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Factors Influencing Demand for a Producer-Owned Beef Retail Outlet

Jayson L. Lusk and Edgar Cevallos

As the farm-to-retail price spread continues to grow, some cattle producers are beginning to consider integrating into the retail sector. Such a venture would require large investments in capital with uncertain return. This study seeks to determine the potential success of a stand-alone retail outlet selling "all natural" beef in an affluent area of Jackson, MS. Using choice-based conjoint analysis, demand for the new retail outlet is modeled as a function of the beef price at the store, distance of the store from consumers' homes, distance of the store from consumers' typical grocery store, and price of beef at substitute grocery stores. Simulation results suggest the proposed outlet could be a profitable venture, depending upon location and beef price.

Key Words: beef, conjoint, demand, retail outlet

JEL Classifications: Q13, D12, D4, M31

The beef sector faced declining demand during the 1980s and 1990s, leading to considerable restructuring and downsizing in the industry. Although beef demand has experienced a modest recovery in the past few years, cattle producers are still exploring avenues to enhance profitability. One trend that continues to trouble some cattle producers is the rising farm-to-retail price spread. U.S. Department of Agriculture (USDA) data indicate the farm-to-retail beef price spread increased more than 82% from 1982 to 2001. Over the same time, cattle producers' share of the retail dollar fell 14% (from 59% down to 45%).

Although it is likely that much of the increase in the farm-to-retail price spread is due to increased costs at the wholesale and retail level, it is possible that other issues such as market power could be at play. Four firm concentration ratios in beef packing are near 80%, and four and eight firm concentration ratios in food retailing are over 20% and 30%, respectively.[1] Azzam and Schroeter have found that increased concentration in the beef packing sector led to increased economies of scale and efficiency, which outweighed the effects of potential market power, at least in terms of aggregate welfare. However, Sexton clearly illustrated that such concentration can have severe impacts on the distribution of welfare within a sector. That is, aggregate beef industry welfare might be enhanced from wholesale and retail concentration; however, cattle producer welfare could still suffer.[2]

Such findings have prompted some produc-

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[1] Regional or local concentration ratios in food retailing are likely much higher.

[2] We do not attempt to address whether market power actually exists in beef packing and retailing. The fact that some producer groups *perceive* there to be market power in these sectors appears to be the primary motivation for their pursuit of integrating into the retail and processing sectors.

er groups to investigate means of capturing a greater share of the beef retail dollar (e.g., Darby). These groups argue that if market power exists in processing and retailing, then this surplus could be transferred back to the farm level by forward integration. Some attempts to enhance profitability have focused on developing branded beef products, which more closely tie producer groups to the retail sector (Lusk). However, these strategies still rely on traditional retailers, which potentially have large degrees of market power, to sell the product. A more complete integration strategy would involve cattle producers selling their beef in producer-owned retail outlets with any profit obtained at the retail level returned to producers.

Despite the appeal of such a venture, there are a number of drawbacks. Conventional food retailers enjoy considerable economies of scale and scope. A small stand-alone beef retail outlet cannot expect to have cost structures equivalent to larger food retailers. Further, it might be questionable whether consumers would be willing to make numerous stops to carry out their grocery shopping. Because of increased transaction costs, consumers likely need to be compensated for the additional time involved in shopping at an additional retail outlet. There are further risks of integrating into the retail sector such as increased exposure to liability of unsafe meat, moving outside the group's core competencies, and other management issues. In order to compete with larger, more scale-efficient retailers, cattle producers must offer services or products that exceed the quality of conventional retailers. Whether the added benefits of integrating into the retail sector exceed costs is, at present, uncertain.

To provide an initial investigation into this issue, we estimate market demand for a stand-alone beef retail outlet selling beef from cattle that were not administered added growth hormones or fed antibiotics in an affluent area of Jackson, MS. The goal of this research is to determine how factors such as product price, distance of the store from consumers' homes, distance of the store from consumers' typical grocery store, and price of beef at substitute grocery stores influence demand for steaks and ground beef sold by the proposed retail outlet. Under certain simplifying assumptions, our results suggest the stand-alone retail outlet could be a successful venture for this market. Although data are geographically specific, it is likely that many of the factors that influence store choice are extendable to other locations.

Factors Influencing Selection of Retail Outlet

A few previous studies have examined consumers' choice among competing beef retail outlets. Medina and Ward examined the impact of demographics, seasonality, type of purchase, and price on selection of outlets for beef. In their sample, supermarkets were the most popular beef retail outlet, capturing over 90% of beef purchases, with the remainder of purchases coming from warehouses, butchers, supercenters, and other outlets. Medina and Ward found that type and size of beef purchased were significant factors influencing outlet choice. The probability of shopping at supermarkets declined when consumers purchased larger quantities of beef. Conversely, consumers were more likely to shop at supermarkets when purchasing roasts than other meat products. Medina and Ward also found that price discounting had an effect on outlet selection.

Grannis, Thilmany, and Sparling also analyzed factors influencing choice of beef retail outlet. They contended that demand for a meat retail outlet is a function of attributes of the outlet, the selection of meat products, and the attributes of those meats. About 90% of respondents to their survey did most of their meat shopping at supermarkets, but about 24% of individuals shopped for at least some of their beef at other locations. They found that consumers who were more concerned about the use of growth hormones in cattle production and animal welfare issues were more likely to purchase beef from natural food stores and from cattle producers.

