Estimating the Value of Retail Beef Product Brands and Other Attributes

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Abstract

This paper finds wide variation in brand premiums and discounts across types of branded beef cuts, ranging from -98 cents for a brand of ground beef targeting cost-conscious consumers to $4.15 for a brand of steak produced by a family-operated beef alliance. Other factors affecting beef cut prices include package size, price promotions, store format, ground beef leanness, type of steak cut, and geographic region where the beef was purchased.

Introduction

Since the late 1970s, per capita consumption of beef in the United States has fallen, while chicken and pork have gained or maintained market share. One reason cited for the reduction in beef consumption is declining demand due to inconsistent and poor eating quality characteristics, such as excessive fat and inadequate tenderness, and lack of convenient, value-added products.

Part of the problem plaguing the beef industry is an antiquated cattle price discovery process that prices slaughter cattle at about the same average price. Consumers might be willing to pay a price premium for high-quality products that differ from the commodity standard. However, price signals that prompt responses to consumer preferences were not being transferred to cattle producers, so that they could make the necessary investments for producing high-quality cattle. In a commodity pricing system, producers are encouraged to compete by increasing in size to reduce costs. This leads to government intervention to ease the transition of farmers who are forced out farming, and to protect rural communities where the cattle industry is economically important. Such intervention can create market distortions and fuel international conflicts over protectionist policies.

Many beef quality attributes that can serve as a basis for differentiating beef products, such as flavor, tenderness, nutrition, and safety are not apparent to consumers until the product is consumed. Emerging consumer concerns such as the humane treatment of farm animals and environmentally friendly production practices are also impossible to detect even after consumption. This can lead to market failure that may prevent consumers and producers from engaging in what would otherwise be a mutually beneficial transaction.

The use of brand names and firm reputation to assure food product performance and safety is one possible private solution to the market failure. The move from commodity beef to high quality, branded beef product lines can provide a means for targeting niche markets, increasing demand, and sharing associated price premiums along the supply chain. In addition, farmer-owned brands that differentiate based on some identifiable attribute, such as production location or environmentally friendly, give producers even greater control over supplies, and can prevent imitation by competitors. Little is known, however, about the value of retail beef brands.

Our primary objective in this paper is to estimate U.S. beef brand premiums and discounts. This will allow us to evaluate the potential for branded beef programs to generate benefits from high-quality, differentiated products. In the process, we also evaluate the effects of other attributes on beef prices, such as price promotions and store formats. We use recent Nielsen Homescan Household panel data in 2004 and 2005.

Data Source

The Nielsen Homescan panel data used in the estimation includes transaction prices, quantities, and other information on household food purchases, including package size, number of units and date purchased, product promotions, item descriptions, and brand. The data also contain demographic information on each household, such as geographic location, income, race, household size, education, and age.

Panel participants were selected based on demographic and geographic targets to match the U.S. population as closely as possible. The nationally representative panel contained about 8,000 households per year who were in the panel for at least ten months during the year. Households in the sample recorded both their random-weight (non-UPC-coded) and fixed-weight (UPC-coded) purchases after each shopping trip using an electronic scanner located at their home. For random-weight products, information is manually recorded using Nielsen's "Category Code Book For Non-UPC Barcoded Items."

Household projection factors contained in the data set are used to produce demographic weighting so that aggregated data is representative at the U.S. level. The projection factors weight each household according to its representation in the U.S. population based on U.S. Census data. A weighted quantity and expenditure is calculated for each recorded transaction, which can then be aggregated over household transactions to provide data that is representative of national purchases. Nielsen recalculates the weights each year to maintain consistency with Census updates.

The data includes brand information on fresh, frozen, and precooked ground beef, steak, roast, and other beef cuts (e.g., beef for stew, ribs, liver, brisket).[1] Table 1 summarizes Nielsen's product modules and brand classifications for the non-UPC random-weight and UPC-coded beef, along with our assessment of whether the category is branded. Non-UPC coded random-weight beef has three broad brand descriptors: an actual brand name (e.g., Excel and Laura's Lean Beef); an "all other brands category;" and "no brand." According to Nielsen's code book for non-UPC barcoded items, panelists are instructed to type the brand name (up to 24 characters) into the scanner as it appears on the package label. Otherwise, they are asked to press the "no" key on their scanner if there is no brand name on the package or if the store's name is the brand name. Hence, private label generic store-name lines (e.g., Kroger or Giant) are not considered to be branded.

