17.8 percent. The second stage estimations are used to determine targetable market segments for natural pork products.

To link the two stages of the probit model, an inverse Mill's ratio is generated in the first stage equation. Since the consumer's decision to pay a premium for natural pork is directly linked to the decision to actually purchase the product, estimates that do not account for such interdependence would be biased. The information contained in the inverse Mill's ratio (IMR) links the underlying purchase decision to the decision whether or not to pay a premium for the natural pork product. Specifically, a probit model is estimated to predict the likelihood of the consumer purchasing the natural pork product at any price. The IMR represents the estimated probability of purchase, thereby controlling for the purchase decision in the second equation. The IMR (IMCHOP in Table 1) is significant and positive in all four of the second-stage equations, as would be expected. The significance indicates that the IMR is an important factor in the decision whether to purchase pork at a premium, and moreover, its inclusion was necessary to avoid bias.

A two step probit framework is used to estimate the probability of purchasing natural pork products at the various premium levels. All 1375 observations are used in each stage and equation. The first stage equations for pork chops and ham (with identical sets of explanatory variables) had 73.5% and 80.8% prediction accuracy. The first stage analyzed the 993 (72.2%) consumers that would purchase natural pork chops and 1111 consumers (80.8%) that would purchase natural ham if it were available.

The second stage further differentiated potential customers based on the premiums they are willing to pay. With respect to natural pork chops, 409 consumers (29.7%) are willing to pay $4.29 (10% price premium) and eighty-six consumers (6.25%) are willing to pay $4.69 (20%

price premium). The premium levels for ham may seem more arbitrary, but the prices were calculated to be close to 10 and 20%, while maintaining the familiar supermarket pricing strategy of prices that end in a "9". At $3.59 (8.8% price premium), 545 consumers (40%) will buy natural ham, and at $3.89 (17.8%), 195 consumers (14.2%) would be willing to pay the premium. Figures 1 and 2 show the market demand (share of respondents who would pay at each premium level) for the natural pork chops and ham across all prices.

## Results

**Table 1: Marginal Effects, Second Stage Equations**

| | Equation | | | |
|---|---|---|---|---|
| **Variable** | **CHOP1** | **CHOP2** | **HAM1** | **HAM2** |
| IMCHOP | 0.13397* | 0.21950* | 0.12747* | 0.17436* |
| INC5CAT | 0.19328* | 0.08736* | 0.10882* | 0.08306* |
| EXPWKY | 0.11144* | 0.17732* | 0.02771 | 0.04802 |
| HHSZ5CAT | -0.04947* | -0.06753 | 0.01821 | -0.11916* |
| DOSINGLE | -0.06896* | -0.01471 | -0.04223 | -0.08024* |
| DYPARENT | 0.05121* | -0.00399 | 0.02787 | 0.10307* |
| DOPARENT | -0.03565 | -0.12989* | -0.01882 | -0.01823 |
| DRETOCPL | -0.05916* | -0.05086 | -0.05895* | -0.06452* |
| HORMANT | 0.12298* | 0.09047* | 0.15653* | 0.10562* |
| FREQPORK | 0.11258* | 0.01093 | 0.11335* | 0.06466* |
| FREQBEEF | -0.08368* | -0.14497* | -0.04789* | -0.02869* |
| DNBFYES | 0.03319* | 0.15586* | 0.06477* | 0.14749* |
| DNFOOD2 | 0.06905* | 0.07672* | 0.03368 | -0.02835 |
| DSUPMKT2 | -0.01490 | 0.01798 | -0.00731 | 0.01819 |
| DSHOP2 | 0.03637* | 0.00752 | 0.04349* | 0.04850* |
| DTYPPK1 | 0.00000 | 0.00000 | 0.04958* | 0.04402* |
| DTYPPK2 | 0.09616* | 0.10894* | 0.00000 | 0.00000 |
| CONSTANT | -0.06488* | 0.23109* | -0.22041 | 0.10612* |

* = Significance at least the 90% level

Table 1 presents results for each probit equation indicating sign, significance and marginal effects. CHOP1 and HAM1 represent the lower premium levels of 10% and 8.8%, respectively. The marginal effects are presented in place of coefficients and standard errors due

to the difficulty of directly interpreting the coefficients returned by probit models. The marginal effects are comparable to the more familiar elasticities of ordinary least squares estimations. The t-statistics on the coefficients in the equations can be interpreted traditionally as they are assumed to be asymptotic in large samples (n = 1375).

Marginal effects can be used to delineate targetable market segments since the sign and magnitude represent the effects of various factors on the probability of a consumer paying that price premium for that product. This information is valuable to local producers in formulating an appropriate marketing plan for natural pork products and securing retailer relationships.