In theory, a number of other factors might influence consumers' decisions about whether to shop at a new beef retail outlet. First, given

the popularity of large supermarkets and supercenters, it is evident that a large segment of the population prefers "one-stop shopping." If consumers must travel to another location to purchase beef, it is likely that they will demand compensation for the additional shopping trip. The opportunity cost of an additional shopping trip is directly related to the distance of the new retail outlet from consumers' typical grocery store and/or the distance of the new retail outlet from consumers' homes. That store location is important to consumers is supported by research by the Food Marketing Institute (2002a), which found that 95% of consumers indicated that convenient location of a supermarket was important in deciding where to shop.

Of course other factors such as store cleanliness, store layout, and a variety of services likely influence consumers' decisions where to shop. Although these factors will likely influence choice of shopping outlet, they are difficult to quantify and can be difficult to compare across small stand-alone outlets and large supermarkets.

Methods and Procedures

Model

To estimate the potential market demand for a stand-alone beef retail outlet, we utilized a choice experiment (CE), which is a type of conjoint analysis. CEs have recently been used to estimate the value of nonmarket goods, the trade-off between environmental or food quality attributes, and market share of novel products (e.g., Adamowicz et al.; Layton and Brown; Louviere, Hensher, and Swait; Lusk, Roosen, and Fox; Unterschultz et al.). CEs are based on Lancaster's theory of consumer demand, where utility for a product is derived from attributes embodied in a good.

In this case, we are only interested in determining the likelihood that an individual would regularly purchase beef from the new outlet. Thus, we only presented consumers with two options: either purchase beef at the new retail outlet or continue to purchase beef from their traditional outlet. Given this setup, we model the probability that an individual will choose to purchase beef at the new outlet. This decision depends on attributes of the new retail outlet as well as attributes of the consumer's traditional beef retail outlet.

Assume that individual i derives utility $V_{i1} + \varepsilon_{i1}$ from purchasing beef from the new stand-alone beef retail outlet, whereas $V_{i2} + \varepsilon_{i2}$ is derived from purchasing beef from the consumer's traditional meat retailer, where V_{ij} describes the deterministic portion of the utility function, which is composed of attributes of each of the retailers and ε_{ij} is the stochastic portion of the utility function, which is unobservable to the researcher. The consumer chooses to purchase beef from the new retail outlet if $V_{i1} + \varepsilon_{i1} > V_{i2} + \varepsilon_{i2}$. Similarly, we observe a choice of the new retail outlet if $\varepsilon_{i2} - \varepsilon_{i1} \leq V_{i2} - V_{i1}$. Let $\varepsilon_i = \varepsilon_{i2} - \varepsilon_{i1}$ and $V_i = V_{i2} - V_{i1}$, so that the choice of the new retail outlet is observed if $\varepsilon_i \leq V_i$. Assuming ε_i are normally distributed produces the traditional probit model. The probability than an individual will choose to regularly purchase beef from the new retail outlet is given by

$$\text{(1)} \quad \text{prob(new outlet is chosen)} = \Phi(V_i),$$

where V_i describe the attributes of the choice between the new and traditional beef retail outlets for consumer i, and Φ is the standard normal distribution function.

As discussed in the previous section of the paper, a number of factors are likely to influence store choice. Given the preceding discussion, the utility of store choice is hypothesized to be a function of price of the beef in the store, the type of beef cut purchased, and the location/convenience of the store. Equation (2) outlines the factors hypothesized to affect the choice process:

$$\text{(2)} \quad V_i = \alpha_0 + \alpha_1 Price_{new} + \alpha_2 Price_{traditional} + \alpha_3 Distance_{new} + \alpha_4 Distance_{traditional} + \alpha_5 Distance_{Grocery} + \sum_{t=5}^{T} \alpha_t D_t + \varepsilon_i,$$

where $Price_{new}$ is the price of the beef prod-

uct at the new stand-alone retail outlet, $Price_{traditional}$ is the price of the beef product at the consumer's traditional meat outlet, $Distance_{new}$ is the distance of the new stand-alone outlet from the consumer's home, $Distance_{traditional}$ is the number of miles from home the respondent currently travels to purchase beef at their traditional outlet, $Distance_{Grocery}$ is the distance of the new stand-alone outlet from the consumer's typical grocery store, D_t are various demographic variables that influence probability of shopping at the new store, and αs are coefficients to be estimated.[3] To determine the influence of the type of beef cut purchased on store choice, we analyze Equation (2) for two different cuts: ribeye steaks and ground beef.

Predictions from Equation (1) can be interpreted as the percentage of the population (market share) that would choose to regularly purchase beef from the new retail outlet, given particular levels of independent variables. Price attributes were included in Equation (2) to determine how sensitive market share predictions were to own- and cross-price changes, such that appropriate pricing decisions could be formulated. The distance variables were also included in Equation (2) to assist in determining appropriate store location. As $Distance_{new}$ and $Distance_{Grocery}$ decline, transaction and opportunity costs should decline and increase the likelihood of shopping at the new retail outlet. At higher levels of $Distance_{traditional}$, it is expected that consumers will be more likely to purchase beef at the new retail outlet because the marginal distance consumers must travel to purchase beef is lower. In the survey instrument, we asked subjects to assume that other attributes that might affect the choice decision, such as cleanliness, were equivalent in both stores.[4]

One last modeling consideration deserves attention. In the survey, which will be described momentarily, each individual answered several repeated survey questions. Thus, we obtained a panel of observations, where each individual chose whether to purchase beef from the new retail outlet in several different scenarios. In this case, the model can be given by $V_{it} + \varepsilon_{it} + u_i$, where each individual i responded to t different choice questions, ε_{it} represents the overall error term, and u_i represents an individual specific error. Incorporating this error structure into Equation (1) produces a random effects probit model (see Greene). This specification allows us to control for individual-specific heterogeneity.