UPC-coded beef cuts have four basic brand descriptors. These include the actual brand name; "CTL BR," which are private label products (e.g., Giant or Safeway's Rancher's Reserve brand); a processor name followed by "NBL" (no brand label) (e.g., Tyson Fresh Meats---NBL); and NBL---no company listed."[2] The processor name together with "NBL" refers to small print on the package that indicates the distributor, for example, "distributed by Tyson Fresh Meats."

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[1] Our analysis excludes further processed products, including sausages and hotdogs, canned meat, jerky, meat snacks, frozen entrees, lunch meat, refrigerated and frozen ready-made sandwiches, sandwich spreads, and soups.
[2] Private label or store-branded beef is exclusively developed, manufactured, and produced for a retailer. The brand can be the store's own name or a name created exclusively by that store (Private Label Manufacturers Association, 2007).

Table 1. Nielsen's classification of branded beef in the Homescan Panel data		
Product modules	Brand descriptors	Branded?
Non-UPC coded random-weight beef	No brand (includes those cuts branded with the store name)	No
	Brand name (e.g., Farmland, Maverick Ranch, Store-specific brands that are not the store name)	Yes
	All other brands	Yes
UPC-coded beef • Fresh meat • Frozen ground beef • Frozen beef steaks • Frozen remaining beef (mostly liver)	Brand name (e.g., Laura's Lean Beef, Excel)	Yes
	CTL BR (private label or store brands)	Yes
	NBL-no company listed	No
	Supplier name-NBL (e.g., Tyson Fresh Meats-NBL)	No

If the store name is the brand name of *non-UPC-coded random-weight* beef, Nielsen considers

this beef to be unbranded. On the other hand, any type of store-branded *UPC-coded* beef is

considered by Nielsen to be a private-label brand. Because of this apparent inconsistency in

branded product classifications, we conduct separate analyses of non-UPC-coded random-weight

products and UPC-coded products.

The Modeling Framework

To evaluate the price premiums associated with different beef brands, we employ a hedonic

regression model, while controlling for some other characteristics that can affect beef prices.[3]

The hedonic price model assumes that consumers derive utility from the characteristics of goods

rather than the goods themselves (Unnevehr and Bard, 1993). Price differences are assumed to

be due to differences in product attributes which include *intrinsic* attributes and *extrinsic*

attributes (Parcell and Schroeder, 2007). Intrinsic quality attributes are those associated with the

actual characteristics of the product, such as fat content, taste, smell, and color. Extrinsic

attributes relate to promotional or informational characteristics that can also affect consumer

choice, including brand and advertising. We also assume that prices may vary by location of the household, and month and year of purchase.

We first estimate the affect of brands and other attributes on beef prices for non-UPC-coded random-weight beef, which accounted for 87 percent of beef pounds purchased in 2005 (Nielsen Homescan panel data). We specified the following equation for ground beef, steak, and roast, which have accounted for over 78 percent of random-weight beef purchases since 1998:

$$(1)\ P = \alpha + \beta_1 YEAR + \beta_2 SIZE + \sum_{i=1}^{4} d_i D_i + \sum_{i=1}^{3} f_i F_i + \sum_{i=1}^{3} r_i R_i + \sum_{i=1}^{3} l_i L_i + \sum_{i=1}^{2} q_i Q_i +$$
$$\sum_{i=1}^{13} b_i B_i + \sum_{i=1}^{11} m_i M_i + \mu$$

Where P is price per pound,[4] SIZE is the weight of the purchased cut, the D_i's are dummies for the four sales promotion categories (feature, store coupon, manufacturer coupon, other deal, base=no deal), the F_i's are dummies for the three store types (supercenter, warehouse club, other, base=supermarket), the R_i's are dummies for three of the four regions (South, West, Central, base=East), the L_i's are dummies for percent lean specifications (less than 80, 80 to 89, 90 or greater, base=lean not specified) (ground beef only), the Q_i's are dummies for quality of steak cut (Medium, High, base=Low),[5] the B_i's are dummies for the 12 brands of substance (i.e., those with at least 15 observations and 250,000 pounds purchased in each year) contained in the

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[3]In addition to brand equity, premiums may also reflect high-quality physical attributes.
[4]Unit values were used to approximate average beef prices by dividing aggregate projected expenditures (incorporating any promotions that may have accompanied the purchase, such as store coupons) by the total projected quantity purchased to obtain a quantity-weighted average.
[5]Steak cuts (e.g., ribeye, T-bone, flank) are grouped into high, medium, and low cuts following Parcell and Schroeder, 2007. Other attributes of steak, such as grade, color, marbling, and

Nielsen data set and an "all other brands" category (base=no brand), the M_i's are monthly

dummy variables (base=December), and μ is a random error term. Purchases made prior to 2004

were excluded because there was no information on the type of sales promotion before 2004. A

dummy variable, YEAR, takes the value 1 for purchases made in 2005, and 0 for 2004.