The four probit estimations describe four potential consumer groups that the producers can choose to target. Two premiums are analyzed for each product so the producers can compare the costs (loss of customers) and benefits (increased revenue per unit) of entering the natural meat market at different price levels. The original hypothesis was that lower premiums may attract a larger consumer base among those that shop at supermarkets that offer other premium meat products. Alternatively, a higher premium may be feasible if producers target those who shop at smaller, specialty markets such as Alfalfa's.

## Target Markets

The results of the market analysis help to define the market segments that the producers can target with an integrated marketing-production system. Across all four equations, income, past consumption of natural beef, age and concerns about production practices are important descriptors of the targetable market segments for natural pork products.

Although the type of store where consumers shop made a difference in several cases, income level was relatively more important. It also seems clear that natural pork is considered a

complement to natural beef, not a substitute, as is generally the case. This indicates that producers may be able to reach most of their targetable market by placing their product in supermarkets in high-income areas. Findings indicate that the consumers who have purchased natural beef in the past still shop primarily in traditional supermarkets. This is plausible in the Intermountain region since changing marketing conditions have led larger, commercial stores to offer branded natural beef. Positioning new natural pork products alongside natural beef will help producers reach a key consumer group. This finding is also strong evidence to present to retailers who currently carry natural beef products, and may even help pork producers secure space in the glass case where premium meat cuts are displayed.

The producers must identify their production practices on the labels for both ham and pork chops. Target consumers are very concerned that their meat is environmentally friendly, as well as hormone and antibiotic free, so the producers must ensure that these production practices are emphasized in marketing materials and packaging. Concern over production practices was one of the most important factors across all meat types and premiums. In short, concentrating on store location, consumer income level, and product placement may be the most effective allocation of marketing resources. This runs counter to the strategy of other local livestock producers that target numerous small natural food or meat stores.

There are also several specific findings for each of the individual probit models. Although it is not clear what factors into such differences, unique findings may help to further develop marketing plans. Those who are likely to purchase natural pork chops at a 10% premium spend a greater amount on food, are more frequent pork consumers and eat a relatively greater share of pork chops. This is an attractive segment since they represent a relatively larger share of total pork chop sales than the numbers represent. These consumers do some of their meat

shopping at natural food stores or meat shops and have purchased natural beef, but are less frequent consumers of beef overall. Potential consumers have smaller households, are relatively young (<45 years old), and are less likely to be retired or single.

The target consumers for natural, local pork chops at a 20% price premium do some of their meat shopping at natural food stores, and have purchased natural beef in the past. These consumers are also more likely to eat pork chops and less likely to eat beef, but several of the other effects are less significant in this market segment. One unique finding for this model is that older parents are not likely to purchase natural pork chops at this price.

Higher income and larger weekly food budgets are important descriptors in the lower premium ham market. A likely consumer eats a large amount of ham and has purchased natural beef in the past, even though they consume a beef less frequently overall. Older, retired couples do not seem willing to buy this product, but no conclusions can be drawn about household size or presence of children in this market segment.

Larger households are less likely to purchase ham at a higher premium level (17.8%). Once again, older consumers show less potential whereas young parents are more likely to purchase ham at this price. This market segment has purchased natural beef in the past, but represents less frequent beef consumers. Finally, more frequent pork consumption increases the likelihood that a consumer will pay a higher premium for natural ham.

## Market Implications and Conclusions

In short, the producers who commissioned this study have sound results from a large regional market study that they can use to position their product in the grocery store at the appropriate price level. These target consumers are very concerned about the production

practices utilized by the producers. A highly visible and descriptive label that highlights the production practices must also be part of the packaging. The resulting market segments are further characterized as a set of wealthy consumers with small households, who consume pork on a regular basis, and occasionally shop at natural food stores and meat shops.

Past research indicated that older consumers are not willing to purchase premium products, a result upheld by this research. It also seems that the presence of younger children in a household may increase the likelihood of purchase and paying a premium for natural pork. In general, the positive relationship between the demand for natural pork products and income is consistent with expectations and should be attractive to retailers that are attempting to attract such consumers to their stores.

Using this information to help develop the agreement with the supermarket should emphasize the benefits of carrying natural pork. Natural or organic product sections are becoming more common in supermarkets, and developing a natural meat section is a logical next step. Carrying both beef and pork will provide the supermarket with a complete meat case to satisfy a wide range of customers. The store will benefit by carrying a new product that this analysis indicates a significant portion of consumers are willing to purchase, and the producers will have secured a viable market for their product.