Survey Design

To estimate Equation (1), a mail survey was developed. In the survey, consumers were presented several descriptions of the new retail outlet and were asked, in each scenario, if they would regularly purchase beef in the new beef retail outlet (yes or no). Because Medina and Ward found that selection of retail outlet depended on type of meat purchased, we constructed two CEs: one for ground beef and one for ribeye steaks. In each CE, consumers were asked if they would purchase beef at the new retail outlet in nine different scenarios.

Each scenario was described with different levels of $Price_{new}$, $Price_{traditional}$, $Distance_{new}$, and $Distance_{Grocery}$. In both CEs, $Distance_{new}$ was varied among 1 mile, 5 miles, and 10 miles, and $Distance_{Grocery}$ was varied among 0 miles (same shopping center), 3 miles, and 6 miles. $Distance_{traditional}$ was determined by surveying respondents about the distance they

[3] This choice situation can also be modeled with a multinomial logit (MNL) model in a manner more consistent with most CE studies. We chose the simple probit model specification here because we are more easily able to control for random effects, and identification of cross price effects in this setup are more straightforward and less restrictive than in the MNL. These alternative results are available from the authors upon request.

[4] Demographic variables are not typically included when using MNL models to estimate effects from CE data because variables that are constant across alternatives drop out of the estimation. In our binomial probit model, demographic variables can be included, and interpretation of the effects is equivalent to the case where demographics are interacted with an alternative specific constant for the new store in the MNL case.

usually travel to purchase the beef they consume at home. For the ground beef CE, $Price_{new}$ was varied at the levels of \$1.00/lb., \$2.50/lb., and \$4.00/lb., and $Price_{traditional}$ was varied at the levels of \$1.00/lb., \$1.50/lb., and \$2.00/lb. For the steak CE, $Price_{new}$ was varied among \$9.00/lb., \$12.00/lb., and \$15.00/lb., and $Price_{traditional}$ was varied among the levels of \$5.00/lb., \$7.00/lb., and \$9.00/lb. In all cases, $Price_{new} \geq Price_{traditional}$ because of the higher-quality meat (described momentarily) and likely higher costs of the new stand-alone retail outlet. Price levels were chosen to be consistent with observed prices in the surveyed region and with anticipated costs of the new beef product.

Subjects would have had to respond to 81 ($3^4 = 81$) different choice scenarios if every combination of every attribute level were presented. To reduce the number of scenarios an individual had to respond to, we generated a fractional factorial design where all attributes were perfectly orthogonal with one another. The resulting design consisted of nine scenarios. A copy of the CE for the ribeye steaks is included in the Appendix.

Description of New Stand-Alone Retail Outlet

In the mail survey, consumers were provided the following information about the new beef retail outlet:

> In the next few questions we are interested in determining your interest in purchasing beef from a new retail outlet, named Family Farm Foods, which is considering opening a store in Jackson, MS. Family Farm Foods is a small retail store that primarily focuses on selling Mississippi-produced, high-quality beef. Although beef is the store's primary product, fresh vegetables are also available. Family Farm Foods guarantees that it sells beef from cattle that *have not* been administered growth hormones, given subtherapeutic antibiotics, or fed animal byproducts. In addition, the meat has passed through a "rinse and chill" process, which potentially lowers the chance of food-borne illness while improving the flavor of the meat. In the questions that follow, we are interested in whether you will regularly purchase beef from the new Family Farm Foods outlet or whether you will continue to purchase beef from your traditional outlet. In the following, assume that Family Farm Foods has the same level of cleanliness and service as the grocery store you typically shop at. Please answer the questions honestly and only indicate that you will purchase beef from Family Farm Foods if you truly believe you will do so.

Survey Sample

Due to the nature of the study, we were interested in surveying a very specific population. An affluent area of Jackson, MS, was selected as the target market. Nine ZIP codes surrounding the target area were selected for surveying, and mailing lists were purchased from a reputable private company that randomly drew addresses from the telephone white pages within the selected region. Seven hundred surveys were mailed in the fall of 2001 to the surveyed region, which contained approximately 48,000 households.

Results

A total of 111 surveys were returned, which, after adjusting for undeliverable addresses, yielded a 17% response rate. Summary statistics from the 102 complete and usable surveys are reported in Table 1. Slightly over half the respondents were women (52%), and the average age was about 50. The average participant had some college education and yearly household income between \$70,000 and \$80,000. The relatively high income levels reflect the population of the target market. Respondents indicated that they consumed an average of 5.6 lbs. of ground beef and 4.2 lbs. of steak per month. Participants travel an average of 4.2 miles to purchase beef at their desired outlet. In general, consumers appeared somewhat likely to consider alternative outlets for their beef.