We define four general types of branded beef. For *national brands*, premiums can be derived

from a broader national prominence, greater advertising, and longer presence in the industry

(Parcell and Schroeder, 2007). Other brands are distinguished based on specific requirements

(Washington State Beef Commission, 2006). A *breed-specific* branded beef program selects

beef from a specific breed. For example, Certified Hereford Beef targets Hereford cattle.

Company-specific branded beef is not breed specific, but includes other criteria, such as premium

grade, no antibiotics or hormones, source verified, or grass-fed. Examples include Sterling

Silver, Laura's Lean Beef, and Maverick Ranch. *Private label* brands can be classified into three

general types: generic, no frills, low-priced products; national-brand equivalents (i.e., copies the

national brands, but sold at lower price); and premium, value-added private label that is priced

near or above the brand leader (Rivkin, 2006; Forgrieve, 2007).

Price Premiums for Brands and Other Attributes

Our results indicate that, as expected, unit package size and price promotions had negative

effects on price per pound (table 2). Reductions in price for a 1-pound increase in package size

ranged from $0.12/lb for roast to $0.45/lb for steak. Price discounts varied by type of promotion.

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external fat may also affect price, but were excluded because the Nielsen Homescan panel data

Table 2. Regression results for non-UPC-coded random-weight beef prices, 2004-2005						
	Ground beef		**Steak**		**Roast**	
	Parameter estimate	**Standard error**	**Parameter estimate**	**Standard error**	**Parameter estimate**	**Standard error**
Intercept	2.96*	.012	4.96*	.040	4.18*	.035
Year (base=2004)	.14*	.004	.12*	.016	.10*	.014
Unit size (pounds)	-0.16*	.002	-.45*	.008	-.12*	.006
Price promotions (base=no sale)						
Store feature	-.41*	.005	-.81*	.018	-.49*	.015
Store coupon	-.78*	.012	-1.60*	.036	-1.05*	.036
Manufacturer Coupon	-1.21*	.059	-2.36*	.192	-1.30*	.182
Other deal	-.42*	.022	-.77*	.064	-.30*	.055
Store format (base=grocery stores)						
Supercenters	-.27*	.008	-.68*	.029	.05	.025
Warehouse Clubs	-.23*	.013	.80*	.039	.54*	.035
Other	-.70*	.011	-.73*	.040	-.35*	.037
Percent lean (base=lean not specified)[1]						
Less than 80%	-.19*	.008	---	---	---	---
80%-89%	.11*	.007	---	---	---	---
90% or greater	.69*	.008	---	---	---	---
Steak quality (base=low)						
Medium	---	---	1.53*	.015	---	---
High	---	---	4.03*	.028	---	---
Region (base=East)						
South	-.18*	.005	-.31*	.023	-.14*	.018
West	.10*	.008	-.41*	.027	.02	.022
Central	-.25*	.006	-.61*	.027	-.41*	.020
Brands (base=no brand)						
National brands						
National brand 1	-.10*	.045	N/A	N/A	N/A	N/A
National brand 2	N/A	N/A	.06	.190	.08	.122
National brand 3	N/A	N/A	2.01*	.450	N/A	N/A

does not include this information.