Placing these products in a traditional supermarket located in a high-income area, and developing a marketing campaign emphasizing hormone and antibiotic free production appears to be the best option available to these producers. Emphasis must be placed on production practices in advertisements and the product labels at the point of sale. Pamphlets that are readily available to the shopper that describe the farms where the pork comes from will also be helpful in explaining the hormone and antibiotic free nature of these products. Other in-store promotions

could be developed that concentrate on the production practices and local aspect of the product if the supermarket believes it may complement their own marketing strategies.

One of the original assumptions in framing this study was that "local" or "regional" products are valued more highly than natural products shipped in from distant production sites. However, attributes were ranked by consumers, and "regional production" (local) was the least valued of all the attributes. Yet, the willingness to pay question combined both the "natural" and the "local" attribute, so using a local label in a marketing program could be effective. Further research into the value of a local label, for meats and for other products, is still necessary before it can be promoted as a distinct and effective value-added marketing tool.

Further research using this particular data set can provide insights into the nature of the marketplace. As estimated in this study, the market segments are assumed to be distinct and discontinuous. It may be appropriate to revise this assumption and estimate these markets using an ordered bivariate process such as an ordered probit or logit. This may also provide information on the general nature of consumption (i.e., how variables such as income affect premium level in a more continuous analysis) and perhaps identify thresholds of willingness to pay categories for consumers in specific market segments.

The targetable market segments for both natural local ham and pork chops have been described, and appropriate marketing implications suggested. The results reported here indicate that distinct and definable market segments for these potential new products do exist. The producers can now enter the retail marketplace with a firm, and comprehensive description of their consumers. They can use this information to secure an agreement that will benefit them and improve the service the store carrying their product supplies to their customers.

| Variable | Percent | Description |
|---|---|---|
| | | **Income** |
| INC1 | 15.11% | Less than $15,000 annual income |
| INC2 | 23.62% | $15,000 - 30,000 annual income |
| INC3 | 23.62% | $30,000 - 50,000 annual income |
| INC4 | 25.73% | $50,000 - 75,000 annual income |
| INC5 | 19.40% | Greater than $75,000 |
| | | **Household Size** |
| HHSZ1 | 26.53% | One member |
| HHSZ2 | 36.55% | Two members |
| HHSZ3 | 16.35% | Three members |
| HHSZ4 | 12.79% | Four members |
| HHSZ5 | 7.77% | More than five members |
| | | **Lifestage** |
| YSINGLE | 5.23% | Young Single, <35 |
| MSINGLE | 12.35% | Middle Single, 35-65 |
| OSINGLE | 8.94% | Old Single, >65 |
| YCOUPLE | 6.76% | Young Couple, <45, no kids |
| WRKOCPL | 13.37% | Working Old Couple, >45, no kids |
| RETOCPL | 11.70% | Retired Old coulple, no kids |
| YPARENT | 14.54% | Young Parent, <45, kid <6 |
| MPARENT | 11.34% | Middle Parent, <45, kid >6 |
| OPARENT | 13.15% | Older Parent, >45, any kid |
| ROOMMATE | 0.00% | Roommates |
| | | **Weekly Expenditures** |
| EXPWKY1 | 22.46% | Less than $50 |
| EXPWKY2 | 45.06% | $50 - 99 |
| EXPWKY3 | 22.17% | $100 - 149 |
| EXPWKY4 | 5.96% | $150 - 199 |
| EXPWKY5 | 1.02% | $200 - 299 |
| EXPWKY6 | 0.15% | $300 - 399 |
| EXPWKY7 | 0.07% | $400 - 499 |
| EXPWKY8 | 0.00% | $500 or more |
| | | **Store Shopping Behavior** |
| SUPMKT1 | 87.79% | Most of Meat purchased at a Supermarket |
| SUPMKT2 | 8.21% | Some |
| SUPMKT3 | 6.54% | None |
| NATFOOD1 | 1.16% | Most of Meat purchased at a Natural Food Store |
| NATFOOD2 | 6.10% | Some |
| NATFOOD3 | 41.20% | None |
| SHOP1 | 1.88% | Most of Meat purchased from a Meat Shop |
| SHOP2 | 14.46% | Some |
| SHOP3 | 34.30% | None |
| PRODUCER1 | 4.79% | Most of Meat purchased from a Producer |
| PRODUCER2 | 6.32% | Some |