Table 2 reports random effects probit estimates and marginal effects for the steak and ground beef using all 918 observations obtained from responses to the CE questions. As

Table 1. Summary Statistics of Selected Survey Responses

Variable	Definition	Average
Gender	1 = women, 0 = men	0.524
		(0.502)[a]
Age	Age in years	49.631
		(14.070)
Education	1 = Bachelor's degree or higher; 0 otherwise	0.644
		(0.479)
Income	Household income level	7.505
	0 = Less than $10,000; 1 = $10,000 to 19,999 . . .	(4.500)
	18 = $180,000 to $189,999; 19 = more than $190,000	
Ground beef	Quantity of ground beef purchased each month for household (lbs.)	5.583
		(4.752)
Steak	Quantity of steak purchased each month for household (lbs.)	4.152
		(4.689)
$Distance_{traditional}$	Number of miles from home respondent normally travels to purchase beef	4.149
		(4.474)
Grocery	1 = Normally purchases beef at grocery store; 0 otherwise	0.894
		(0.308)
Likely	Likelihood respondent will purchase beef at any new outlet	2.718
		(1.248)
	1 = very likely; 5 = not likely	

Note: Number of observations = 102.
[a] Numbers in parentheses are standard deviations.

expected, both own and cross prices were important factors determining store choice for steaks. Marginal effects imply that if the new retail outlet increased steak price by $1.00/lb., it can expect to lose 5.1% market share. The positive coefficient on $Price_{traditional}$ suggests that steaks from the consumers' traditional outlet are substitutes for the new outlet's steak. A $1.00/lb. increase in traditional grocer's steak price results in an increased market share of 3.7% for the new retail outlet. The only demographic variable to influence selection of retail outlet for steaks was gender, with women being more likely to shop at the new retail outlet than men. Somewhat surprisingly, results suggest that the distance parameters did not have a statistically significant influence on the likelihood of choosing to purchase steak at the new retail outlet. Although distance levels were chosen to represent the realistic extremes, it is possible that there was not enough variation in distance to have a statistically significant influence over choice of steak outlet. What the estimates indicate is that distance does not significantly influence ribeye steak sales *over the range of distances examined in this study.* Making predictions about the effect of distance outside that examined in this study would require further survey work and analysis.

The latter two columns in Table 2 report random effects probit estimates and marginal effects for the ground beef CE. All variables are statistically significant except income and education. Results indicate decreases in own price, increases in cross price, and decreases in the distance the new store is from the consumer's home and traditional grocery store and are associated with increases in the new outlet's market share. The marginal effects of the price variables are relatively large, with a $1.00/lb. increase in own price associated with a 28% loss of market share. Results also suggest that women and consumers who eat more ground beef were more likely to purchase beef from the new retail outlet than men and less frequent beef-eating consumers. That the distance variables were statistically significant in the ground beef model but not the ribeye model is entirely consistent with economic theory.

Table 2. Random Effects Probit Estimates

	Ribeye Steak		Ground Beef	
	Model Estimates	Marginal Effects[a]	Model Estimates	Marginal Effects
Constant	0.145	0.020	1.099**	0.301**
	(0.664)[b]	(0.094)	(0.476)	(0.137)
$Price_{new}$	−0.363**	−0.051**	−1.035**	−0.283**
	(0.036)	(0.011)	(0.050)	(0.024)
$Price_{traditional}$	0.264**	0.037**	0.439**	0.120**
	(0.053)	(0.011)	(0.188)	(0.052)
$Distance_{new}$	−0.031	−0.004	−0.106**	−0.029**
	(0.025)	(0.003)	(0.016)	(0.005)
$Distance_{traditional}$	0.036	0.005	0.052**	0.014**
	(0.044)	(0.006)	(0.018)	(0.005)
$Distance_{Grocery}$	−0.030	−0.004	−0.082**	−0.022**
	(0.037)	(0.005)	(0.027)	(0.008)
Income	0.033	0.005	0.040	0.011
	(0.035)	(0.005)	(0.029)	(0.008)
Education	0.234	0.033	0.037	0.010
	(0.330)	(0.046)	(0.241)	(0.066)
Meat consumption[c]	0.037	0.005	0.444**	0.012*
	(0.030)	(0.004)	(0.022)	(0.006)
Gender	0.516*	0.073	0.510**	0.140**
	(0.295)	(0.046)	(0.233)	(0.064)
Rho[d]	0.473**		0.430**	
	(0.093)		(0.062)	
Log likelihood	−306.2		−370.2	
Number of observations	918		918	
Number of individuals	102		102	

Notes: McFadden's R^2 = 0.13 and 0.32 for the steak and ground beef models, respectively. Percentage of correct predictions = 83.6% and 79.1% for the steak and ground beef models, respectively.

[a] Computed at the means of the independent variables.

[b] Numbers in parentheses are standard errors.

[c] For the ribeye steak equation, the meat consumption variable is the steak variable from Table 1, whereas for the ground beef equation, the meat consumption variable is the ground beef variable from Table 1.

[d] Rho is the correlation between the individual specific error terms in the panel regression models.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

Ground beef is a lower-valued good, and the opportunity cost of seeking out alternative outlets relative to the cost of the good is relatively high. In contrast, ribeye steaks are higher-valued, and the opportunity cost of seeking out alternative outlets relative to the cost of the good is relatively low.