Table 2. (continued)						
National brand 4	N/A	N/A	.36*	.164	N/A	N/A
National brand 5	N/A	N/A	.05	.219	N/A	N/A
National brand 6	N/A	N/A	1.11*	.447	N/A	N/A
Private label						
Grocery store 1	.43*	.035	.21*	.086	.26*	.097
Grocery store 2	.40*	.031	.44*	.098	1.16*	.108
Grocery store 3	.37*	.068	-.44*	.197	n/a	n/a
Club store	.20*	.015	.75*	.064	.37*	.080
Company-specific brand	1.44*	.062	4.15*	.264	n/a	n/a
Breed-specific brand	.57*	.056	.89*	.171	.43*	.111
All other brands	.13*	.006	.31*	.022	.20*	.018
Month (base=Dec.)						
Jan.	-.08*	.010	-.21*	.042	-.55*	.036
Feb.	-.08*	.011	-.18*	.043	-.64*	.037
March	-.09*	.011	-.17*	.043	-.60*	.038
April	-.08*	.011	.06	.044	-.64*	.038
May	-.07*	.011	.13*	.043	-.68*	.038
June	-.06*	.011	.12*	.044	-.70*	.038
July	-.04*	.011	.00	.043	-.65*	.038
August	-.01	.011	-.10*	.042	-.69*	.037
Sept.	-.01	.011	-.06	.043	-.68*	.038
Oct.	-.04*	.011	-.17*	.043	-.68*	.036
Nov.	-.03*	.011	-.13*	.045	-.38*	.041
No. of observations	115,287		87,717		37,851	
Adjusted R^2	.38		.30		.11	
Highest condition index[2]	15.22		15.12		12.62	
White's Test[3]	3076.0		7047.0		1096.0	

N/A=Not applicable. Only those brands with at least 15 observations and 250,000 pounds purchased in both 2004 and 2005 are segregated for analysis.

Notes: Asterisk indicates the coefficient is statistically significant at the 5% level.

Standard errors are from White's asymptotic consistent covariance matrix, which provides heteroskedasticity-consistent test results for parameter estimates.

[1]Ground beef only.
[2]Low condition indices for each regression suggest that multicollinearity is not a problem.
[3]White's test for heteroskedasticity was significant for each regression.

Source: Underlying data from Nielsen Homescan Panel data.

Across all cuts, the largest price reductions compared to nonsale items were associated with

manufacturer coupons, followed by store coupons, store features, and other deals. Except for

other deals, the price discounts were largest for steak, followed by roast, and ground beef. For example, price reductions associated with manufacturer coupons ranged from $1.21/lb for ground beef to $2.36/lb for steak.

Among store formats, the other outlets, including commissaries, mass merchants, and butchers, had the lowest prices for all cuts. Supercenters had lower prices across all cuts compared to warehouse clubs. Ground beef and steak were also priced lower at supercenters compared to grocery stores (base format), but there was no significant difference for roast. Warehouse club ground beef was $0.23/lb lower than grocery stores, but steak was priced $0.80/lb higher and roasts were $0.54/lb higher.

Prices also varied by U.S. geographic location. Ground beef and roast were priced lowest in the Central states, followed by the South, East (base region), and West. Steak prices were also lowest in the Central states, but steaks in the West region were priced lower than the South and East. Steak prices ranged from $0.31/lb lower in the South to $0.61/lb lower in the Central region compared to the East.

Regarding ground beef leanness and quality of the steak cut, ground beef that was 90 percent lean or greater received a premium of $0.69/lb compared to ground beef without a leanness specification. Ground beef that was 80 to 89 percent lean received a smaller premium of $0.11/lb, while that falling in the less than 80 percent lean category was discounted by $0.19/lb. As expected, the high-quality cuts of steak received the largest premium of $4.03/lb compared to the low-quality cuts, exceeding the premium for the medium-quality cut by $2.50/lb.

Beef cuts were priced higher in 2005, and seasonal variation in beef prices was evident. Ground beef and roast prices were generally lower compared to the base month of December. The lowest prices were found from January to June for ground beef, and from February to October for roast. Steak exhibited much more price variation across months. From October to March, and in August, steak was priced lower compared to December, ranging from $0.10/lb less in August to a $.21/lb less in January. Steak prices were $0.12/lb to $0.13/lb higher in May and June.

The 12 specified brands included six national brands, four private label brands, a company-specific brand, and a breed-specific brand. To protect proprietary information, we do not divulge the names of specific brands. For ground beef and roast, only two national brands had significant quantities of branded beef. National brand 1 ground beef was purchased at a discount to unbranded beef, while there was no discernable difference in the price of national brand 2 and unbranded roasts.

On the other hand, five of the six national brands had significant quantities of branded steak. Three of these brands were purchased at a premium compared to unbranded steak, with sizeable differences across brands. National brand 6 and national brand 3 had relatively high premiums compared to most all other branded steak. To qualify for the national brand 3's program, producers must choose genetics that provide non-black hided cattle with specific quality and

yield grade requirements.[6] Cattle supplies are obtained from an alliance between the national

brand 3 company, a breed association, and a marketing services provider. The national brand 3

company was purchased prior to 2004 by a producer-owned "new generation" cooperative.