| Variable | Percent | Description |
|---|---|---|
| | | **Frequency of Beef Consumption** |
| FRQBF1 | 16.44% | 4 or more times per week |
| FRQBF2 | 26.11% | 3 times per week |
| FRQBF3 | 28.51% | 2 times per week |
| FRQBF4 | 15.49% | once a week |
| FRQBF5 | 12.29% | Less Often |
| FRQBF6 | 0.65% | Never |
| | | **Type of Beef Consumed** |
| TYPBF1 | 64.58% | Ground Beef |
| TYPBF2 | 20.95% | Steak |
| TYPBF3 | 8.29% | Roast |
| TYPBF4 | 2.76% | Other |
| | | **Frequency of Pork Consumption** |
| FRQPK1 | 1.02% | 4 or more times per week |
| FRQPK2 | 4.44% | 3 times per week |
| FRQPK3 | 13.53% | 2 times per week |
| FRQPK4 | 29.89% | once a week |
| FRQPK5 | 45.82% | Less Often |
| FRQPK6 | 4.95% | Never |
| | | **Type of Pork Consumed** |
| TYPPK1 | 24.07% | Ham |
| TYPPK2 | 49.60% | Pork Chops |
| TYPPK3 | 9.89% | Pork Roast |
| TYPPK4 | 10.55% | Pork Sausage |
| | | **Bought Natural Beef** |
| YES | 17.02% | |
| NO | 63.34% | |
| | | **How Often Natural Beef is Consumed in last 6 months** |
| FREQNBF1 | 1.53% | Weekly |
| FREQNBF2 | 4.00% | Monthly |
| FREQNBF3 | 9.89% | Less Often |
| FREQBF4 | 2.83% | Not at All |
| FREQBF5 | 17.02% | Don't know |
| | | **Attributes** |
| | **Mean** | |
| PENS | 3.106 | No small or crowded pens |
| ANTIBIOT | 3.475 | No antibiotics |
| HORMONES | 3.814 | No growth hormones |
| STREAMS | 3.441 | Grazing managed to protect streams |
| ENDANG | 3.276 | Grazing managed to protect endangered species |
| LOCAL | 2.461 | Animal born and raised within 250 miles |
| AGED | 2.461 | Meat aged at least 14 days |
| GRASSFED | 3.01 | Grass Fed |
| ORGANIC | 1.05 | Produced Organically |

**Figure 1- Willingness to Pay for Local, Natural Pork Chops**

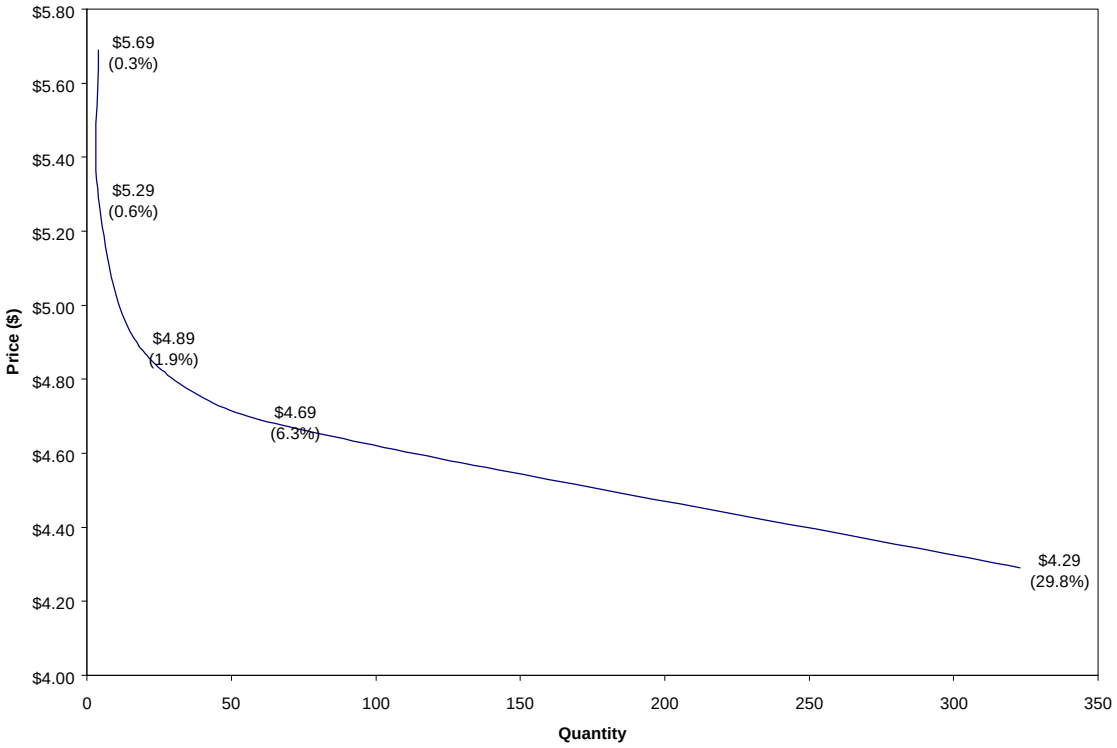


**Figure 2- Willingness to Pay for Local, Natural Ham**