In order to determine how successful the new retail outlet might be, we simulated market share and volume of sales under a variety of scenarios. Table 3 reports the assumptions of the baseline simulation. First, to estimate the volume of steak sales for the new retail outlet, we assumed the ribeye steak model reported in Table 2 was applicable for all steak types (i.e., T-bone, sirloin, etc.). To establish the beef prices in competing grocery stores, average steak prices and ground beef prices were obtained from the USDA/ERS (Economic Research Service), as reported by the NCBA (National Cattlemen's Beef Association), for November 2001, the month the survey was administered. The average T-bone, ribeye, and sirloin price in the United States for this time period was $6.26/lb., and the average ground beef price in the United States for this

Table 3. Simulation Assumptions

Variable	Steak	Ground Beef
$Price_{new}$ ($/lb.)	8.76	2.98
$Price_{traditional}$ ($/lb.)[b]	6.26	2.13
$Distance_{new}$ (miles)[a]	4.15	4.15
$Distance_{traditional}$ (miles)[a]	4.15	4.15
$Distance_{Grocery}$ (miles)	3.00	3.00
Percent of population eating particular meat (%)[c]	80.0	93.0
Average weekly household consumption (lbs.)[d]	0.84	1.27
Market size (households)[e]	40,000	40,000

[a] Average distance traveled to traditional beef retailer in surveyed sample.
[b] National average prices for steak and ground beef reported by USDA/ERS in November 2001.
[c] Percentage of surveyed sample that ate at least some steak and ground beef, respectively.
[d] Calculated using average monthly household consumption in the surveyed sample.
[e] There were approximately 48,000 households in the surveyed region.

time period was $2.13/lb. We assumed the new retail outlet would sell beef at a 40% premium to traditional grocery stores. Thus, we assigned $Price_{new}$ the values of $8.76/lb. and $2.98/lb. for steaks and ground beef, respectively. Next, we assumed the store would be located 4.15 miles from the consumers' homes, which was the average distance consumers traveled to traditional beef outlets in the surveyed sample. We also assumed the new store would be located 3 miles from the consumers' typical grocery store.[5]

The above assumptions, together with average values of the demographic variables used in Equation (2), are sufficient to calculate expected market share for the new beef retail outlet. However, further assumptions are needed to make predictions about the volume of sales and revenue. The expected volume of weekly sales (in pounds) for meat k is

$$(3)\quad Volume_k = (Percent\ of\ Population\ Eating\ Meat_k) \times [(Average\ Monthly\ Consumption\ of\ Meat_k)/4.33] \times (Market\ Size) \times [\Phi(V_g)],$$

where, k is steak or ground beef, *Percent of Population Eating Meat*$_k$ is the percentage of the surveyed sample that ate at least some quantity of the particular meat type, and *Average Monthly Consumption of Meat*$_k$ is the monthly consumption of meat k in pounds for those individuals who consumed at least some of meat k as defined by the Ground Beef and Steak variables in Table 1. *Average Monthly Consumption of Meat* is divided by 4.33 to convert monthly statistics to weekly values.[6] *Market Size* is the expected size of the market that would consider the new beef retail outlet, and $\Phi(V_g)$ is the predicted percentage of the population (market share) that would choose to regularly purchase beef from the new retail outlet, given particular attribute levels, g. Simulated revenue for steaks and ground beef is

$$(4)\quad Revenue_k = Volume_k \times Price_{new\,k}.$$

Market share, volume, and revenue predic-

[5] The store might be placed in the same shopping center as *some* consumers' typical grocery store, but cannot be placed in the same shopping center as *all* consumers' typical grocery store. Thus, on average, we assumed a distance of 3 miles, as most grocery stores in the surveyed region are located in close proximity.

[6] Weekly household consumption data reported in Table 3 are consistent with data on U.S. per capita beef consumption reported by the USDA. In 2001, yearly per capita consumption of beef was 68 lbs./person/year or 1.31 lbs./person/week. Assuming an average household size of 2.43 (our sample average), weekly household consumption is 3.17 lbs./household/week. Surveyed individuals reported an average of 0.84 + 1.27 = 2.11 lbs. of household consumption of ground beef and steak per week. The remaining 3.17 − 2.11 = 1.07 lbs. of household beef consumption likely comes from away-from-home consumption and consumption of other beef products such as roasts in the home.

Table 4. Simulation Results—Performance of Stand-Alone Beef Retailer Outlet

Scenarios		Steak	Ground Beef
1	Baseline predictions[a]		
	Predicted market share (%)	26.4	25.0
	Weekly volume sold (lbs.)	7,117	11,783
	Weekly revenue ($)	62,288	35,112
2	Market size reduced to 30,000 households		
	Predicted market share (%)	26.4	25.0
	Weekly volume sold (lbs.)	5,333	8,837
	Weekly revenue ($)	46,716	26,334
3	Grocery store reduces steak and ground beef prices to $5.26/lb. and $1.91/lb.		
	Predicted market share (%)	18.5	22.1
	Weekly volume sold (lbs.)	4,992	10,386
	Weekly revenue ($)	43,731	30,951
4	Store is poorly located: $Distance_{new}$ and $Distance_{Grocery}$ increased to 8 miles		
	Predicted market share (%)	18.3	6.8
	Weekly volume sold (lbs.)	4,933	3,188
	Weekly revenue ($)	43,212	9,500
5	Market size reduced to 30,000 households *and* store is poorly located: $Distance_{new}$ and $Distance_{Grocery}$ increased to 8 miles		
	Predicted market share (%)	18.3	6.8
	Weekly volume sold (lbs.)	3,700	2,391
	Weekly revenue ($)	32,409	7,125
6	Store is poorly located: $Distance_{new}$ and $Distance_{Grocery}$ increased to 8 miles *and* grocery store reduces steak and ground beef prices to $5.26/lb. and $1.91/lb.		
	Predicted market share (%)	12.1	5.6
	Weekly volume sold (lbs.)	3,272	2,635
	Weekly revenue ($)	28,667	7,852