Members of the cooperative purchase shares that entitle them to deliver one head of cattle for

each share purchased. Producers are rewarded for delivering high quality cattle based on a

"grid" pricing system that prices cattle individually rather than paying an average price for the

entire lot.

Private label brands were more prevalent across all three cuts. Most of these brands were priced

at a premium compared unbranded beef. The lone private label brand that was priced at a

discount was a new grocery store brand, introduced in 2003.

The company-specific brand commanded by far the largest premiums for ground beef and steak.

The premiums exceeded that for the leanest ground beef category and the highest quality steak

cuts. The family-operated beef alliance produces source-verified lines of natural, organic, and

grass-fed beef, using enhanced food safety practices. It was one of the first branded beef systems

to pay producers according to the true value of each animal, rather than paying an average price

for cattle. In 2004, the company contracts with ranches, where the cattle are born, and feedlots.

The company has diversified its product offerings to include buffalo and chicken.[7]

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[6]A quality grade is a composite evaluation of factors that affect palatability of meat (tenderness, juiciness, and flavor). Basic quality grades include Prime, Choice, and Select, with Prime representing the highest quality and Select representing the lowest. Yield grades reflect the amount of boneless, closely trimmed retail cuts. Yield grades range from 1 to 5, with 1 having the highest percentage of boneless retail cuts and 5 havng the lowest.
[7]A strong brand with respect to perceived quality can be exploited by extending the brand to other product categories (Aaker, 1991).

The breed-specific brand premium also ranks in the upper range of premiums across all cuts. Breed-specific brands are often organized as a brand licensing program that typically requires that cattle meet certain genetic requirements (often breed-based), and uses the breed as a proxy for quality. They tend to involve loose contract arrangements with the only requirements being that participants are certified to sell beef under the program name and that the breed of cattle can be verified. Producers may choose to sell all or no cattle through the program, and premiums are generally based on a yield or quality grid.

Next, we use the hedonic price model to examine premiums or discounts associated with specific UPC-coded ground beef brands and other attributes in 2004 and 2005. Ground beef accounted for nearly all UPC-coded beef purchases, increasing from 94 percent of pounds purchased in 1998 to 96 percent in 2005. Steak accounted for most of the remainder---falling from 5 percent of pounds purchased in 1998 to 2 percent in 2005.[8] Equation 1 is specified for the top 20 brands purchased, the private label category, and all other brands (i.e., B_i, i=1 to 22).[9]

Our results show that larger package sizes were discounted, and the two leanest categories received premiums, while the least lean category was discounted compared to no leanness specification (table 3). Unlike non-UPC-coded random-weight ground beef, the largest price discounts were found for store coupons instead of manufacturer coupons, and the South region, followed by the Central states. There was no difference found between the East (base region)

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[8]According to the Nielsen Homescan Panel data, nearly all UPC-coded steak was branded.
[9]In 2005, over 100 UPC-coded beef brand names were contained in the Nielsen Homescan Panel data, compared to 46 non-UPC-coded random-weight brand names.

Table 3. Regression results for UPC-coded ground beef prices, 2004-2005		
	Parameter estimate	**Standard error**
Intercept	2.58*	.027
Year (base=2004)	.17*	.009
Unit size (pounds)	-.12*	.003
Price promotions (base=no sale)		
Store feature	-.18*	.013
Store coupon	-1.12*	.064
Manufacturer Coupon	-.99*	.106
Other deal	-.18*	.066
Store format (base=grocery stores)		
Supercenters	-.09*	.010
Warehouse Clubs	-.12*	.021
Other	-.17*	.024
Percent lean (base=lean not specified)		
Less than 80%	-.32*	.013
80%-89%	.18*	.015
90% or greater	.62*	.017
Region (base=East)		
South	-.15*	.013
West	.02	.019
Central	-.08*	.016
Brands (base=no brand)		
Top 20 brands		
Brand 1	-.37*	.015
Brand 2	-.74*	.022
Brand 2 2005 recall (base=months preceeding 2005 recall)	-.15*	.049
Brand 3	.30*	.021
Brand 4	.19*	.027
Brand 5	.24*	.027
Brand 6	.01	.043
Brand 7 (company-specific brand)	1.11*	.039
Brand 8	.01	.026
Brand 9	.13*	.024
Brand 10	.21*	.025
Brand 11	-.98*	.028
Brand 12	1.33*	.025
Brand 13	.18*	.040
Brand 14	-.01	.039
Brand 15	.16	.091
Brand 16	-.17*	.059
Brand 17	-.11*	.043
Brand 18	.27*	.035