[a] Assumptions of baseline prediction are shown in Table 3.

tions for these baseline assumptions are reported under scenario 1 in Table 4. Results suggest that 26% and 25% of consumers would purchase steak and ground beef from the new retail outlet under the assumptions identified in Table 3. In this scenario, weekly volume is predicted at 7,111 lbs. of steak and 11,783 lbs. of ground beef, with weekly revenue at $62,288 and $35,112 for steaks and ground beef, respectively. Preliminary estimates indicate that the stand-alone beef retail outlet could cover fixed and variable costs if it sold 3,150 lbs./week (Darby). These estimates suggest a much higher sales volume might be obtainable.

Nevertheless, a number of the assumptions made in the analysis could be inaccurate or market conditions may change once the new retail outlet begins operation. To determine how these changes might affect demand for the new retail outlet, several other simulated scenarios were considered, as shown in Table 4. The second scenario considers the case where the market size may be smaller than expected: 30,000 households instead of 40,000 households. This scenario is considered because fewer households may actually be aware of the new retail outlet than expected (i.e., advertisement and marketing have not reached all of the households in the target market). Alternatively, reducing the market size might be one way to account for hypothetical bias—that elicited demand is greater for a new product in a hypothetical setting than when actual payment is required (e.g., Cummings, Harrison, and Rutström; Fox et al.). In this case, sales

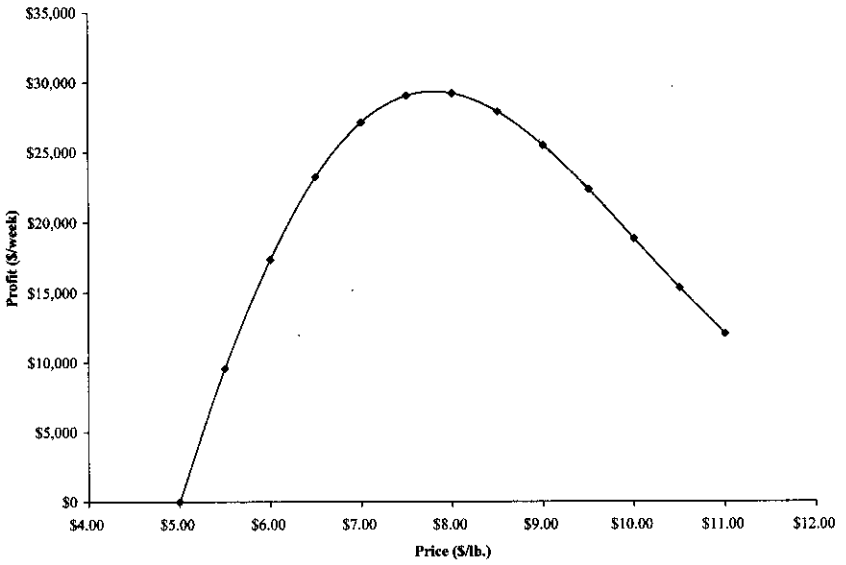

Figure 1. Profit-Maximizing Steak Price at New Retail Outlet

volume reduces to 5,333 lbs. and 8,837 lbs. for steak and ground beef, respectively.

Another situation that might arise is that grocery stores, upon encountering competition from the new retailer, could reduce their beef prices. Given the economies of size and scope possessed by most grocery stores, it is very likely that they might try to "undercut" the competition. In this case, it is assumed that the grocery stores reduce the average steak price to $5.26/lb. and the average ground beef price to $1.91/lb. These prices were determined by calculating the average price of "featured" beef cuts sold in grocery stores across the United States in November 2001 as reported by the USDA, ERS, and the NCBA. In this case (scenario 3), market share declines to 19% and 22% for steaks and ground beef, respectively.

Scenario 4 considers the situation where the new store is poorly located. In this case $Distance_{new}$ and $Distance_{Grocery}$ are both increased to 8 miles. For scenario 4, market share for steaks and ground beef decline to 18% and 7%, respectively. Scenarios 5 and 6 consider combinations of scenarios 2, 3, and 4. In the worst-case scenario examined here, weekly volume of steak sales (revenue) is projected at 3,272 lbs. ($28,667), and weekly volume of ground beef sales (revenue) is 2,391 lbs. ($7,125). Even in these scenarios, weekly volume is greater than the estimated volume required to cover fixed costs (Darby).

As one final consideration, the new meat retail outlet might be interested in determining the steak and ground beef prices that maximize expected profit. These statistics can be readily calculated using the baseline assumptions in Table 3 and model estimates in Table 2. The only additional assumption that must be made is with regard to the marginal cost of steak, which we set at $5.00/lb., and ground beef, which we set at $1.50/lb. (Darby). Given these assumptions, the profit-maximizing steak and ground beef prices are illustrated in Figures 1 and 2, respectively. Results indicate that the profit-maximizing steak price is $7.80/lb., which is roughly 25% higher than the steak price at the traditional grocery store. Results also indicate that the profit-maximizing ground beef price is $2.53/lb., which is about 20% higher than the ground beef price at the traditional grocery store.

Discussion

In some respects, the predicted market shares reported in Table 4 are higher than a priori expectations, with predictions indicating that the new retail outlet will capture about 25%

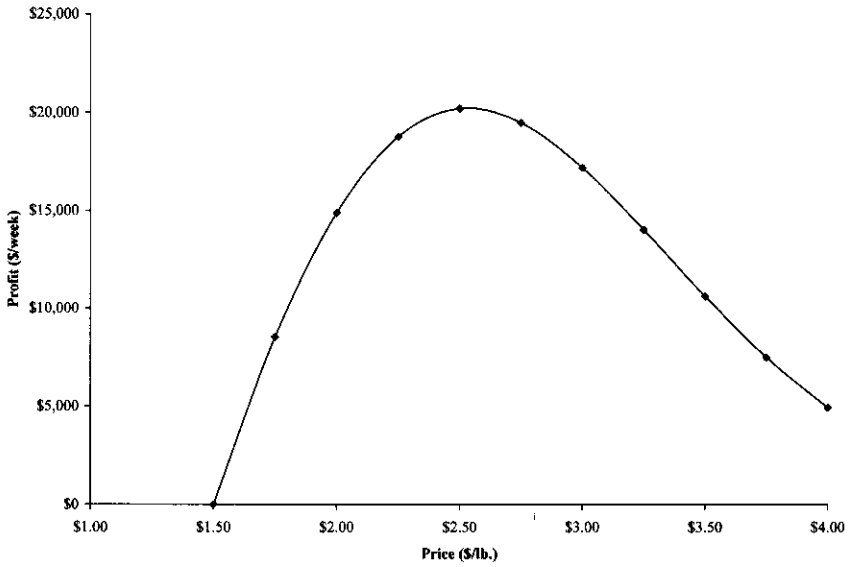

Figure 2. Profit-Maximizing Ground Beef Price at New Retail Outlet

of the local beef market. Because of the hypothetical nature of the survey, it is possible that estimates are subject to hypothetical bias (e.g., Cummings, Harrison, and Rutström; Fox et al.). Lusk and Schroeder, in a CE somewhat similar to that employed here, found that predicted market shares from a hypothetical CE were as much as 20% greater than nonhypothetical market shares when consumers actually had to pay money to back up their choices. If results from Lusk and Schroeder carry over to this application, predicted market shares in Table 4 need to be reduced by 20%. For example, in scenario 1 the projected market share for steak would decline from 26.4% to 6.4%. Scenario 2 in Table 4 explicitly attempts to incorporate this sort of behavior (albeit in an indirect manner) by reducing the expected market size.

This overstatement of potential demand for the new outlet might also be noted by examining historical data on supermarket store sales. According to Food Marketing Institute (2002b) data, average weekly sales of supermarkets were $368,779 in 2001, with 14.32% of sales coming from the meat department. It follows that average weekly sales revenue from the meat department in supermarkets were $52,809 in 2001. Assuming beef accounts for 35% of all meat department sales (with pork, poultry, and fish sales accounting for the remainder), average weekly beef sales of supermarkets would amount to $18,483. Given that these figures represent U.S. sales averages and that per capita consumption of meat is higher in the southern United States, it is likely that average weekly beef sales of supermarkets in the analyzed region are around $25,000. Clearly, the baseline sales predictions (scenario 1 in Table 4) are much greater than this figure. Given alternative assumptions about the market (such as that in scenarios 5 and 6 in Table 4), projected sales are much closer to industry averages, but are still slightly inflated.[7]

If market shares and sales from the hypothetical survey are overpredicted, can any of the reported estimates be trusted? We believe so. Even if our estimated models do not correctly predict *total* market shares or sales, they are likely accurate at predicting *marginal*

[7] Despite the apparent overestimation of sales, it is important to recognize that the weekly sales figures from the Food Marketing Institute represent *individual* store sales. Even if there were only six supermarkets in the surveyed region, beef sales for the entire market would approach $150,000/week, and 25% of this total (the projected market share of the new store) would yield $37,500, which is similar to several of the projected scenarios in Table 4.

changes in market share or sales associated with changes in attribute levels. Louviere, Hensher, and Swait, in their extensive summary of previous research, contend that revealed preference data are more accurate at predicting absolute market shares, but that stated preference data from CEs are better able to capture attribute tradeoff information and better predict marginal changes in market share. Lusk and Schroeder also found that although a hypothetical CE overpredicted total willingness-to-pay, it was generally accurate at predicting marginal willingness-to-pay for changes in steak quality. In that regard, one can be reasonably confident in utilizing the marginal effects reported in Table 2, but might be less confident in using overall market share and sales predictions in Table 4. It should also be noted that although the overall predicted profit levels in Figures 1 and 2 are sensitive to assumptions about the overall market size and market share, the expected profit-maximizing prices, conditional on other attribute levels, are not (because profit-maximizing prices are determined by equating *marginal* revenue and *marginal* cost). Thus, the profit-maximizing prices illustrated in Figures 1 and 2 are likely to be robust to problems associated with hypothetical bias.