Table 3. (continued)		
Brand 19	.04	.037
Brand 20	-.17*	.032
Private label brands	-.10*	.014
All other brands	.35*	.035
Month (base=Dec.)		
Jan.	-.07*	.021
Feb.	-.08*	.023
March	-.08*	.022
April	-.04	.022
May	-.03	.021
June	-.03	.021
July	.02	.021
August	.02	.021
Sept.	.03	.021
Oct.	.03	.022
Nov.	.03	.023
No. of observations	19,381	
Adjusted R^2	.53	
Highest condition index[1]	17.79	
White's Test[2]	2512.0	

Notes: Asterisk indicates the coefficient is statistically significant at the 5% level.
Standard errors are from White's asymptotic consistent covariance matrix, which provides heteroskedasticity-consistent test results for parameter estimates.

[1]Low condition indices for each regression suggest that multicollinearity is not a problem.
[2]White's test for heteroskedasticity was significant for each regression.

Source: Underlying data from Nielsen Homescan Panel data.

and West. In addition, UPC-coded ground beef was purchased at a slightly greater discount at

warehouse clubs (-$0.12/lb) than supercenters (-$0.09/lb), in comparison to grocery stores.

Prices were higher in 2005, but there was little seasonality as only January through March was

statistically significantly different from December.

There was a wide range in brand premiums and discounts, ranging from -$0.98/lb to $1.33/lb.[10]

Among the brand prices that were significantly different from the unbranded beef price, there

was a nearly equal split between those priced at a discount to unbranded beef and those receiving premiums. Two brands, brand 12 and brand 7, had premiums that exceeded the 90% or greater leanness percentage category. Brand 12, which included natural and Certified Angus Beef® lines, garnered the highest premium.[11] The brand 7 company produces naturally-raised, lean beef.[12] A picture of the company's founder is prominently displayed on the package, invoking images of wholesomeness. Farmers who produce cattle for the program sign a legal contract agreeing to adhere to the company's requirements regarding feed and other management. Bonus or discounts apply to the contract price on an individual carcass basis. Premiums over the cash market are based on the quality, uniformity, management, and location of the cattle.

Price discounts for brands 1, 2, and 11 exceeded that for the less-than-80-percent-lean category. Brand 11 and Brand 2 received the largest price discounts. Brand 11 frozen beef patties target cost-conscious consumers. Over the period analyzed, brand 2 beef patties were voluntarily recalled because of possible E. coli contamination. Following the 2005 recall, the brand price was discounted an additional $0.15/lb.[13]

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[10]In 2005, over 100 UPC-coded beef brand names were contained in the Nielsen Homescan Panel data, compared to 46 non-UPC-coded random-weight brand names.

[11]Certified Angus Beef (CAB) operates as a division of the American Angus Association, which is composed of Angus breeders, to produce high quality, tender, and flavorful beef. USDA inspectors certify the program. Cattle must be at least 51 percent black-hided, along with other carcass specifications. The CAB program does not own cattle or beef at any stage of production or processing. The program sells licenses to processors, distributors, retailers, and restaurants to harvest, fabricate, and sell CAB beef.

[12]Cattle are not given hormones to speed growth, or antibiotics. The beef achieves its leanness through the selection of cattle breeds and a feed program based on grazing and natural feeds. No fillers, additives, or water and salt are added.

Conclusions

Our objective in this paper was to estimate the effect of beef brands and other characteristics on beef prices. In 2004 and 2005, we found considerable variation in brand premiums across brands. Those receiving the largest premiums included branded beef alliances with specific production requirements, including natural, organic, source-verified, grass-fed, and breed-specific.

High premiums for branded beef products suggest incentives may exist for beef companies to enter into strategic alliances to meet consumer demand for specific types of beef products. Public policies aimed at restricting alternative marketing arrangements to spot markets may limit competitiveness of the beef industry. USDA certification of branded beef programs provide one means of facilitating beef quality improvements and the targeting of niche markets.

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[13]To capture price adjustments in brand 2 following the recall, an additional dummy variable was created that equals one for brand 2 purchases made after the recall, and zero otherwise.

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