Conclusions

Because of the perception of market power at the wholesale and retail levels, some producer groups are considering integrating forward into the retail sector to capture a larger share of the retail dollar (e.g., Darby). However, a great deal of uncertainty regarding the efficacy of such a venture exists. Before producer groups are willing to put forth funds to invest in a retail outlet, more research is needed to identify consumer demand for the new store.

This study estimated the demand for a producer-owned, stand-alone beef retail outlet in Jackson, MS. Potential demand for the new outlet was modeled using a choice experiment where consumers were asked to decide whether they would regularly purchase beef from the new outlet given a set of attributes corresponding to attributes of the new outlet and the consumers' traditional beef retail outlet. The choice experiment was used to estimate the percentage of consumers (market share) that would regularly purchase beef from the new retail outlet. Simulation results indicate that the expected volume of sales is sufficient to cover projected fixed costs of the retail outlet. Factors such as price of beef at the retail outlet, location of the new store, and price level of beef at competing grocery stores were found to influence market share and revenue projections. Of course, ultimate success of the retail outlet will also depend on effective marketing and advertising, level of service and cleanliness of the new retailer relative to competitors, and effective management.

Because the new beef retail outlet's business model consists of selling a "natural" beef product in a stand-alone retail environment (Darby), profitability at the new outlet might be eroded if traditional grocery stores in the region begin to sell similar "natural" products. Therefore, in some respects the sustainability of a new beef retail outlet selling natural beef might be questionable. A competitor might erode the outlet's competitive advantage by offering natural beef through traditional channels. However, this argument holds for any product (or store), as standard economic theory suggests that a differentiated product will again become a commodity-type product as competition increases in the long run. To attempt to counteract some of these problems, beef producers might simply consider selling natural-branded beef through traditional grocery stores instead of integrating into the retail sector. However, some producer groups (e.g., Darby) strongly contend that traditional retail outlets must be bypassed for cattle producers to fully realize the profitability of a differentiated product. That is, traditional retail outlets will potentially utilize their market power to diminish profitability of a branded product. Deciding whether to develop a branded product and sell through traditional outlets versus fully integrating into the retail sector depends, among other things, on the competitiveness of the local retail market, market power exerted by local retailers, and costs of vertical integration. Regardless of whether a branded or in-

tegration strategy is employed, a new retail outlet (or branded product) must develop brand equity by cultivating a strong positive relationship with consumers to achieve sustainable profits.

Although results of this empirical analysis are limited to a specific geographic location and target market, some generalizations can be made. First, analyzing store choice in this attribute-based framework provides several advantages over previous studies. The researcher can readily manipulate attributes hypothesized to influence demand for the retail outlet while controlling for other compounding factors. Although revealed preference data also have advantages, the benefit of this stated preference approach is that the choice situation can be more tightly defined and controlled so that the effect of other extemporaneous factors is minimized—a task more difficult with secondary data. Second, our results indicate that there are several factors that influenced choice of retail outlet, and many of the marginal effects are likely extendable to other locations. Consumer choice was sensitive to prices of beef at the new retail outlet, as well as prices of beef at traditional grocery stores. In the case of ground beef, location of the store significantly influenced demand—with outlets located closer to consumers' homes and closer to large groceries being more desirable. By reducing transaction costs for consumers, a stand-alone beef retail outlet will likely be more successful if located in a high-population area near other grocers.

The beef sector still lags behind the pork and poultry industries in terms of industry structure and ability to respond to dynamic consumer demand. Cattle producers, with creative marketing strategies, may be able to respond to unmet consumer demand in niche markets by bypassing traditional marketing channels and integrating into the retail sector. However, such ventures are risky and returns are uncertain. By providing information about factors affecting success of producer-owned retail outlets, producer groups can potentially arrive at effective decisions.

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Appendix. Choice Experiment Questions for Beef Steaks

We are interested in finding out if you would regularly purchase *steak* from a Family Farm Foods retail outlet. However, we realize that this decision may depend on a number of factors. Below we have listed nine different shopping scenarios. Please examine each scenario carefully and decide for each scenario whether you would shop and purchase *steak* from a Family Farm Foods retail store or continue to purchase beef at your usual outlet. For example, in scenario 1 the price of ribeye steak is $9.00/lb at Family Farm Foods store, and Family Farm Foods is 5 miles from your home and is in the same shopping center as your typical grocery store. Furthermore, the price of a "typical" ribeye steak at your usual grocery store is $7.00/lb. If this were the case, would you purchase steak at Family Farm Foods or at the place you currently buy beef? Please answer this question for each of the scenarios reported below.

	Description of Shopping Scenario					
Scenario	Ribeye Steak Price at Family Farm Foods ($/lb.)	Distance of Family Farm Foods from Home (miles)	Ribeye Steak Price at Your Typical Outlet (lb.)	Distance of Family Farm Foods from Your Typical Grocery Store (miles)	Would You Regularly Purchase Steaks at Family Farm Foods in this scenario? (circle one)	
1	9.00	5	7.00	Same shopping center	YES	NO
2	15.00	5	5.00	6	YES	NO
3	12.00	10	5.00	Same shopping center	YES	NO
4	12.00	1	7.00	6	YES	NO
5	9.00	10	9.00	6	YES	NO
6	12.00	5	9.00	3	YES	NO
7	15.00	10	7.00	3	YES	NO
8	9.00	1	5.00	3	YES	NO
9	15.00	1	9.00	Same shopping center	YES	NO